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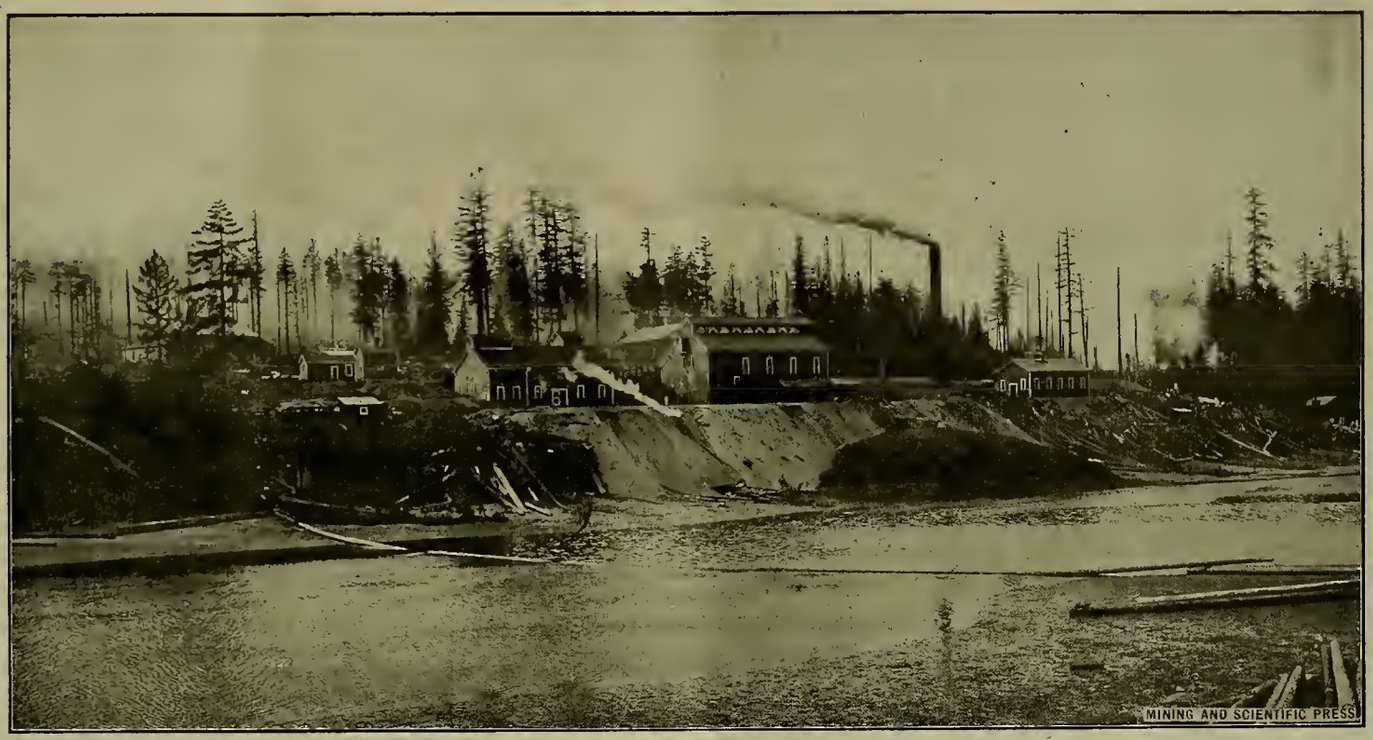
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MINING AND SCIENTIFIC PRESS

Whole No. 2241.—VOLUME LXXXVII. Number 1. SAN FRANCISCO, CAL., SATURDAY, JULY 4, 1903. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Heap Roasting of Copper Ores.

Sulphide ores containing copper are roasted for the purpose of desulphurizing the ore as a preliminary to smelting. This is accomplished by roasting in reverberatory or mechanical rotary furnaces; in stalls or in heaps. The latter is the least expensive, as small plant or none at all is required, but it can only be practiced where no material damage will result to vegetation, as is usually the case in the arid regions of the southwest. Heap roasting is almost as old as the metallurgy of copper. It is accomplished by piling up heaps of the sulphide ores, usually containing a large percentage of iron and sulphur and a relatively small amount of copper, with generally some silica, aluminum, lime and magnesia in the gangue accompanying the ores. This ore is piled upon a layer of cord wood and the whole built up with care, and covered with the finer screenings to make the heap less impervious to draft. In selecting a site for roasting heaps consideration should be given the prevailing direction of the wind, that the fumes may not be constantly blown upon the office buildings, smelting works, etc., of the mine. Heap roasting should be conducted in the most economical manner possible, as a saving of 25 cents per ton of ore means a saving of about $1 on the matte, and much more on the ton of copper. Large heaps can be roasted at less cost per ton than small ones. A pile of ore 40 feet long, 24 feet wide and 6 feet high will contain about 240 tons of ore and should be roasted in this manner in about seventy days. To this should be added ten days for removing and rebuilding. The wood is first fired and this is communicated to the sulphur in the ore, which, taking fire, continues to burn, supplying its own fuel, until all has been consumed. Heaps are sometimes built side by side and the intervening space filled with ore, making one large heap.



Tyee Smelter at Ladysmith, B. C. (See Page 7)



Building Roasting Heaps, Tyee Mine, B. C. (See Page 7)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION.

United States, Mexico and Canada.....$3 00
All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

BRANCH OFFICES:

NEW YORK CITY, 720 Park Row Bldg. BOSTON, 42 Worcester Square.
CHICAGO, 1115 Monadnock Block. DENVER, 606 Mack Block.

J. F. HALLORAN.....Publisher

San Francisco, July 4, 1903.

TABLE OF CONTENTS.

ILLUSTRATIONS: *Page.*

Tyee Smelter at Ladysmith, B. C..... 1
Building Roasting Heaps, Tyee Mine, B. C..... 1
The Redfield Rock Drill 5
Scale in Boiler Tube..... 5
Mining and Metallurgical Patents..... 6
Open Cut, Dewey Mine, Siskiyou County, Cal..... 9
Dewey Mill, Siskiyou County, Cal..... 9
Ajax Drill Sharpener..... 9

EDITORIAL:

Heap Roasting of Copper Ores..... 1
Nevada's Eight-Hour Law..... 2
Mine Taxation 2
The Deadly Fire Damp..... 2
The Silver Market..... 2
Labor Unions..... 2
Timber Land Filings in Plumas, Lassen and Shasta Counties... 2

MINING SUMMARY.....11-12-13-14

LATEST MARKET REPORTS.....15

MISCELLANEOUS:

Concentrates 3
Mining at the Homestake Mine 4
Regeneration of Cyanide Solutions..... 4
Filter-Press Treatment of Gold Ores and Slimes by Cyanide.... 4
Redfield Rock Drill..... 5
Weinland Mechanical Cleaner..... 5
Mining and Metallurgical Patents..... 6
Mount Sicker Mining District, British Columbia..... 7
The Utilization of Furnace Slag..... 8
The Reducing of Zinc Ores..... 8
The Dewey Mine..... 9
Hematite in Spain..... 9
Ajax Drill Sharpener..... 9
The Del Frat Process..... 9
The Crucible Process of Making Fine Steel..... 9
The Cost of Gold Milling.....10
Assaying Cyanide Solutions.....10
Personal 15
Commercial Paragraphs 15
Obituary 15
Catalogues Received.....15
New Patents 15
Notices of Recent Patents.....15

Nevada's Eight-Hour Law.

At the last session of the Nevada Legislature a law was passed making eight hours a day's labor in mines. The law has been generally accepted by mine operators, but some difficulty has arisen between operators and miners over wages. At Dayton, in Lyon county, however, Mr. Phillips, operating a cyanide plant, refused to recognize the law, and worked his men longer than eight hours. He was fined $100 by a local justice, according to the provisions of the eight-hour law, and Mr. Phillips appealed to the District court, which court rendered a decision in favor of Phillips, declaring the eight-hour law to be unconstitutional. This has not tended to simplify matters in Nevada and further trouble is anticipated. Judge Murphy of the District court bases his decision on the State constitution, which provides that no law passed by the State Legislature covering two separate measures can become effective; that had the law been framed as in two separate laws, one affecting underground miners and the other applying to workers in metallurgical establishments, they would both have been constitutional, but as they are now, neither branch can be legally bound by the law. The intention is given no consideration. It is merely a technical point, however, which may be remedied at the next meeting of the Legislature in 1905.

Mine Taxation.

The Cœur d'Alenes, in Shoshone county, Idaho, are in danger of being sold out by the sheriff for nonpayment of taxes. For some time past the greater number of the companies owning and operating these mines have refused to pay the taxes assessed by the county. The county officials have placed an arbitrary valuation on the mines and plants. The companies have paid the taxes on the plants, but say the valuation on the mines is too high. It is expected that a long-fought legal battle will result. The entire trouble is the result of the law passed by the Idaho Legislature at its last session making patented mines pay taxes on an assessment based on the full market value of the property. The larger mines were assessed at $500,000 each. The taxes remaining unpaid, the county has advertised the several mines for sale for taxes in the usual manner.

The Deadly Fire Damp.

Another coal mine horror in Wyoming and the lives of over two hundred men reported sacrificed! This is fortunately not a daily occurrence, and yet it is so frequently similar accidents are chronicled that it seems that some of them at least might have been avoided had the necessary precautions been observed. The mine is at Hanna, on the line of the Union Pacific railroad. Two hundred and eighty-two men were on shift underground when the explosion of "fire damp" occurred, and of these two hundred and thirty-six are reported to be dead, only forty-six escaping, the others being killed outright by fire, concussion or caving roofs, or smothered by the "after damp." Rescuers attempted to relieve their entombed comrades but were unable to live in the dense gases which shut off the life-giving oxygen as completely as water could have done. Human life can endure but a few moments in such an atmosphere. The mine was recognized as dangerous by reason of the large amount of "fire damp" always present, but as the mine was supposed to be well ventilated no unusual danger was apprehended. The primary cause of the explosion is unknown, but it is presumed that one of the miners accidently or carelessly exposed an open light in the gas-laden atmosphere and the explosion followed.

Reasonably it is expected that miners for their own safety would look very carefully after the amount of fire damp present in mine workings and would see to it that a sufficient volume of fresh air was driven into the mine to secure safety, but long accustomed to the danger they became heedless by apparent immunity from harm. An important fact concerning fire damp, and one not generally known, even to many miners themselves, is that the danger from fire damp increases with a falling barometer. A mine where the percentage of fire damp is known, and it is not considered very dangerous, and where, in fact, the usual precautions render it comparatively safe, within twenty-four hours may become extremely dangerous by reason of a large increase in fire damp, due to lower barometer. It is not an uncommon thing for the atmospheric pressure to change by slow degrees and remain high or low for several days in succession, while a radical change may occurs within a few hours. A high barometer—equivalent to heavy atmospheric pressure—has a tendency to retard the flow of methane or "fire damp," and a low barometer, or light atmospheric pressure, seems to permit a more voluminous flow from the vein of coal or rocks inclosing it. Methane is the simplest compound of carbon and hydrogen known, and is the highest gas, next to hydrogen, known. It explodes with great violence when mixed with air when coming in contact with a flame or the electric spark, with the formation of water and carbon dioxide. The water vapor produced by an explosion of fire damp condenses with such rapidity, in fact, instantaneously, that it causes a second explosion, making two explosions following each other in rapid succession. In the event of a mine explosion such as that which has just occurred the men not killed by the explosion, by fire or caving ground, are promptly suffocated if an avenue of escape is not immediately open to them.

In view of the great danger in a gasy mine, and the known fact that the atmospheric pressure is an important factor, it seems that a recognition of this fact, and a consequent provision for sending a larger volume of air into the mine workings during the low barometer might possibly avert such calamities as that above mentioned.

THE silver market seems to have suffered less from the recent transfer of $1,423,000 in Mexican silver by the United States Government than might have been anticipated. This silver was deposited in the National Bank of Mexico, subject to the draft of the United States, in settlement of the Pious award. The silver is to be coined for use in the Philippines. The entire amount of this Mexican silver weighs about seventy tons.

Labor Unions.

The question of labor unions has entered the mining world the same as every place else, and it adds another factor to the problem of the investor as to how he shall get a return on his investment. The thing has been threshed over so much by writers and talkers that a few primary facts seem partially overlooked.

There is nothing new in the movement, though the method of operation is somewhat different from former procedure. Men who have little ambition, and who apparently expect to work for other people all their lives, have concluded that the old Bible story of labor being "a curse" is true, and, accordingly, that the less they work the less cursed they will be, and, meanwhile, the more they can get for what they do the better off everybody will be. The idea is based on a wrong understanding of the primal facts. The dignity of labor, the freedom of the individual man and the joy of useful, honorable, helpful existence is discarded for the dull combination of destroying force which cuts down all degrees of usefulness to the dead level of mediocrity and makes the least skillful man the standard for all the rest. True, the written code of many labor unions provide for high standards of skill in the craft, but it is equally true that the chief requirement is the payment of fixed dues, obedience to rules, and the total surrender and extinction of all individual rights. The chief, and, in cases the only object, seems to be to make demands upon the employer. If these demands are conceded then the union claims it to be a proof of the justice of its demands, regardless of the real facts or how the result was produced.

Usually the demand made is for increase of wages, or shorter hours, or a recognition of the union, the last being the most prolific cause of trouble. Success is more fatal than failure, as it fills the minds of the successful strikers with the idea that an incompetent man is worth as much and should get as high a wage as the competent man, with the result that the ordinary law of supply and demand is thrown over, and the rate of wages paid is not determined by the worth of the man receiving them, but by the demand of his union.

But it must constantly be borne in mind that the relations between the employer and the employe, so far as hours and wages are concerned, are governed by great natural laws over which neither employer nor employe have control—the law of the business world, which pays no heed to the wishes of wage giver or taker. Thus it is that, as regards wages, when times are good wages will advance regardless of the action of miners, and when times are bad no union can maintain a fixed wage scale. Wages advance or decline according to the eternal law of supply and demand, as is proved by the history of labor unions, which shows that in strikes for advance of wages 80% have been successful, while in strikes against the reduction of wages but 20% have been even temporarily successful.

That labor unions are beneficial is not to be denied; that they are susceptible of greater good is equally manifest, and one good way to advance their usefulness is that they be Americanized, that the members of any union recognize the difference between Old World and New World conditions and meet the progress and the spirit of the century by less of that old tyrannical flavor from across the sea, and more of the open, hearty co-operation that is a part of American commercial usage. Any worker in any capacity, whether employer or employe, is deserving of a fair division of the profits arising from the results of their joint labor, and members of labor unions can best secure their stated desire of advancement by ignoring those of their leaders who act in ignorance or defiance of business laws and requirements, and by exercising their own individual common sense and manhood.

PROBABLY as the outcome of the agitation last spring over the extensive timber land filings in Plumas, Lassen and Shasta counties, California, and the repeated charges of fraudulent entries, the Government has withdrawn from entry 272,000 acres in the Susanville, Cal., land office. This tract will be included in the Warner mountain forest reserve. A large portion of the land in that section is covered with fine timber.

CONCENTRATES.

THE man who is right and knows it never offers to compromise as long as he is determined to remain right.

MOST diamond drills are so constructed that they can bore at any desired angle, and the capacity ranges from 200 or 300 to 5000 feet or more, according to size of machine.

LARGE BODIES of soft ore are stoped in various regions, but only successfully underground by some system involving filling, to sustain the overhanging weight of roof—either ore or wall rock.

WHEN heated to about 600° C., aluminum becomes brittle and at a higher temperature becomes soft. Zinc acts in much the same way under similar treatment. Either may be pulverized in a mortar when thus heated.

THE fuel bill at a steam plant can be materially lessened by providing some sort of water heater if one is not already in place. The heater utilized the steam from the engine exhaust. There are several types of water heaters.

ROPE DRIVING is an economical and generally satisfactory method of transmitting power, and may be accomplished by use of either hemp, manila or steel ropes. The sheaves must be suited to the size and kind of rope for the best results.

THE duty per stamp in the mills on the Witwatersrand varies somewhat, but not so widely as in some other fields. The highest "capacity per stamp" reported is at the mill of the Lancaster West, where 5.93 tons are crushed daily per stamp.

EUCALYPTUS WOOD, a native of Australia, but now largely grown in California, is said to make excellent stamp stem guides. There are a great many varieties of this wood, but the red gum is said to be superior for the purpose indicated, requiring a minimum of lubrication.

IN stamp-mill construction care must be taken to prevent grease from getting into the mortars from cams, guides, or elsewhere. Care must also be taken to prevent sand from splashing up from the mortar into the guide blocks, as the grit will cause both stem and guide timbers to cut rapidly.

ORES containing nickel might be sent to the Camden, N. J., Reduction Works. The percentage of nickel which will pay to work, like any other metal, depends upon the conditions surrounding it and the situation. The ore is usually shipped in crude state or made into matte at the mine and this product shipped.

SHAFTS intended for the development and operation of coal mines should be sunk in the same manner as shafts intended for metal mines. If it is desirable to drill an oil well the best plan is to employ an experienced well driller and have the hole sunk by contract at a stated price per foot. Novices in well drilling often find their economy misplaced.

THE reason why some gold-bearing ores do not amalgamate readily is because the particles of gold are coated with a thin film of iron oxide, and consequently are not attacked by mercury. Grinding usually has the desired effect, brightening the gold when it is taken up readily by the quicksilver. This is one of the reasons why the arrastra is a superior device for amalgamating gold ores, particularly those occurring in the oxidized zone.

ALL veins and ore deposits are not associated with igneous rocks, but the greater number and most valuable are. It has also been noticed that where there was a belt of schist, slate or other rock in which gold-bearing veins occur, and where a portion of the veins thus occurring are associated with dikes and the remaining are not, those accompanied by dikes are usually more remunerative than those without them. This is a subject receiving much attention of late from mining geologists.

NO MILL MAN can afford to cling tenaciously to a "pet theory," for an attempt to apply this same theory to a new ore in another district may give unsatisfactory results. The most competent mill men are those who have a wide experience, treating many kinds of ore in many different districts. This sort of experience gives a man broader ideas and he soon is weaned away from his "pet theories," otherwise he must quit milling for some other occupation. Hard and fast rules will not always work in metallurgical processes.

REPLYING to the Dillon, Colo., query, the 125-volt, 12-ampere dynamo can be used to operate electro-magnets for the separation of magnetite from black sand. A single magnet may be built, or a group connected "in series," the size in either case may be such as to take only a part or the entire capacity of the dynamo. If the former, some other resistance must be added into the circuit to make up the difference (either use a series of lamps or a regular rheostat) The electro-magnets are made up of a cylindrical coil of wire wound around a soft-iron core (preferably a bundle of small straight rods rather than a solid core). The coil of wire is connected directly to the poles of the dynamo, except where other resistance is added, which may be on either side of the machine.

MALLEABLE CAST IRON is made of a special composition, cast and softened subsequently by annealing. The principal difference between malleable cast iron and other castings, such as car wheels, is due chiefly to the condition of carbon in each. The tensile strength of malleable castings should be from 42,000 to 48,000 pounds per square inch. It is not considered advisable to run them much over 50,000 pounds per square inch for the reason that the elasticity is reduced thereby, thus destroying one of the most valued properties of malleable casting.

THERE are many types of mortars. They differ chiefly in the width between the back and front discharge. A narrow mortar discharges more rapidly than a wide one; screens set inclining outward from base to top discharge more readily than vertical screens. Most modern mortars are fitted with liners, which, upon becoming worn, may be removed and replaced with new linings. This makes the life of a mortar almost indefinite. The modern mortar, like many other pieces of mining and milling machinery, has been evolved through years of experience and experiment.

GOLD may usually be bought in the Central and South American republics at considerably below its assay value. Most of the placer gold is worth from $17 to $19 per ounce and can usually be purchased at $11 to $12 per ounce in native silver money. As American exchange is only about 50 cents on the dollar, one can practically buy gold dust for about $5 an ounce, but the amount of gold thus obtainable is so small at any one place as to render it inadvisable to undertake any expense in the matter. The most of the gold offered for sale is bought up by the merchants and travelers who chance to learn of the whereabouts of the gold. In Colombia, S. A., platinum is also found with the gold—nuggets weighing as high as 14 ounces having been discovered recently. The value of native platinum varies greatly from $3 or $4 to about $20 per ounce, according to the purity of the grains.

CUPELS are usually made of pulverized bone ash, free from organic matter, ground and washed. Few assayers buy their cupels, preferring to make them. Cupels do not stand transportation nor rough handling well. They are made by moistening the bone ash with just sufficient warm water or stale beer, to cause a quantity of the ash to hold together when compressed in the hand. It should retain this shape when so compressed, but crumble readily when disturbed. Excellent cupels are also made from ground calcined magnesite (magnesium carbonate). The action of the cupel in absorbing lead oxide (litharge) is purely mechanical and not chemical. Experiment might prove that there are other absorbent substances which would make good cupels. While bone ash and calcined magnesite are both good absorbents of lead oxide the cupel must not be oompressed too tightly in the mold, or they will be too dense to work properly.

THE only material difference between a vein cropping which has a red color from one having a yellowish or brownish color is in the fact that the red is due to an anhydrous iron oxide and the yellow or brown color is due to a hydrous iron oxide. If the yellow or brown rock be burned, thereby driving out the water of crystallization, it will become red. The idea that red-colored vein croppings are uniformly of higher grade than those that are yellow or brown is not borne out by the facts. In both cases the color is due to oxidation of the normal ore, which on investigation will usually be found to have been iron sulphide. If the original sulphide was rich in precious metals the oxidized croppings are also likely to contain good values. There may also be gold present in quartz, independent of the iron oxides. The oxidized zones of the Homestake, South Dakota, are deep red; the veins of California are usually yellowish brown. In Arizona they are generally brown, but in some districts are red.

LARGE capacity in stamp batteries is not always synonymous with soft rock. A rock may be so soft as to completely "choke" up the screens, filling the battery and causing much trouble and delay. Some tuffs containing gold or silver act in this manner whenever an attempt is made to force large capacity upon the stamps. At Calico, Cal., some years since, a tufaceous ore could not be crushed faster than four tons per stamp per day, owing to the soft, spongy nature of the rock, but by an admixture of flinty rhyolite or brittle barite ore the capacity per stamp was increased to five and six tons per atamp daily. This was due to the fact that the hard, brittle particles of the rhyolite or barite, and sometimes jasper, cut the soft, pulpy tuff, driving it through the screen, keeping the latter clean. A hard granular ore will pulverize and pass through a screen of given mesh more quickly than hard, flinty ores which have a splintry fracture. Round-punched screens are suitable for the former and slotted screens for the latter rock.

VARIOUS METHODS of extinguishing mine fires are practiced. The most successful methods are tightly closing all openings leading into the mine shafts, tunnels, raises to the surface, etc.; flooding the mine with water; driving steam into the mine workings, and sending large volumes of carbon dioxide (carbonic acid gas) into the mine. The first remedy is a good one but is not always successful, owing to the fact that considerable oxygen reaches the fire through cracks and pores in the rock. The second method is direct and efficient, if the fire can be reached, but it often involves heavy loss from other causes than the damage by fire, disastrous caves often resulting; beside which, the expense of subsequently removing the water is always heavy and requires much time. The injection of steam into the workings is not efficient if the development of the mine is extensive, owing to condensation. Carbon dioxide is usually efficacious when other schemes fail, as the gas penetrates to every corner, driving out the air and smothering the fire as effectually as water would, moreover, the gas can be readily driven out of the workings when the fire has been extinguished.

THE SULMAN-TEED PROCESS of extracting gold from its ores is also known as the bromo-cyanide process. It depends upon the chemical reaction

$$Cy\ Br + 3KCy + 2Au = 2KAuCy_2 + KBr.$$

The inventors of this process claim for it that it is superior to the ordinary cyanide methods in the higher potential of cyanogen. The quantity of cyanogen bromide in solutions is determined by mixture with an excess of potassium iodide, and acidification with hydrochloric acid, during which iodide is liberated as follows:

$$Br\ Cy + 2HI = HBr + HCy + 2I.$$

The amount of iodide is determined by the use of sodium thiosulphate in the usual manner. A plant employing the Sulman-Teed process does not differ from the usual type of cyanide plant. The solution is made up in a single tank, containing about 7% bromide cyanogen, which is added to the ordinary KCy. solution, but an excess must be avoided, as potassium bromide is decomposed during its passage through the zinc. The amount employed should not exceed one-fourth the weight of potassium cyanide present.

TUFF is the name given to accumulations of volcanic ejectamenta on land more or less solidified by rain and surface waters. They are of various kinds, as for instance, quartz porphyry tuff, porphyry tuff, feldspathic ash. These are usually compact "claystone," colored white, buff, various shades of yellow, green, brown and other colors, often including quartz crystals, mica and organic substances. Tuff of this description is often hard and rings like pottery. Rhyolite tuff, rhyolite pearlite tuff, rhyolite pumice tuff and trachyte tuff are abundant in many volcanic regions. These occur as earthy masses of various colors, usually white or grayish. Often quarried and employed as a building stone. It may generally be easily sawn or cut out with an ax, and trimmed to the desired size and shape. Trass is tuff, formed from mud streams due to melting snows or rain. There are also phonolite tuff, andesite tuffs, basalt tuffs, diabase tuffs, etc. These rocks may or may not be stratified. Those deposited on land are usually massive and show little sign of stratification, but there are tuffs deposited under water which are generally distinctly stratified. Such material has been named tuffite, and tuffoid is the name given to tuffite that has been altered by regional metamorphism. In some regions tuffs are the bearers of valuable mineral veins. Silicified tuffs are reported, but are of rare occurrence.

VANADIUM was discovered in 1830 by Sefstroven, a Scandinavian chemist, who obtained the mineral from a specimen of iron ore taken from the mines at Taberg, Sweden. It was subsequently produced in considerable quantity from the slags from the Taberg blast furnaces. Vanadium has a specific gravity of 5.5 and is a light grayish white metal, of silver-white luster. Its reduction from pentoxide to the metallic state is accomplished by heating the oxide in the electric furnace, under the addition of reducing agents. It is insoluble in hydrochloric acid or aqueous alkalies, but is attacked by sulphuric acid and readily dissolved by dilute or concentrated nitric acid. When fused with caustic soda, hydrogen is evolved and sodium vanadate is produced. It is obtained from iron ores containing it by mixing the finely powdered ore with niter and heating the mixture in a fireclay crucible to complete fusion. The cooled mass contains the vanadium compounds in the form of potassium vanadate, which is then treated in boiling water, the solution thus obtained is filtered, nearly neutralized with nitric acid and mixed with a solution of barium chloride or nitrate, to precipitate the insoluble barium vanadate. This is separated from the liquid by filtration, washed with water and decomposed by heating with dilute sulphuric acid. The acid liquid thus resulting is then filtered from the precipitated barium sulphate, neutralized with ammonia, concentrated by evaporation on the water bath and cooled. Solid pieces of ammonium chloride are then introduced into the solution, when ammonium meta-vanadate, soluble in water but insoluble in a concentrated solution of ammonium chloride, gradually separates out after long standing. The vanadate thus formed is then filtered off, washed with a concentrated solution of ammonium chloride, dried and gently heated in an open crucible. Vanadium is often associated with ores of uranium. Vanadium may be recognized by the yellow color given to the salt of phosphorus bead in the oxidizing flame before the blowpipe. Vanadium pentoxide is worth about $1 per pound, the price having fallen since the discovery of considerable quantities of vanadium with uranium ores in Colorado.

Mining at the Homestake Mine.

The Homestake mine at Lead City, S. D., is the largest gold mining enterprise in the world. The original Homestake claim was staked in 1876. It is surrounded hy claims which lie in a helt or zone over 2000 feet wide and more than 10,000 feet long. The properties of the Homestake company include the Homestake No. 2, Giant and Old Ahe, Palmetto, American Flag, Clara, Big Missouri, Highland Chief, Golden Star, Golden Terra, Deadwood, Caledonia, Father De Smet, Justice, Belcher and numerous others. In the passing years these several mines, mostly owned and operated individually, have heen consolidated in groups and finally absorhed hy the central company—the Homestake—until these mines, noted in their day, have to a great extent lost their identity. The principal mines and mills of the group originally were the Homestake, at first with a mill of thirty-five light stamps, which was removed in 1878 and a mill of eighty heavy stamps huilt. This was followed by the Highland Chief with 120 stamps and the Golden Star with 120 stamps; the Caledonia had originally twenty stamps some distance from the mine, but later huilt a 60-stamp mill at the mine; the Golden Terra and Deadwood mines had sixty stamps each. These mines afterward were consolidated and the mills made one by the removal of sixty stamps of the Deadwood to the Terra mill. The Father De Smet had originally ten stamps, hut this mill was torn down and one of 100 stamps built. Many changes have since been made until now the Homestake company operates 900 stamps.

In describing the mining methods at the Homestake the Lead City Call says: The Star shaft was the first sunk hy the company that is now being used, and the only one in the ore hody, properly speaking. In sinking this shaft a station was cut every 100 feet and a level thus estahlished. A crosscut was then driven to the foot wall on each level. These crosscuts are usually 12 feet wide for douhle track. Commencing at 50 feet from the shaft a drift 24x12 starts off the main header, and one on each side of the latter on the north and on the south. These are continued with the ore hody until the latter is exhausted. Sixty feet farther west the same methods are pursued in the several instances until the foot wall is reached. Each level contains a douhle track drift to the Old Ahe shaft. These are used to transport ore from shaft to shaft.

Having blocked out the ore the next step is crosscutting. No. 1 is started ahout 60 feet north or south, as the case may he, of the main header, and is widened to 60 feet.

Timhering in the Homestake is hy the square-set system and sills are employed. These consist of 12 and 6-foot pieces of timber, the latter heing known as "ties." These are laid to form squares every 6 feet. These sills are laid on the floor and the space hetween sets is filled in with dirt. With the completion of these the standing of the sill-floor posts will be 8 feet high. These posts range in dimensions from 18 inches to 2 feet. The caps and ties are then put in place, forming the square set.

Lagging over consists in laying a floor of timher not less than 6 inches in thickness and 5 feet 10 inches in length, from cap to cap. In some instances these stopes extend a distance of ninety sets, and, having 60 feet to hreak to, long holes can he drilled with the machine drills, breaking large quantities of rock. As soon as stoping has progressed upward above the first or sill-floor set to warrant it, timher for the next is placed. This raising up is continued until eight or nine floors have been completed, depending largely on the condition of the ground, when a small raise is run to the next level and the work of filling in with waste is hegun. All that is necessary is to remove lagging, leaving the other timbers standing. When this has heen accomplished to the height attained the remainder of the ore is taken out to the next level. As the ore is hroken it is shoveled into mill holes left in the floor, the ore passing to the ore bins in the lower sets, whence by means of chutes it is drawn into cars for transportation to the shaft.

The next stope is started 60 feet from No. 1, thus leaving a pillar of solid ground 60 feet wide, and as the system is pursued on each level a solid pillar extends clear through, which holds the immense weight and makes mining on this large scale practicable. In time, probably years to come, after the levels have all heen worked in the manner described and the stopes filled with waste, the pillars may he removed, but up to the present time, owing to the immense hody of ore encountered, the cutting of pillars has not been attempted except in a very few instances.

The cost of timhering in square sets per ton of ore varies greatly, hut is estimated to range from 30 cents, under favorable conditions, as to cost of timber, character of ground, etc., to 50 or 60 cents under more expensive and less satisfactory conditions. The variahle cost of lahor also is important, as well as the size of timhers employed. Where very large timhers, as in this mine, are used the timber gang from necessity is larger than where the timbers are relatively small, more men being required to handle the large timbers, which are often 24 inches or more in diameter, weighing upwards of 800 pounds.

Stoping without timher, or the "hull pen" system, as it is called by the miners, is another method of mining these large ore bodies that has been practiced by this company during the past two years. The sills and sill floor timbers are put in one set high as in a timhered stope, and the hroken rock falls between the sets, with the exception of over the lines of track, where the rock is handled hy the carmen. The latter is lagged over and laced on the sides as a protection to the men taking out the rock below. The rock hroken accumulates so much faster than it can he utilized helow that the miners are enahled to work on top of the pile. The upward stoping is continued until not more than 20 feet still remains between the hack and the next level, when operations are suspended, and the rock thus hroken is drawn off. Here again the same methods are pursued as in a timhered stope, viz.: The running of a small raise and filling of waste, after which the remaining rock is removed.

Man-ways for the safety and convenience of the miners and the disposition of air pipes, etc., are provided in the stope next to the pillar. These manways consist of one square set of timber. In order to insure this set standing as the loose rock is drawn out, in addition to the hracing, holes are drilled into the pillar at regular intervals and a strong piece of steel inserted, the outside posts being tied to these by means of wire ropes. Each level contains a great many small raises, prohahly 4½ feet square, from level to level, to permit the escape of the gas and smoke.

The waste rock to fill the stopes is partly supplied by dead work, all the ground thus broken heing utilized for this. But the hulk of it comes from the open cut north of the Star hoist. In several of the upper levels, and as far down as the 400-foot level, raises have heen put through to the surface, and the rock as it is broken falls into these and is drawn out as desired, when it can he hoisted at one of the numerous hoists to the level where it is wanted. Considerable ore has also heen taken from this cut, heing hlasted out after the waste has been stripped from it.

Several years since, when the hoisting capacity of the Homestake was pushed to its utmost to keep the mills going, the estahlishing of ore hins in the mines was undertaken. These hins are started on timhers and widened upward as stoping is carried on to a certain height, when they are narrowed again as the level above is reached, leaving a hole sufficient to dump the ore from above. Each of these will hold 1000 tons of ore, and some more, thus enabling the management to have a reserve supply on hand sufficient to keep the mills running for several days.

The Homestake is not a wet mine as compared with some others, still considerahle water is encountered. The drainage is effected hy means of a large pump situated on the 1100-foot level. A hrick building, 60 feet long hy 20 wide, was constructed in a large chamher cut in the rock for this purpose. The walls are 2½ feet wide at the base and 2 feet at the top, and 10 feet in height. The roof is arched and at the highest point is 18 feet ahove the floor. A hrick building of these dimensions containing 300,000 hricks, 1100 feet below ground, is something unheard of elsewhere. A Reidler pump, with a capacity of 500 gallons per minute, has been installed within the structure and handles the water with ease.

Machine drills, run by compressed air, are used, there being ahout 200 of them.

Something like 150 miles of steel track is laid in the Homestake and eighty-five head of horses and mules are employed. All the main headings are lighted by electricity, as are also all stations. A sawmill at the Highland hoist is kept busy night and day cutting the timher, making wedges, lagging, etc.

The Homestake is now opened up to a depth of 1100 feet. At least 400 men on each shift (night and day) are employed.

The Homestake mine has a record of gold production exceeding $90,000,000. Of this sum $30,000,000 has been profits, $18,000,000 of which has heen dishursed to stockholders in dividends, and $12,000,000 in the purchase and betterment of property. The Homestake alone has paid over $12,000,000 in dividends in 296 successive monthly payments, covering a period of twenty-four years and eight months up to June, 1903.

The operations of the Homestake cover 2 miles on the strike of the lode, with twenty years of reserve ore explored in its territory—equal to 26,000,000 tons—ahove the 1100-foot level, the deepest exploration. The company now operates six stamp mills, with a total of 900 stamps, reducing 3600 tons of ore daily; and two cyanide mills of 800 and 1300 tons capacity, respectively, which treat the tailings from the mills direct. It has five working shafts equipped with steam hoists.

Regeneration of Cyanide Solutions.

In the article written by William Orr, on "Regeneration of Cyanide Solutions," which appeared in the issue of June 20, in the fifth paragraph it speaks of the regeneration of the H_2S from ZnS_2. This is an error and should have read; "The regeneration of H_2S (hydrogen sulphide) from ZnS (zinc sulphide)."

Filter-Press Treatment of Gold Ores and Slimes By Cyanide.

The treatment of finely slimed gold ores by the cyanide or bromo-cyanide process has, during the last few years, caused much discussion and experiment among the metallurgical engineers of this and other countries.

The process of filter-press cyanidation, first used in the Kalgoorlie gold fields of Western Australia for the treatment of the sulpho-telluride ores, has heen so far perfected as to prove the efficiency of the system on finely pulverized pulps, and to demonstrate that close extraction can he ohtained hy this means on talcy slimes.

The systems at present in vogue for crushing gold ores have for their first object the avoidance of the production of slimes—owing to the difficulty of treating the latter—hut it has been found that a stamp hattery or any other system of crushing will always produce a percentage (small or great, according to the character of the ores) of slimes that are not amenable to direct leaching treatment in vats by percolation or natural subsidence.

The decantation system for the treatment of slimes has proved successful on pulps of a talcose nature, but some difficulties have been experienced in the economical extraction of values, owing to the long period required and the heavy consumption of cyanide, the latter due to the excessive period of contact under agitation.

One of the first principles laid down hy Elsner is that "during the process of dissolving gold in cyanide solutions the presence of an oxidizing agent such as air is necessary." This is the underlying principle in the filter-press process of cyanidation.

On the Rand, South Africa, where operations in the percolation process have been conducted on an enormous scale, vats of as much as 900 tons capacity are sometimes employed, and the time required for treatment, including dissolving the gold and the final washing out of the solution remaining in the hed after the gold has heen hrought into solution, is from one to three weeks.

Where single percolation plants capahle of dealing with many hundreds of tons per day are in use, the large size of the plant required can he readily realized. Although the plant seems to be very simple in character, yet, owing to its extent, it is expensive, compared with a filter-press plant of equal capacity.

The latter process for capacity depends largely upon the fact of a high pressure, urged or forced filtration, that accomplishes in a little over an hour the results in extraction that are gained in ten or fifteen days hy the percolation or natural subsidence systems. At this rate a filter press, capahle of dealing with five tons of ore at each charge, would be equal in output to a percolating vat of 1000 tons capacity. This, of course, is in the treatment of slimes.

There are cases where the slimes contain a good deal of sharp sand and are more permeahle, when satisfactory results are obtained by percolation; hut in the case of the filter-pressing system it does not matter how slimy the ore, if proper precautions are taken to produce uniformly permeable cakes, a high percentage of extraction is the result.

If other than uniformly graded sharp sand pulp material is pumped or dumped into a percolating vat, the bed becomes more compacted in some parts than in others, thus leaving some porous and some dense parts. Then when the solvent liquor is pumped on to such percolator with its bed variahly dense and porous, what may he called "short circuiting" takes place, that is to say, it passes readily through the more porous parts of the bed, leaving the more compacted portions untreated, or very slightly acted on, by the cyanide solution.

In the case of filter-press treatment, means are taken to insure the most perfect homogeneity and uniform permeability, or porosity, of the cakes of ore deposited in the chambers of the filter press.

In the filter press of the American Filter Press Extraction Co. of Denver, Colo., a method is provided to secure the required filter bed of uniform permeability. This bed admits of the solution contained in same, both as to dissolved gold and cyanide, being readily displaced without, or with very little, admixture of the wash water.

In dealing with material of slimy character, the percolation process is not advantageous, and the results will be more imperfect the more slimy the material. Percolation is alone suitable for dealing with sharp sands, in which the difficulties of forming a uniformly permeable filter bed are a minimum.

Experience has shown that the most of these materials have yielded readily to the filter-press process and given a high percentage of gold extraction.

In general, with regard to percolation and natural subsidence processes in the treatment of slimes, the principal defects are low per cent of extraction of total gold, owing:

(a) To imperfect methods of hringing the gold into solution.

(h) To short circulting of the wash water through

the more permeable part of the bed or ore; and in the case of subsidence.

(c) To loss of gold remaining in solution in the solvent, in which the particles of ore are suspended at the termination of the process.

(d) Further, the loss of chemicals in both processes by dilution is very great.

A filter press is essentially a high-pressure arrangement of filtration, a forced or urged filtration, acting under hydraulic pressure. In this process there are available from 100 to 200 feet head of liquid against a few feet in the percolating vat. It is also practicable in the case of the filter press to increase the pressure to any extent which may be desired.

The saving of time is a matter of prime consideration. This is accomplished, not only by the high pressure or forcing referred to, but by reason of the shallow filter beds, in compact form, and the extended area of same, resulting from the use of a battery of filter cells.

The chambers of the press can be fed so rapidly that the filtering cells are filled with the cake in so short a time that no subsidence takes place; and the slimes are charged into the filter press in such a state of concentration that subsidence under any circumstances would be greatly retarded.

Another improvement is an increase of the depth of the filter chamber.

It was found advantageous to increase these chambers to two or three inches. This proved to be important, inasmuch as the production of cakes of uniform permeability could never be assured in shallow chambers when working with such freely filtering material.

The cakes require to be built up in the filter cells under pressure in order that they shall be uniformly coherent. When the cakes are built up in this fashion under pressure, it is found that they are much more uniformly porous and homogeneous in character.

For the purpose of expeditiously feeding the filter presses large feed pipes are employed, and a system of forcing by means of compressed air from an air accumulator or storage vessel, in which a considerable volume of air under high pressure is stored.

The next point of importance with reference to securing the production of a uniformly permeable cake is through the mixing of the material before it is delivered into the filter press, so as to secure homogeneous slimes having both the fine sandy portion and the finer slimy portion so mixed together as to be uniform in character. This material when forced into and instantly deposited in the cells of the filter press forms uniformly permeable cakes, filling the battery of cells from end to end of the machine.

Attention has also been paid to the matter of the preliminary solution of the gold in solvent chemicals before treatment in the leaching press. For this purpose two different systems of agitating vats are provided. The first is a special form of mixing vessel by means of which a rapid circulation of the liquid from top to bottom is obtained, thus avoiding any possibility of subsidence and securing a homogeneous mixture of the slimes, as well as the direct contact of the gold with the solvent.

This machine is a circular, comparatively shallow vat, fitted with a central vertical shaft, driven by beveled gear placed either above or below the vat, the vertical shaft carrying horizontal radial arms attached, which revolve in the pulp at a speed commensurate with the size of the vat or amount of pulp to be agitated.

Another device is one in which the pressure tank is used as an agitator.

A worm-shaped or voluted pipe perforated with mall holes is placed through the center of a specially shaped pressure tank, through which air under mesium pressure is forced, giving the pulp a swirling or rotary action, which mixes the whole of the particles and results in a thorough homogeneity of the mass.

In addition to the process of agitation in the latter device, there is added the factor of aeration for the purpose of insuring the presence of a sufficient amount of oxygen to enable the cyanide to efficiently do its work. According to Professor Elsner, what takes place is shown in the following equation :

$$4KCy + Au_2 + H_2O + O = 2\,(KAuCy_2 + 2KHO.$$

(Cyanide Potassium) (Gold) (Water) (Oxygen) (Auro Potassic Cyanide) (Potassic Hydrate)

In the case of telluride and highly arsenical ores, it has often been found necessary to apply a roast before attempting to extract the gold. If such ores are finely pulverized, and no copper present, an extraction of 90% to 98% is often obtained by the filter press without roasting. In some cases where arsenical pyrites in large quantities are present, it may be necessary to obtain a preliminary extraction by concentration.

At some mines there are large accumulations of slimes which have become air dried and are ready for immediate treatment. On the other hand, it is desired to treat slimes as they come from the battery or mill to avoid accumulations.

Accumulated slimes are in most cases in a semi-dry condition, requiring preliminary mixing with water, or solution, to enable them to be forced into the press in pulp form, whereas slimes as they come from the battery can be treated direct. In both cases, the pulps have the liquids eliminated immediately they are forced into the filter press. This is necessary to avoid the loss of chemicals.

In the treatment of dried accumulated slimes, the material to be treated is delivered from the elevator chute into a circular vat containing radial agitator arms, moving at a speed of, say, thirteen revolutions to the minute.

Simultaneously to the discharge of the material into the vat, there should be a pipe conducting weak cyanide solution which will wash the material from the chute of the elevator into the vat. The amount of liquid should be so arranged as to give a pulp containing about 45% solids. The nearer the pulp approximates an equal proportion of liquids and solids the better it is for after reatment.

The mixer is kept charged and working continually, being kept in its normal working condition fully charged.

From the mixing tank the slimes, with the whole of the gold brought into solution in the cyanide, and in a uniform and homogeneous condition, are discharged into the pressure tank or forcing receiver. The pressure tank is specially constructed to contain about two-thirds more than the capacity of the filter press when fully charged. The slimes, on entering the receiver, are agitated with the central perforated pipe agitator, the period of which agitation is variable, according to the composition of the ore. The slimes are then forced by compressed air into the filter press at from sixty to eighty pounds per square inch, according to the character of the slimes.

The time required to charge the filter press is from three to eight minutes, and it is important that a longer time should not be employed for this purpose, in order to avoid any settlement of the slimes in the chambers of the press.

The time employed in filling the machine should be as short as possible. Assuming the operation of charging the filter press with slimes takes five minutes, the next operation of alternate washes of strong and weak solutions under air pressure, and the washing or displacing of the gold-bearing solution from cakes, will require about thirty minutes, so that the whole operation of charging, leaching and washing will take approximately from one-half to three-quarters of an hour. This assumes that the slimes to be worked are of an ordinary porous character. If they are more of a sandy nature, less time will be required; if of a plastic and slimy nature, a longer time will be required, depending upon the condition of the material.

The forcing of the solution and wash waters through the press may be done either through the pressure tank or specially constructed forcing receiver, or by pumps. It is best to have separate zinc boxes for the different strength (strong and weak) cyanide solutions.

The contents of the filter press are then discharged into tip trucks or on to conveyor belts by unscrewing the press and lifting the frames and plates apart. This completes the operation.

The discharging of the filter press and adjusting the cloths for the next working will take from twenty minutes to half an hour. This makes the whole operation of working and filling the press to be about one and a half hours, but, for continuous working, it is found in practice that it is not safe to calculate on less than two hours, so that, with continuous working, the daily output is from ten to twelve charges for twenty-four hours.

An air compressor of suitable capacity and an air receiver are used to work the forcing and washing arrangements. In the treatment of dry slime accumulations it would be advisable to pass the slimes through a coarse screen, prior to elevation into the mixing tank. This will remove the rubbish that invariably collects in all slime dumps (pieces of wood, ashes, stone, bagging, etc.)

This screening of the slimes has proved to be important, as a good deal of trouble has been occasioned on account of rubbish getting into the channels of the filter press.

The whole of the platform and launders leading to the mixing tank should be placed at a suitable incline, to allow slimes to flow quickly away, and a point of importance in mixing the slimes is to maintain a constant relation between the quantities of solid slimes and cyanide liquor.

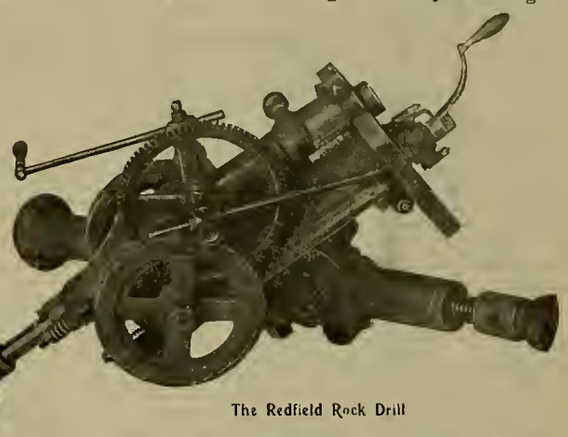
A good plan to determine the strength of the slimes is to use a hydrometer of special construction, and particular care should be taken with regard to this, as otherwise, if the slimes are too weak, the forcing receiver will not hold the charge for the press.

It is of the utmost importance that there should be no stoppage in charging the filter press, but that the whole charge should be blown in with one blow from the forcing receiver.

(TO BE CONTINUED.)

Redfield Rock Drill.

The Redfield hand-power rock drill, as now made, is of steel, each part interchangeable, one machine being a duplicate of the other. Seven-eighths octagon steel will fit the chuck without swedging the shanks. The drill has an extra long double-thread feedscrew, which permits the operator to crank the drill back rapidly and change the steel readily. It also has a universal joint, which by giving one nut a half turn, the drill may be tilted to either side out of the line of the drill hole, so that long steel may be changed without loosening clamp bolts; the drill can be tilted back in alignment easily. It is operated by a rotary movement of a hand crank, without any jar or shock to the operator, by one or two men. It is claimed by the manufacturers that double the work can be accomplished with this drill over hammer and bit with less exertion. The drill delivers 3½ strokes for each revolution of the crank, or from 175 to 275 blows per minute when running at ordinary speed. It has a tension lever, by which one can regulate the blows to strike hard, medium or light without stopping the drill. The machine is supplied with an automatic feed to minimize friction and to enable the operator to determine when his bit is dull or broken, for it will not feed up if the bit is not cutting. The Redfield hand-power rock drill, illustrated herewith, was invented by J. H. Redfield and is manufactured by the Redfield Drill Co., 1606 Blake St., Denver, Colo.



The Redfield Rock Drill

Weinland Mechanical Cleaner.

It would seem unusual that scale would be allowed to accumulate in boiler tubes to the thickness of an inch, yet the Lagonda Mfg. Co. of Springfield, Ohio, reports cases where this much is found in boiler tubes which they are frequently called upon to clean. The cut shown herewith represents one of over 215 tubes in the boilers of a street railway company in the South. The engineers were surprised. The water was bad, and, having use for all the power the boiler would furnish, without any opportunity to shut down, the scale accumulated before they knew it. They were about to cut out the tubes when their attention was called to the "Weinland" mechanical cleaner, which they purchased, and in a short time, with little trouble or expense, were enabled to clean out the tubes without injury to them, leaving the inside in good condition. The firm referred to makes a full line of cleaners for all kinds of boilers, notably the turbine cleaner. In the majority of cases, they say, this turbine cleaner does the work, and they are ready at all times to send these machines on approval. They make a business, also, of cleaning boilers by contract, and will be glad to enter into correspondence with anyone having any inquiry to make about such work. A line to the Lagonda Mfg. Co., Springfield, Ohio, will bring its illustrated catalogue, showing cleaners at work and other interesting matter.



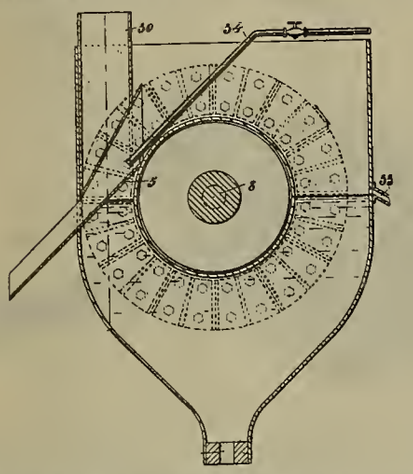
Scale in Boiler Tube.

Mining and Metallurgical Patents.

PATENTS ISSUED JUNE 23, 1903.

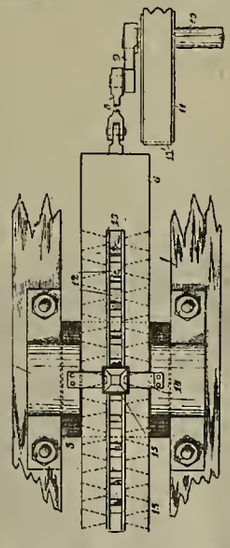
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

MAGNETIC ORE SEPARATOR.—No. 731,443; K. V. A. Eriksson, Falun, Sweden.



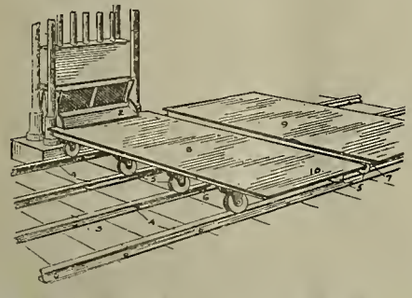
In magnetic ore separator, combination of separating chamber formed by vertical plates, transverse opening in separating chamber, rotatable shaft inserted through opening, means for rotating shaft, electric winding on shaft, means for feeding electric current to winding, two disks rigidly fixed to shaft, number of magnet poles on each disk adapted to run close to walls of separating chamber, feeding channel entering with lower end between magnet poles, and discharge channel for magnetic material traversing feeding channel.

MAGNETIC SEPARATOR.—No. 731,446; A. E. Forsgren, Falun, Sweden.



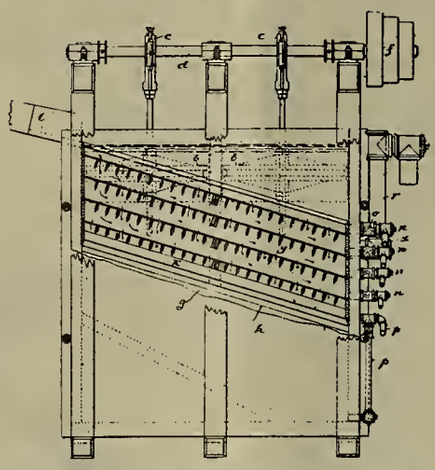
Combination with magnetic ore separator having primary and secondary magnet poles movable in relation to each other, frame arranged to move between primary magnet poles, two rows of secondary pole pieces fixed opposite each other in frame, and intermediate row of openings in frame, each opening arranged between one pair of secondary magnet poles.

ORE-MILLING APPARATUS.—No. 731,634; G. R. Tuttle, Grass Valley, Cal.



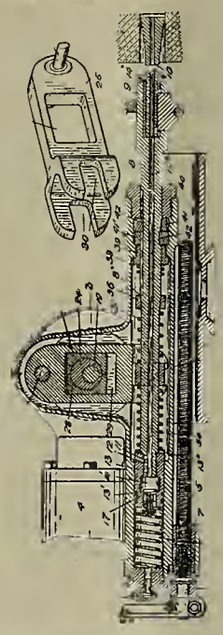
An ore-milling apparatus comprising stamp mortar, discharge lip projecting therefrom, parallel tracks arranged transversely to mortar, independently movable tables working thereon, amalgamating plates carried by table, tables being arranged that movement of one table into field of action forces other table with amalgamating plate therefrom.

APPARATUS FOR SIZING ORES OR FOR OTHER USES.—No. 731,522; S. R. Swain, El Paso, Tex.



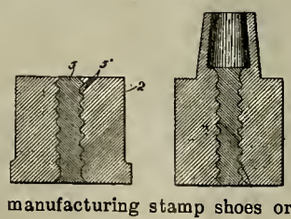
Combination of tank having partition in upper part to form sieve compartment and plunger compartment communicating at lower ends, plurality of differently sized sieves supported one above tbe other in sieve compartment which sieves are closed against entrance of water except through openings thereof, vertically reciprocating plungers in plunger compartment, means for feeding material to be sized and water to upper sieve, and overflow pipe located outside the tank and leading from plunger compartment below normal water level.

ROCK DRILLING MACHINE.—No. 731,569; J. G. Heimrich, Seattle, Wash.



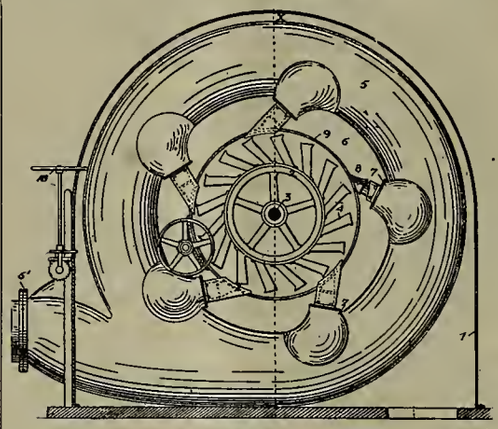
In rock drilling machine, combination with frame having cylindrical body portion, ram reciprocally mounted in body portion, crosshead loosely mounted on ram, spring connections between crosshead and ram, lever pivotally connected adjacent to one end to frame and provided with elongated aperture intermediate of its length, sliding connection between crosshead and end of lever opposite pivotal end, shaft extending transversely through frame, motor secured to frame, and connection between motor and shaft; of a sleeve loosely mounted on shaft and passing through aperture of lever, eccentric integral with sleeve, and positioned within aperture, boxing for eccentric, and means to couple shaft to sleeve.

METHOD OF MAKING STAMP SHOES OR DIES.—No. 731,748; W. Brinton, Highbridge, N. J.



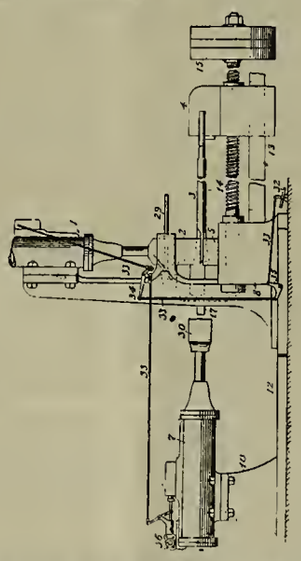
Method manufacturing stamp shoes or dies, consists casting body with heat-equalizing opening, having irregular wall surface, heat treating body by heating and cooling it, and pouring into opening of cooled body molten metal to form plug which as it solidifies, interlocks with walls of opening and owing to contact with cooled wall of opening is toughened;

WATER NOZZLES FOR IMPACT WATER WHEELS.—No. 731,570; G. J. Henry, Jr., San Francisco Cal.



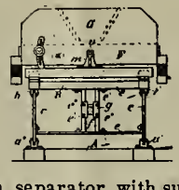
In combination with impact wheel, water nozzle provided with series outlet openings, nozzle tip for each outlet opening, plates secured to nozzle opposite sides of nozzle tips and projecting outwardly to point beyond discharge ends of tips, inwardly turned flanges at free ends of plates, and cut-off slidable between plates and between flanges thereof and discharge ends of nozzle tips.

PROCESS OF FORGING ROCK DRILLS.—No. 731,727 W. W. Word, Soulsbyville, Cal.



Process forging and shaping rock drills, which consists swaging end of drill blank to bring it to flaring cruciform shape having wings right angles and angular depressions between, then swaging terminal portion to condense and shorten wing corners, and finally forming cutting edges of wings by means of endwise blows delivered thereon through suitable appliances from center successively outward, which reduce and draw redundant metal from center outward, fill out corners, and form finished V-shaped solid edges all lying in same plane.

MACHINE FOR SEPARATING ORES.—No. 731,438; D. S. Decker, New York, N. Y.



Combination in separator with supporting frame, oscillating platform arranged over frame, and swinging standards for supporting platform and permitting oscillation, of trunnioned separator bed carried by platform, framework interposed between platform and separator bed and having bearings for receiving trunnions of separator bed, vertical screws provided to platform and arranged for changing angle to horizontal of framework, and dash pots and pistons arranged to cushion oscillations of platform and parts carried thereby.

Mount Sicker Mining District, British Columbia.*

Written for the MINING AND SCIENTIFIC PRESS by W. M. BREWER, E. M.

The early history of the Mount Sicker mining camp has associated with it a considerable amount of luck, because the first discoveries made on that mountain of copper ore were not the result of any systematic prospecting nor the result of the observations made through a geological survey. In fact, so far as the writer can ascertain, this mountain, which is situated in the vicinity of the agricultural district of Cowichan valley, had never attracted any attention other than that of sportsmen until after a timber fire, about 1896, which left a portion of the summit and side of the mountain bare.

Some hunters were attracted by the discoloration of the rocks, and, more to satisfy their curiosity than otherwise, carried away some specimens of the outcroppings, which they had assayed. As it was found that these samples carried good copper values, the attention of some prospectors from Port Townsend and Washington was directed towards the mountain.

As a consequence, several mining claims were located, amongst them the Lenora and Tyee.

During 1898 several prospectors visited the camp, and quite a number of mineral claims were located both on Mount Sicker and Mount Brenton, which is situated to the west of Mount Sicker, the Chemainus river flowing between the two. Until 1899, no really serious attempt at development of any of the claims had been made.

The owners, as a rule, were without any capital; there were no roads to the mountain, and all supplies had to be packed in on men's backs.

During that year the owners of the Lenora mineral claim were successful in securing capital to develop the property, and also in securing aid from the Government to build a wagon road up the mountain. As soon as this road was completed, sample shipments of ore which had been taken out during the progress of development were made to the Tacoma and Everett smelters in Washington. The results from these tests proved so satisfactory that it was deemed advisable by the management to take out all the available ore and ship it, notwithstanding the fact that the freight by wagon haul to the Esquimalt & Nanaimo Railway, at Westholm Siding, added to the railway freight and cost of transportation by steamer from Oyster bay, on the east coast of Vancouver Island, to Tacoma, made the total cost for transportation alone about $5 per ton.

During the winter of 1899–1900 the management constructed a surface tramway with wooden rails from the railway to within about 2 miles of the mine, because the heavy rains made hauling practically impossible over that portion of the wagon road. The policy of continuing to ship all the available ore was continued, and the shipments often exceeded sixty tons of first-class ore per day. The second class was dumped near the mouth of the tunnel, through which the work was carried on.

About a year later the management decided to replace the tramroad by a narrow gauge railroad, built direct from the mine to the same point as where the tramroad connected with the E. & N. Railway.

In December, 1901, the management of the mine made arrangements with Messrs. Breen & Bellinger of Butte, Mont., to build a smelter on the townsite of Crofton, situated on the shore of Oshorne bay, about 11 miles from the mine, and made a contract for the smelting of the product.

In October, 1902, this smelter plant was completed and the furnaces ready to blow in. The plant is one of the most modern in the West, has a total capacity of about 750 tons of ore per day, and converts the matte into blister copper.

About the same time the management of the mine turned the property over to mortgagees and the mining company went into liquidation, after having mined a total tonnage of all grades of ore of 60,000 tons, about 20,000 tons of this being first-grade shipping ore and balance second grade or cullings.

During the time that these events were transpiring with regard to the Lenora mineral claim, the Tyee mineral claim had been acquired by an English company, designated as the Tyee Copper Co. The management of this company pursued an entirely different policy from that followed by the management of the Lenora. This company was organized first with $25,000 cash for a prospecting fund and later with $100,000 cash in the treasury; the management commenced to systematically develop the property, in order to block out "ore in sight," and determine the capacity of the mine, extent of the ore bodies, grade of the ore and its characteristics.

This work was commenced during the spring of 1900, previous to which time a vertical prospecting shaft 200 feet in depth had been sunk, in which was exposed an ore body presumed to be an extension towards the east of the ore body being worked in the Lenora mine.

Mining machinery was installed and sinking was commenced on a two-compartment working shaft in the country rock, about 100 feet or so from the other shaft and within about 200 feet from the eastern boundary of the Lenora mine.

This shaft was carried down 235 feet, or to the same level as was reached by the first shaft, the difference in measurement being the difference in altitude between the collars of the two shafts.

From the bottom of the vertical shaft a crosscut was made in the expectation of intersecting an ore body; but, owing to the fact that the ore bodies are lenticular in structure, the result desired was not accomplished until an upraise had been made some 20 feet, when the lower extremity of a lens of ore was encountered.

The next work done by the management was opening a level 135 feet below the collar of the shaft. A short crosscut was run to the south which intersected ore, and this being continued, an ore body over 30 feet in width was crosscut before the foot wall was reached. Drifting was then commenced and driven both to the east and west along the foot wall.

During the summer of 1902 the management decided to erect a smelter having a capacity to treat about 150 tons of ore per day, at the town of Ladysmith, on the shore of Oyster bay, and on the main line of the Esquimalt & Nanaimo Railway. Because no satisfactory arrangement could be made to haul the ore from the mine to the railway by means of the Lenora narrow gauge, it was decided to install an aerial tramway about 3½ miles in length from the top of Mount Sicker to a point on the E. & N. Railroad about 10 miles from Ladysmith.

During the early fall this tramway was put in operation and an average tonnage of between 3000 and 4000 tons per month have been since transported over it.

In December, 1902, the smelting plant was completed and the furnace blown in. Since then this smelter has been treating an average of nearly 150 tons of ore per day. The matte produced is not converted in the plant, but is at present being shipped to the Tacoma smelter, where a converter plant was installed during 1902.

The development work which has been carried on at the Tyee mine systematically has resulted in there being to-day fully 100,000 tons of ore in sight blocked out above the 200-foot level. In driving to the west on the 100-foot level from that station it was found that the ore body maintained continuity to within some 60 or 70 feet of the boundary between the Tyee and the Lenora, and in driving to the east it was found that, although the ore bodies lay in lenses, these overlapped each other, so that practically the entire 900 feet of drift has been driven through ore all the way, because, although breaks occur between the lenses, yet it has been demonstrated that, whenever the drift has been driven through the barren rock, forming one of these breaks, by crosscutting to the north another lens has been exposed.

By means of upraises driven from this level, it has been determined that practically the same conditions as to structural features prevail when a vertical section is considered, as have been demonstrated to exist when the horizontal section is considered.

By upraising from the 200-foot level it has been determined that the ore bodies apparently maintain their continuity without a break between the 100 and 200 levels.

As the main drift has been driven towards the east and as the summit of the mountain is situated in that direction from the shaft, the backs above what is the 100-foot level at the shaft have increased quite rapidly towards the east, so that under the summit the level of the drift is really 245 feet below the apex of the mountain. The working shaft has been carried down to a depth of 435 feet. The foregoing is a brief history of the development work which has been carried on in the two most prominent properties on the mountain.

The development on other properties has been limited to assessment work, except on the Richard III, Key City and Copper Canyon group of mineral claims. The first named of these adjoins the Tyee on the east, and the development work performed on it has exposed a body of ore similar in character to that mined on the Tyee and Lenora mines. The Key City joins the Lenora on the west, and, although a shaft has been sunk to a depth of about 300 feet and a long crosscut tunnel run, intersecting the shaft at the 200-foot level, yet no ore body of importance has been exposed. The Copper Canyon group adjoins the Key City on the west and comprises three mineral claims and a fraction. This property is situated on the western slope of Mount Sicker and eastern slope of Mount Brenton, having a total length of 4700 feet. The Chemainus river, which flows between the two mountains, crosscuts the formation, and an examination of the bed of the river at low water shows that a mineralized zone exists of considerable width and apparently the same zone as that in which the Tyee and Lenora ore bodies occur. The bed of the river has an elevation about 1400 feet below the summit of Mount Sicker and about 3000 feet below the summit of Mount Brenton. A considerable amount of development work has been done on the Copper Canyon group, consisting chiefly in tunneling; but as the tunnels, although driven for drifts, have been driven in the schist rather than in the ore, it is impossible to express any more favorable opinion than that this group of claims form a promising prospect with possibilities of developing into a mine.

GEOLOGY.—The geological formation of Mounts Sicker and Brenton is quite different from that of most of the mineralized zones on Vancouver Island. Whereas most of the deposits of copper ore on the island occur in the formation classified by the late Dr. Dawson as the "Vancouver series," which comprise not only the entire mass of volcanic rock, but also the crystalline limestones, the deposits on Mount Sicker and Mount Brenton occur in a schistose formation and lack all the characteristics belonging to contact deposits, in which class the majority of the other ore bodies on the island should be included.

The schists on Mounts Sicker and Brenton, in the opinion of the writer, are metamorphosed slates or argillites. They are to some extent graphitic in character and in portions of the belt only partially crystalline. Dikes of igneous rock occur as intrusions throughout the district; some of these are porphyritic in structure, and all, so far as the writer has observed, are felspathic and basic.

The conditions in this belt, so far as the vicinity of Mounts Sicker and Brenton are concerned, indicate a considerable disturbance from volcanic movements during the period when these intrusive dikes were thrown up; that at that time the slates were tilted to an almost vertical angle, considerably contorted and subjected to great pressure, and at the same time there occurred an extensive shearing movement. Slickensides are very frequently met with in the underground workings, not only along the walls which form the boundaries of the ore bodies, but often in seams through the ore itself. As a result of pressure and shearing, wide fissures having lenticular structure were opened, with their lines of strike conformable with the line of schistosity of the country rock. Some of these lenses are quite extensive in width and length, as well as vertical measurement, while others are almost insignificant in their extent.

Development has demonstrated that the widest and most extensive lenses occur at the higher altitudes and on the Tyee and Lenora mineral claims; while on the level of the river, although the crevices filled with mineral are quite numerous, yet so far none possessing such extent as have been opened on the Tyee and Lenora ground have been found. There would appear to be reason, though, why extensive lenses should not occur at deeper levels than have been so far explored by workings. Certainly the movements which produced the schistosity and opened the fissures which have been exploited on the Tyee and Lenora claims were very deep-seated in their origin, and, unless lateral pressure had been evenly distributed at deeper levels and of such force as to squeeze the schists quite closely together, there is no reason to doubt that as equally productive ore bodies will be found in the deeper levels as have been found near the summit of Mount Sicker.

So far as it has been explored, the belt of schist which crosses Mounts Sicker and Brenton extends to the east to the vicinity of Maple bay and to the west an unknown distance beyond the summit of Mount Brenton. In width its exact measurement has not been determined; but locally on the mountains mentioned its maximum width is probably about 1200 feet. There is evidence that west of the Lenora mineral claim the belt of schist has for some distance been pushed over to the south from its general course; but on the Victoria claim, to the west from the Key City, the belt has assumed its normal course, nearly east and west, through that claim across the Chemainus river and into Mount Brenton.

On the west coast of Vancouver Island the Gordon river for quite a distance flows through a similar belt of schist; but whether this has any connection with that of Mounts Sicker and Brenton is a question the writer is not prepared to answer unless he had traced the belt from one point to another.

The occurrence of a wide vein of quartz, which extends across Mount Sicker to Mount Brenton and maintains persistent continuity, is a noticeable feature in studying the geology of the district. So far as the surface indications show, this vein of quartz appears to form the northern boundary of the mineralized zone.

On the Tyee and Lenora claims a second ore body has been exposed in the underground workings to the north of the main ore body. This is a body of quartz ore in which have often been found specimens carrying quite high gold and silver values. Its thickness is variable, and the same rule applies to its values.

The character of the ore mined from the Tyee and Lenora claims is a chalcopyrite, the gangue being pyrite, baryta and zincblende. The ore carries an average of about $5 in gold and 5% in copper (dry), with variable silver values per ton.

The smelting facilities for treating the ores of Vancouver Island are most excellent at the present time, and especially accessible to the various mining properties in the eastern portion of the island.

The smelting and converter plant erected by the Northwestern Smelting & Refining Co. at Crofton, on Oshorne bay, has already been described in detail in many of the technical journals; but the smelting plant erected by the Tyee Copper Co. at Ladysmith,

* See illustrations on front page.

on Oyster bay, (see illustration, page 1), a few miles farther up the coast of the island, has not yet been so described. Therefore the writer deems it proper to give the following description in the present article:

The Tyee Co.'s smelter was built after the plans designed by Thomas Kiddie, the smelter manager, with a capacity of about 200 tons per day; but the power house, smelting shed and dust chamber have been built for a capacity of 600 tons per day; so that only the additional machinery will be required to treble the capacity of the works. The ground between high-water mark and the track of the Esquimalt and Nanaimo Railway has been laid out in terrace form to give a gravity system throughout. The buildings are situated on the 37-foot level above the sea, and have been placed sufficiently far back into the hillside to admit of the installation of a converter plant. Two spurs from the Esquimalt & Nanaimo Railway have been built on the smelter property, entering it on the east—the lower one to the 37-foot level, for the shipment of matte, and the upper to the 51-foot level (the level of the charging floor), for the delivery of coke and coal. At the rear of the smelter buildings, and constructed so that the ore is dumped into ore buggies, on the 51-foot level, are the bins into which is dumped the burned ore, hauled from the roast piles. These bins have a capacity of 1000 tons and are connected with the roast piles, which are situated to the west, by a tramway about 2000 feet in length. (See illustration, page 1)

The machinery for the sampling mill is all on the ground, but the site has not yet been selected—the question being whether it is more desirable to erect it near the smelter or at the roast yard.

The ore is delivered from the bunkers at the terminal of the aerial tramway into bottom-dumping cars on the side track of the E. & N. Railway. From there it is hauled to bunkers at the roast yards, which have a capacity of 1600 tons. These bunkers or bins are furnished with automatic dumping gates and dump the raw ore into tram cars, from which it is dumped onto the roasting piles. The roast yard is arranged very systematically. There are a series of six permanent trestles, placed 60 feet apart and running from north to south. At right angles to these trestles six trenches have been dug, 4 feet deep and 40 feet apart, thus dividing the yards into beds 60x40 feet. In each trench a tram track has been laid and the roast heaps are built up parallel to these tracks, so that when the roasted ore is being removed the men shovel from both sides of the heap into tram cars run on parallel tracks. The trestles are built about 8 feet higher than the floor of the foundation for the roast heaps, and the ore is spread over the beds by means of a traveling bridge, placed between and at right angles to the permanent trestles. This bridge is so constructed as to run on rails and can be moved from end to end of the roast yard at will.

The traveling bridge was invented by Thomas Kiddie, the smelter manager.

By placing the roast heaps so far from the smelter and the town of Ladysmith, all inconvenience and annoyance from the fumes have been removed.

The smelter building is 81 feet in length by 51 feet in width. The charging platform, covered with steel plates, is 14 feet above the furnace floor, and is carried on cast iron columns with concrete foundation. A ventilator, 6x10 feet, extends the full length of the building and gives ample ventilation. The water-jacketed furnace, 42x120 inches, built by the Allis-Chalmers Co. of Chicago, Ill., is provided with fourteen 6-inch tuyeres and stands at the west end of the building. The slag is granulated as it flows from the settler and is carried in a flume into the lagoon.

At the east end of the smelter shed are two matte bins, each with a capacity of forty tons, a bucket elevator, matte sampler, one 7x10 Blake crusher, sample grinder and hoist elevator.

The engine and boiler house are 60 feet distant from the smelter shed and to the east of it; the dimensions are 70x50 feet. In this building are an 80 H. P. boiler of the return tubular type, No. 7 Connersville blower, an Allis-Chalmers (Corliss) engine and an electric light engine and dynamo. The power is transmitted from the power house to the smelter shed by means of a rope drive.

The water supply for the works has been provided by the E. & N. Railway Co., who have constructed a storage tank on the west side of their track, which is supplied through a flume 1 mile in length from the head of Rock creek. The railway company has since constructed a flume 4 miles in length in order to take the water supply from a source which has never been known to fail during the hottest and driest summers, and thus insure the smelter company against having any difficulties to contend with.

The assay office is located to the east of the smelter and has a frontage of 46 feet. It is divided into three rooms, with a furnace room 20x16 feet in the rear. In the furnace room is a 30-foot stack divided into four compartments, while on either side are located the muffle furnace of the most improved type and a sand bath with a hot-air oven; all are fired from one side, while the openings are in the assay and analytical rooms, respectively. In front of the stack stands a melting furnace, 16 inches square inside measurement, which is used for experimental purposes.

The Utilization of Furnace Slag.

Written for the MINING AND SCIENTIFIC PRESS by R. SCHORR, M. E.

Considering the mere enormous amount of slag made in metallurgical processes and the difficulties and expense which its disposition in many locations necessitates, in course of years, the subject of utilizing this waste product is of great economic importance. The products made from furnace-slag possess superior qualities and they are used to a large extent in the smelting works themselves, and find also a ready sale in cities and surrounding settlements.

The slag from iron furnaces of various descriptions is of predominant importance, and its composition is very similar to that of a hard fusible glass. It is a safe estimate to assume that in European iron making, for every ton of pig iron produced about one ton of slag is obtained, while in American practice it will be nearer to half a ton of slag per ton of iron. Estimating the American iron production alone to be 16,000,000 tons per year, about 8,000,000 tons of slag would be available. The most important and valuable slag products are slag bricks, slag cement and metallic. The casting of slag bricks and blocks is an old established practice, but the bricking of granulated slag on a commercial scale is of a more recent date, i. e., its thorough practical and financial success is of a more recent date. In the year 1859, the Georgs-Marienhutte Co. at Osnabruck started a slag brick plant, using lime mortar as binder and hand forms for molding. The bricks were fairly good, but their manufacture too slow and expensive. With the improvements in ordinary brick presses conditions changed somewhat, but the quality of the bricks still remained not quite satisfactory, as unslacked particles of lime were present in the mixture which slacked afterwards in the brick. This disadvantage led to the closing of the works, but their manufacture was resumed in 1890 with slag cement as a binder. The new process proved a complete success, which is illustrated by the fact that the production of slag bricks at Osnabruck increased from 5,000,000 in 1893 to 15,000,000 tons in 1898. The manufacture of such pressed slag bricks is very simple and about the same whatever binder is used. The slag discharging from the furnace is granulated by a stream of water which is running with high velocity through a narrow trough, forwarding it at the same time to a settling pit. The further arrangement may be to scoop the slag up by means of a bucket elevator and to discharge it into bins, wherefrom it may be drawn into hopper railroad cars to be forwarded to the briquetting plant. While in the bins and cars a large amount of the water drains off. The granulated slag is mixed with a slag cement in a proportion of one to eight, and the mixture is conveyed to an intermittent acting plunger press. The pressure is exerted from one side only and about 1000 bricks are made per hour. The bricks are sharp cornered and can be stacked without injury after leaving the press. Their hardening is affected by the atmosphere and after three or four months they are ready for use. They harden with age, as the chemical combination between the slag and the cement gets more complete, gaining also in compression strength, which already after a few months is about 1400 pounds per square inch. Slag bricks are in every respect as good as clay bricks. Their specific gravity is in the neighborhood of 2.6, i. e., about the same as an ordinary brick. They are grayish white, but by adding ochre or ultramarine to the mixture very nice color effects are created. As long as the bricks are not very hard, i. e., not very old, they can be cut and shaped quite easily for special purposes (profile bricks). As their resistance against high temperature is considerable, they are used in the construction of stacks and for boiler setting very extensively. They are not more hydroscopic than well burned clay bricks, but as they permit of a more thorough air circulation they are very valuable for the construction of hospitals and schools.

The total production of slag bricks cannot be ascertained; it must be very considerable, however, as nearly every modern European iron works manufacture slag bricks, and a single concern in Lothrinzen (Lorraine) turns out over 50,000,000 annually. In the granulating of slag it is advisable to have not less than 12 to 30 feet head of water, and the launder should have a pitch of 1 inch to the foot. It is a good practice to build the launder of slag bricks and cement, as every other material would wear too rapidly. For every ton of slag about two and one-half to four tons of granulating water are required, depending on the specific gravity of the slag, which varies from 2.5 to 3.5. In re-using the water a loss of 5% to 20% should be figured on.

In the manufacture of slag cement the granulated slag is disintegrated further by means of tube or ball mills, and the fine powder thus obtained is thoroughly mixed with slacked lime [$Ca(OH)_2$ Calcium hydroxide]. The slacked lime is prepared in the usual manner by adding to the burnt lime (quick lime) just sufficient amount of soft water to make it crumble into a fine white powder. The mixture of the disintegrated slag and the slacked lime powder must be thorough to give a good cement, and as it should be protected from access of the air to prevent the absorption of carbon dioxide, it has to be put into casks right away. The ratio between slag and lime powder varies according to the composition of the slag, and it must be established by careful experimenting. The qualities of a good slag cement are very similar to those of the best Portland cements or cements made by mixing slacked lime with Puzzolan or Santorin earth, Trass, etc. By adding 20% to 30% of water it hardens quickly to a stonelike mass, and after four to six months it is equal to the best of cements in strength. For hydraulic construction work it is not quite as good as Portland cement. A mixture of sand and broken stone makes a very good concrete. One cement plus 2 sand plus 4 stone equals 4.4 concrete, 1 plus 3 plus 6 equals 6.6 concrete, and 1 plus 4 plus 8 equals 8.8 concrete. The stone should not surpass 2½ to 3 inches ring size. The compression strength is sometimes as high as 500 kilograms per square centimeter, or about 7000 pounds per square inch, and the tensile strength is about 10% of this.

As slag bricks have a rather rough surface, the mortar adheres to them very readily and very little of it is required. Their manufacture is cheaper than the manufacture of ordinary bricks, as the expense of burning is avoided.

A composition of broken slag, slag sand and Portland cement is called metallic, and it forms a very good material for plastering streets, sidewalks, floors of factories, smelters and railway stations, in fact anywhere where the traffic is heavy. Steps and stairways are also made in this manner, and to give them a smooth surface only cement and slag sand should be used for the first few inches of depth. The usual volumetric proportion is two parts of slag and one slag-sand and one Portland cement mixed mechanically in a dry state. Water is added to make it plastic and then it is tamped in layers of 4 inches in thickness. An addition of soda speeds the hardening, and a street made in such a manner can be turned over to the traffic all ready after twenty-four hours. Sometimes single plates of 3 feet by 3 feet are made of metallic and joined by slag sand and Portland cement. In this case the ground underneath has to be very solidly tamped to prevent uneven settling and cracking.

The Reducing of Zinc Ores.

The production of zinc from its compounds involves difficulties due to the very electropositive nature of that metal, or, to put it into more modern terms, on account of the high value of the energy of combination of zinc compounds. In electrolysis this means the use of such high voltages, that other undesirable reactions take place for which that voltage is more than sufficient. In aqueous solutions, for instance, hydrogen is liberated much more easily than zinc. Such processes are, therefore, of special interest; all the more so as the electric methods have not yet come into use as much as might be expected.

In a recent article in the Electro-Chemical Journal, Danneel describes several zinc processes which were worked out at the metallurgical laboratory of the Institute of Technology of Aix-la-Chapelle. They chloridize the raw ore in the presence of salt solutions, such as sodium chloride and magnesium chloride, in revolving iron drums, lined with lead, at a temperature of 30° to 40° C., by means of free chlorine, obtained in another part of the process. The chlorides of lead, zinc and silver are then leached out with hot water or hot dilute lyes, obtained during the process. The following data of a test are given: 1000 kg. ore contained 140 kg. lead, 310 kg. zinc, 0.69 kg. silver. There were chlorinated and leached out 140 kg. lead, 175 kg. zinc, 0.11 kg. silver. In the residue there remained 135 kg. zinc, 0.53 kg. silver and 114 kg. sulphur. After the extraction of the sulphur, there remained a residue of 39.1% zinc and 0.168% silver. From the residue, the sulphur is removed by Schaffner's method under steam pressure.

The chloride lyes are purified by means of zinc oxide or roasted zinc ore, evaporated to dryness and dehydrated as completely as possible. The dehydrated mixture of chlorides is then electrolyzed in a fused state, and at the anode the chlorine gas is obtained which is used in another step of the process, as mentioned above; while at the cathode a mixture of molten lead and zinc is produced, which is obtained in two alloys—lead poor in zinc and zinc poor in lead. From the lead which is poor in zinc, the zinc can be removed by steam; the zinc which is poor in lead is refined by distillation.

The second process described was devised by Borchers and Von Kueglegen, and is for treating waste from zinc galvanizers. This waste is dissolved in hydrochloric acid to saturation. The iron is removed from the solution by means of chloride of lime and other oxidizing agents; it is then evaporated to dryness in iron crucibles lined with lead. The pulverized zinc chloride is mixed with metallic oxides—for instance, copper oxide and calcium carbide—and is then melted to zinc alloys—brass. The reaction between zinc chloride, metallic oxide and calcium carbide goes on by itself, owing to its own heat of reaction, after the reaction has been started

by means of an incandescent body; but to obtain good metal it is necessary to heat the crucible.

The third process described was devised by Dorsemagen, for the treatment of siliceous zinc ore, especially if the percentage of zinc is small; zinc and silicon carbide (carborundum) are produced. An electric furnace is used. A mixture of carbon and siliceous zinc ore is heated in the furnace by a carbon rod; the zinc is distilled off, and there remains silicon carbide. The reduction temperature of the silica is only slightly above the distillation temperature of zinc.

The fourth process described is by Borchers and Dorsemagen, and is analogous to the last described. It is used for the treatment of ores containing iron and zinc, in order to get ferrosilicon and iron. The process differs from the last one only in so far as ferrosilicon, instead of silicon carbide, is obtained.

The Dewey Mine.

The accompanying illustrations are of the Dewey mill and open cut on the vein. The mine is in Siskiyou county, Cal., near Gazelle. The mine is extensively developed by tunnels, several levels having been opened. The ore is largely mispickel, containing gold. The vein is said to carry about $9 per ton, beside which there is a large amount of ore of lower grade. The mill contains ten stamps, two Frue vanners, two Wilfley tables and hydraulic classifier. There is also a canvas plant and cyanide works. The premises are lighted by electricity. There is an air compressing plant and machine drills are used in the mine. Water power is said to be available to run the entire plant. The Dewey mine is one of the important mines of Siskiyou county.



Open Cut, Dewey Mine, Siskiyou County, Cal.



Dewey Mill, Siskiyou County, Cal.

Hematite in Spain.

According to a recent report, says the London Mining Journal, within the last year a rich vein of oxide of iron ore has been discovered near the city of Jaen, in the province of that name, about 85 miles from Malaga. The Compania Mineralurgica, the firm owning and operating the mine, has estahlished a plant on the outskirts of this city, where the ore is refined and prepared for export.

The owners claim that this deposit is the only one of consequence in Spain, a small mine near Santander being its sole rival. The ore is known as hematite, or sesquioxide, and those interested claim that it possesses a durability of color and the other properties necessary for the manufacture of red paint not excelled by any other mine in the world.

The ore is shipped both in its crude state and refined ready for mixing with oil. Levigation is effected by submitting the crude ore to the process of grinding by stone crushers. It is then forced through filters of purified water and finally dried in kilns. The result is a fine red powder, which mixed with a trifle more than 10% of linseed oil, produces paint ready for use. Iron structural work of all kinds is usually protected by a coating of this paint. The Malaga product was invoiced at 50 pesetas per short ton of crude, and at exactly double that price for the levigated or prepared material. At present, however, the ore finds its largest market in England.

Ajax Drill Sharpener.

The Ajax drill sharpener shown in the accompanying cut is a power machine for fashioning and resharpening machine drills. To sharpen drills by this means it is necessary that the drills be placed in a coke forge of large capacity (the common forge will not heat drills fast enough for this machine), and when it is at the right heat it is placed under the upright hammer, which sidesets and pinches out the edges to a sharp cutting edge. The drill is then placed in the dies in the upsetting machine, the dies are closed on the bit and the dollie, which is held in the chuck, is allowed to strike the bit until it has been upset enough, when the tailblock which holds the drill to the dollie is allowed to run back, when the dollie will drive the bit into the die, which finishes the bit to the exact size of the die. These dies are made in the different sizes required. The advantage of having drills made in a die can be readily seen, for they are then all correctly gauged, for example: Say that the die for a starter bit is 2½ inches wide, every drill that is made in this die will be 2½ inches wide when it is finished, and so it is with every other size, the dies control the gauge.

The manufacturers of the Ajax drill sharpener claim that, even though the mine has only 100 drills to sharpen each day, this machine will pay for itself in the time saved and the saving in wear and abuse that the machines get under ground from inaccurate drill sharpening. It is as easy, they say, for a crew of sharpeners to sharpen 600 drills each shift with this machine as it is for them to sharpen 125 by hand. In one instance the saving in the shop alone amounted to 75% over handwork, to say nothing of the saving underground.

The peculiar feature in the making of these machines, they say, is that no two mines use the same system for making drills, and it is, therefore, necessary that the manufacturer knows every detail of the system at each mine. To illustrate, at the Homestake mines a starter bit is 2¾ inches wide, at the Alaska-Treadwell mine it is 2½ inches wide, at the Jumper mine in California it is 3 inches wide, at the Tamarack and Kearsarge mines in Michigan it is 2¼ inches wide, and so on. It is different at each mine, and of the twenty of these machines now running no two have dies just alike. In order to make these machines standard it would be necessary that almost every mine would have to change their entire lot of drills, which, it is claimed, would cost more than this machine. Then again, some mines have hard rock which requires one kind of a bit, and others have soft rock which again requires another kind of a bit; some mines have both hard and soft rock, so require dies for the different kinds of rock. This machine is sold by Harron, Rickard & McCone, 21-23 Fremont street, San Francisco, Cal.



Ajax Drill Sharpener.

The Del Prat Process.

It is expected that some time will elapse before the working tests of the Del Prat salt-cake process of sulphide treatment, which are being carried out at the Broken Hill Proprietary mine, are completed. The Australasian states that the cost of the chemicals used in the process for the crux of the position has yet to be determined. The plant used in the tests will cope with at least one ton of material per hour. Six of the pans could treat about 1000 tons weekly. The cost of the plant must be moderate compared with the machinery necessary for other processes at work on the field in connection with the zinc problem. Briefly described, it consists of a copper pan, 6 feet long by 3 feet wide, with sloping bottom, below which a number of gas jets are placed. At the end are the settling pits for the product, and below the pan is a boat or small bin, into which the accumulated waste falls. Under this again is a larger bin. There are two tanks, a primary mixing tank, in which the saltcake is dissolved, and another elevated lead-lined tank for the solution in active use. The liquor which carries the concentrates to the settling bins flows by means of launders to settling tanks below the trucking floors, from which a steam pump raises it to the initial storage tank. The plan is simple in its working, and evidently does not require very delicate handling to secure good results.

[Crude sodium sulphate is known as salt cake, andis utilized to make a liquid of high specific gravity. In this the pulverized mineral falls, the zinc blende ascending to the surface, where it overflows into a tank, the gangue and other sulphides being recovered later from the separating tank.—Ed.]

The crucible process of making fine steel, says Sparks From the Anvil, will probably never be superseded by other methods. Selected irons with their "medicines" are melted in crucibles which are luted and sealed, where chemical reactions take place unseen and unaffected by outside influences. For securing high quality, accuracy of what the steel maker calls "temper," there is no substitute process in sight. When steel has been overheated the property called temper is destroyed. This may in a measure be recovered by careful manipulation.

The Cost of Gold Milling.

The difficulties in the way of comparison of the total cost of extraction in various gold fields of the world, says S. Horsley in the Queensland Government Mining Journal, are:

First. The nature of the power used—e. g., water power is much cheaper than the most effectively applied steam power. If steam power is used, the relative cost of fuel must be taken into consideration. Extraction is much less costly where coal is obtained easily and cheaply than where indifferent firewood costs 30s. per cord.

Second. The nature of the material to he crushed. Hard material is not so easily crushed as a soft or friahle material. A custom battery putting through 4 tons per stamp per day for one mine finds itself unahle to put through more than 2 tons per stamp for another mine. Here the nature of the material causes one mine to pay twice as much for crushing as another mine.

Third. The numher of operations or processes necessary for a complete extraction.

Where coarse gold only occurs in an easily pounded quartz in close proximity to ample water power the cheapest conditions possible for almost complete extraction are realized. But the case is exactly reversed where gold occurs in minute particles locked up in or combined with other suhstances which are hard and resisting, and which occur in waterless areas, where inferior fuel costs 30s. per cord.

Under favorahle conditions, such as the occurrence of large deposits, requiring an extensive milling plant, the total cost of extraction might he as low as 9d. per ton in the former case. Yet the most efficient machinery comhined with the most approved methods of treatment have failed to hring down the total cost of extraction so low as 10s. per ton, or thirteen times as much as in the latter case.

The way out of the difficulty is now apparent. Since the total cost of extraction necessarily varies so largely, we are unahle to derive any useful information from a comparison. A great deal can he learned, however, if, after the hardness of the material has heen defined according to some prearranged standard, the cost of fuel per indicated horse power per ton and the cost of each separate operation or process is separately recorded.

It is also natural to expect a hattery of 100 heads to crush more cheaply than one of 10 heads. But a company which finds 10 heads a sufficient numher to erect on their mine cannot he said to lack economy. Although an examination of the cost of extraction hy the various gold milling plants of the world reveals a wide divergence, yet the divergence is not so marked when the cost of each separate process is considered.

At Chiapas, Mexico, the cost of milling the soft ore there is only 9¾d. per ton of 200 pounds, with a 10-head battery having 750-pound stamps. The cost of the power is not taken into account, as water power is used. The Alaska-Treadwell Co., Douglas Island, Alaska. with 540 stamps, crushed and concentrated for 9¾d. per ton in 1900. This company's costs for total extraction—milling, concentration, chlorination, smelting and office expenses—were:

Year Ending—	Quantity Treated. Tons.	Value per Ton. s.	d.	Total Cost Extract'n. s.	d.
May 31, 1899	250,408	10	10	2	1
May 31, 1900	557,960	8	4	1	6¾
May 31, 1901	457,802	8	3	1	5½

Their total costs for mining and milling for the same periods were 5s 1½d., 3s. 7¼d. and 4s. 4d. per ton, respectively.

The Alaska-Mexican Co., at the same place, with 120 stamps, crushed and concentrated for 1s. 2d. per ton in 1899. They put through during 1899 166,054 tons, valued at 8s. 7½d. per ton, for a total cost for mining and milling of 7s. 1d. per ton. The total extraction costs were 1s. 11½d. per ton of 2000 pounds.

The Homestake Co., S. D., crushed nearly 900,000 tons for the year ending June 30, 1900. The total milling costs were 3s. 4d. per ton and the total mining costs 10s. 9d. per ton, a grand total of 14s. 1d. per ton. For the year ending June 30, 1901, the Homestake Co. mined and milled 934,373 tons, valued at ahout 16s. per ton, for a total cost of 14s. 8d. per ton, thus making a profit of nearly £63,000 out of ore of a quality that is practically despised in Queensland. There are large deposits of low-grade ore, similar in character and value to that mined hy the Homestake Co., and superior to that mined hy the Alaska companies, in parts of Queensland as yet harely touched hy the miner.

The milling costs of the De Lamar M. Co., Idaho, for the year ending March 31, 1899, were 9s. 3¾d. per short ton.

The total cost of mining and milling at the following mines for the period ending with the date given is as follows:

Year Ending—	s.	d.
Dec. 31, 1901—Montana G. M. Co., Mont.	36	10½
June 6, 1899—Montana G. M. Co., Mont.	23	6¾
1899—Mill at Bend'Or, B. C.	21	4
Aug. 8, 1901—Morro Velho Mines, Brazil	25	8
Dec. 31, 1899—New Elkhorn M. Co, Mont.	66	10

The milling costs—or total cost of extraction—of the last-named company at the date given was 39s. 7d. per short ton.

There is thus a wide difference hetween the 9¾d. per ton of the Alaska-Treadwell Co. and the 39s. 7d. per ton of the New Elkhorn G. M. Co.

In Western Australia the Lake View Consols crushed and cyanided for 10s. 1½d. per ton in 1898, and for 6s. 10½d. per ton in 1899, hut the extraction was unsatisfactory when sulphides came to he dealt with. For these other methods were adopted, and on August 31, 1900, the cost of extraction was 43s. 5d. per ton. This amount was reduced to 32s. 10d. per ton during the last three months of 1900, and was still further reduced in 1901 to 28s. 3d. hy the adoption of the Diehl process.

At the Great Boulder Perseverance mine the costs of extraction were 34s. 11½d. in 1900, and 24s. 10½d. per ton in 1901.

At the Ivanhoe mine, Kalgoorlie, during November, 1902, the reduction costs were set down at 10s. 4d. per ton; mining, 14s. 3d.; general, 3s. 5d.; development and capital, 6s. 2d.; total 34s. 2d. per ton. The question here is, what part of the general expenses is connected with the process of extraction?

At the Kalgurli mine, for the same period, the total mining and crushing costs were 38s. 5d. per ton—presumahly a short ton in all Western Australia instances.

At Mount Morgan, Queensland, the cost of dry crushing for 1900 is given as slightly under 4s. per ton.

At the New Ravenswood, Ltd., Ravenswood, the total cost of mining and milling their refractory ore is (1902) 38s. 10d. per ton—2240 pounds. The works here, however, are not yet complete.

The Brothers' mill, Ravenswood, cart and crush hard mineralized quartz for 15s. per ton, and dyke stuff for 8s. 3d. per ton, Carting in the former case costs 1s. 6d. and in the latter 9d. per ton. Concentration hy Wilfley tables is included, hut not cyanide.

The Commonwealth mill at Donnyhrook for similar treatment charges 16s. per ton, viz., 2 for carting and 14s. for crushing, etc.

The cost of crushing, concentration, grinding and smelting of concentrates at the Imperial mine, Charters Towers, for the half year ending Novemher, 1901, was 9s. 8½d. per ton of 2240 pounds. Their total mine, hattery and office costs were 28s. 4¾d. per ton.

The usual charges for carting and crushing at the Charters Towers mills are as follows:

	Per Ton. £	s.	d.
5 tons or under	5	00	0
Over 5 tons and up to 25 tons	0	14	6
Over 25 tons and up to 50 tons	0	13	6
Over 50 tons and up to 100 tons	0	13	0
Over 100 tons	0	12	6

Carting costs variously up to 2s. 3d. per ton, all of 2240 pounds. These prices, though apparently high, leave a very small margin of profit. Numerous small crushings for the public cause much loss of time and require a large numher of pits for saving the tailings, also entail considerahle extra cost of cleaning up. If a mine, owning its mill, could keep it fully supplied, the crushing, concentrating and grinding costs would prohahly not exceed 7s. 6d. per ton.

The cost of crushing and concentration only at some of the mills is stated to he not much over 3s. per ton. Grinding and the drying and hagging of concentrates necessitates this amount, and further expense is entailed by cyanide treatment or smelting.

The exact cost per ton at Charters Towers of a 5-ton lot or a 1000-ton lot does not appear to he known, and in high-grade districts like Charters Towers and Ravenswood there will always he numerous small lots raised, and there must he custom hatteries to treat them.

As regards the duty per stamp per twenty-four hours in various parts of the world, nothing can he done in the way of a correct comparison unless the hardness, etc., of the material to he crushed is first compared with some standard. Even within the limits of Charters Towers and Millchester variations in the hardness of the material affect the rate at which it can he crushed. At Ravenswood one party of trihuters has to pay the mill owner nearly twice as much as another party has to pay owing to the difference in the character of the material crushed. It may he said that the hest mills at Charters Towers and Ravenswood crush rather over 2 tons per stamp per twenty-four hours of very hard mineralized quartz, and they will crush 4 tons per head per day of softer stuff, and each ton of 2240 pounds—not 2000 pounds.

Most of the mills at Charters Towers have high pressure steam, compound condensing engines, rock breakers, self-feeders, etc., and are not hehind hand in adopting the latest gold or mineral-saving device if it suits the ore which occurs in the gold field.

COMPARATIVE TABLE OF GOLD MINING AND MILLING COSTS.

Year Ending	Name of Mine or Mill.	Annual Tonnage (2000 Pounds)	COST PER TON OF ORE. Power	Crushing and Concentrating	Cyaniding or Chlorination	Smelting	Administration	Total Extraction cost	Total Mining Cost	Grand Total	Average Stamp Duty per ton 24 Hours
				s. d.	s. d.	s. d.	s. d	s. d	s. d.	s. d.	
.....	At Chiapas, Mexico	.....	.....	0 9¾	.....	.....	.....	0 9¾	.....	.....	.....
May 31, '99	Alaska-Treadwell	250 408	.....	1 1	Ch.	0 3	.....	2 1	3 0½	5 1½	3
May 31, '00	"	557.960	.....	0 9¾	.....	.....	.....	1 6¾	2 1½	3 7¼	3 to 4
May 31, '01	"	457 802	.....	.....	.....	.....	.....	1 5½	2 10½	4 4	3 to 4
'99	Alaska-Mexican	166,054	.....	1 2	Ch 1½	.....	.....	1 11½	5 1½	7 1	3
June 30, '00	Homestake	891.585	.....	.....	.....	.....	.....	3 4	'0 8	14 0	.....
June 30, '01	"	934,373	.....	.....	.....	.....	.....	.....	.....	14 8	.....
Mar. 31, '99	De Lamar, Idaho	.....	.....	.....	.....	.....	.....	9 3¾	.....	.....	.....
June 30, '99	Montana G. M. Co	.....	.....	.....	.....	.....	.....	.....	.....	26 6¾	.....
Dec. 31, '01	"	.....	.....	.....	.....	.....	.....	.....	.....	36 10½	.....
'99	Mill at Bend'Or, B C	.....	.....	.....	.....	.....	.....	.....	.....	21 4	.....
Aug. 31, '01	Morro Velho, Brazil	.....	.....	.....	.....	.....	.....	.....	.....	25 8	.....
Dec. 31, '99	New Elkhorn, Mont	.....	.....	.....	.....	.....	.....	39 7	27 3	66 10	.....
'98	Lake View Consols, W. A	.....	.....	.....	.....	.....	.....	10 1½	.....	.....	.....
'99	"	.....	.....	.....	.....	.....	.....	6 10½	.....	.....	.....
'00	"	.....	.....	.....	.....	.....	.....	43 5	.....	.....	.....
								32 10	.....	.....	.....
'01	"	.....	.....	.....	.....	.....	.....	28 3	.....	.....	.....
'00	Gt. Boulder Perseverance	.....	.....	.....	.....	.....	.....	34 11½	.....	.....	.....
'01	"	.....	.....	Dry cr'sh 4s	.....	.....	.....	24 10½	.....	.....	.....
'00	Mt. Morgan, Ltd., Q	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Nov., '02	Ivanhoe Co., W A	.....	.....	.....	.....	.....	.....	10 4	.....	34 2	.....
Nov., '02	Kalgurli Co., W. A	.....	.....	.....	.....	.....	.....	.....	.....	38 5	.....
'02	New Ravenswood, Ltd	2240-lb. ton	.....	.....	.....	.....	.....	.....	.....	38 10	2 to 4
Nov., '01	Imperial, Charters Towers	2550 t'ns half yr.	1.11⅛	3 10⅞	.....	3 4¼	1 4	9 8¼	18 8½	28 4¾	2
.....	Charters Towers Mines	"	.....	.....	6 0?	.....	.....	.....	.....	.....	2 to 4¾
.....	Ravenswood mines	"	.....	.....	.....	.....	.....	.....	.....	.....	2 to 4

Assaying Cyanide Solutions.

To the Editor:—In your issue of June 6, W. H. Davis of the Idaho Gold Coin M. & M. Co., Bear, Idaho, comments upon "Assaying Cyanide Solutions" hy a method mentioned hy A. H. Jones of the Smuggler-Union, Telluride, Colo.

Have used practically the same method as Mr. Jones, hoth in this country and in South Africa, hut have never experienced the discrepancy mentioned when the other part of the work was looked after with the same care as the assaying of the solution.

Have checked up the clean-ups extremely close with this method on low-value solutions where the lead-tray method gave varying results.

Can see no reason why there should he any more loss due "to the infusihility of zinc silicate or loss hy suhlimation with zinc during the assay" than there is in the assay of zinc ores. The assay of this precipitate gives a heautifully fluid slag.

There might he a loss due to incomplete precipitation, as Mr. Davis suggests, or it might he a mechanical loss due to incomplete filtration. This, it would seem, is ohviated hy the method I have used, which differs from that of Mr. Jones in this particular: The litharge used for assaying is added before filteriug; also, some milk of lime and soap solution are afterwards added. These, mechanically, take everything out of solution, clarifying it and leaving a precipitate that readily filters. The solution will run through the filter ahout as fast as it can he poured on. The assay, then, is finished, as Mr. Jones states.

Maiden, Mont., June 10. C. T. Durell.

Mining Summary.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

Alaska-Treadwell G. M. Co. at Douglas May returns show the 240-stamp mill ran 29½ days and the 300-stamp mill 23½ days, crushing a total of 72 889 tons of ore, for bullion valued at $68 974, and 1640 tons sulphurets, valued at $90 476. Working expenses for month, $53 313.

F. M. Stone, manager of the Alaska Treasurer Co., reports he will start further development work on the group on the lower end of Douglas Island.

Placer mines on Slate and Silver creeks, Windham Bay district, are reported running 10 cents to 15 cents per pan. Several quartz properties are being worked.——The Yellow Jacket Co. is putting in machinery and expect to increase development.——The Jennie Reid G. M. Co. report work progressing.

At the Alaska-Juneau mine, in Silver Bow Basin, near Juneau, forty-five stamps are dropping. Three machines on day and two on night shift are breaking ore. The company has fifty men at work.

Near Ketchikan, preliminary work on building a smelter has been started by the Brown-Alaska Co., says Manager P. Johnson.

The Crystal G. M. Co. is dropping five stamps at its mine in Snettisham district, says Manager B. Hines. The ore bins are filled with milling ore.

Manager P. Early of the Bessie G. M. Co., operating at Yankee Cove, reports the foundation down for the 2 mile wagon road and the sawmill cutting lumber for the planking. The stamp mill machinery is being taken in.

O. E. Sauter, speaking of oil in Alaska, tells the Alaska Dispatch one of the oil fields extends northwest from Yakatago to Valdes, a distance of 125 miles, and the other extends from Valdes southwesterly along the Alaskan peninsula to Chigik bay, a distance of 150 miles. There are oil indications in all of this district. At Catalle there is one well producing, and at Iliamna there are several wells down. Two rigs have been started at work at Cold bay, one by A. Castella of Buffalo, N. Y., and the other by J. Cary of Washington.

The Oil Reporter says it is estimated that 1000 men are in the Alaska oil fields, and that during the summer 5000 are expected to be on the ground.

ARIZONA.

COCHISE COUNTY.

A 10-stamp mill will be built by the Golden Era M. Co., near Bisbee, and the plant is expected to be in operation by Aug. 10.

The Duluth & Pittsburg Dev. Co. has been incorporated at Calumet, Mich., to operate near Bisbee. The directors are C. Briggs, P. Rappe, J. S. Dymock, C. A. Conger, G. E. Tener, C. d'Autremont, J. Hoatson, T. F. Cole and T. Hoatson. The company has a shaft down 200 feet and development work will be continued.

At the Twilight mine, near Bisbee, the machinery has been placed in position, says Superintendent Parnell, and when the hoist is in position the shaft will continue sinking. Compressed air drills will be used.

E. C. Bartlett of Dillon, Mont., has bought the Rider group of copper claims near the Burns group, owned by the Chiricahua Dev. Co., in the Chiricahua mountains, near Douglas, and will begin work this month. One claim of the group has a showing of copper ore at depth of 80 feet in a shaft, the bottom of which is all in ore assaying 16% copper and with some silver and gold, says the Douglas International.

Development on the Amole No. 1 of the Martinez G. M. Co. group, in Yellowstone district, north of Benson, is confined to a tunnel being driven to cut the ledge at depth of 250 feet. The tunnel is in 170 feet, and expected to cut the vein at 230 feet. The open cut above the tunnel has shown the vein to be 2 feet in width, with values running $80 per ton. Work on shaft No. 8 is down 40 feet and shows a ledge of 2 feet of free milling ore.

MARICOPA COUNTY.

The Arizona M. & Dev. Co. are operating the Ryland lead and silver mine, near Wickenburg.

It is reported the 10-stamp mill on the O'Brien mine, near Wickenburg, will be enlarged by addition of twenty stamps. A hoisting plant will also be put in.

At Wickenburg, T. Elder, W. S. Rees & Co. expect to blow in their 30-ton water-jacket smelting furnace next week.

MOHAVE COUNTY.

(Special Correspondence).—The Tennessee mine at Chloride is in silver-lead ore of good grade in the drift on the 600 level. The Elkhart mine and mill are both in operation. The mill is handling 100 tons daily. The Minnesota mine and mill have been idle of late, but W. J. Cleeland, president of the Philadelphia & Arizona M. Co., is expected from Philadelphia, when it is expected work will be resumed. Ore in some parts of the mine is looking well, the vein is of good size, and carries forty ounces silver. The Samoa mine, operated by Hoffman Bros., continues in rich shipping ore. Some of this ore carries 2000 ounces silver to the ton, one and one-half ounce gold and 1% to 8% copper. The principal work is on the 350 level. The Lucky Boy mine, adjoining the Samoa on the north, belonging to T. B. Scott and others of Chicago, Ill., is working twenty-five men. Ore from this mine is being packed to the railroad by jack train and shipped. During June four carloads were sent out. It is locally reported that work on the Pinkham mine is to be resumed. The mine is owned by the Schee Bros. of Santa Monica, Cal., who have developed it while extracting a large quantity of low-grade ore. The mine is thoroughly equipped. J. Barry has let a contract for the sinking of the 140-foot shaft on the Sunrise mine 100 feet deeper, and the steam hoist has been overhauled. The Sunrise ore is low grade. The shaft so far, in sinking, is all in ore. The Payroll mine will be worked again, say J. M. Murphy and I. M. Hawkins of Kingman, owners. The work to be done will consist mainly in developing the lesse formerly opened up, also in sinking of the shaft deeper and driving a crosscut for a parallel vein, which shows good surface croppings. The mine has an abundance of water. The silver discovery by J. Carroll, near the Juno mine, is being developed, the vein of ore showing 2 feet wide, and assaying fifty ounces silver.

Chloride.

YAVAPAI COUNTY.

The B. B. mine in Cherry Creek district, near Cherry, 15 miles south of the United States group, which has been shut down for four years, will be reopened, says Manager De Keuhn.

CALIFORNIA.

AMADOR COUNTY.

At the Gover mine, near Amador City, the framework on the mill is finished and the machinery is being put in.

CALAVERAS COUNTY.

The Dunharton Castle mine and the Homestake mining claims, near Railroad Flat, have been bonded to L. M. Rucker of San Jose, who will begin operations next week. He will drive a tunnel into the hill and expects to strike the vein at depth of 500 feet.

The 120-stamp mill of the Royal Con. M. & M. Co. at Hodson is expected to start up next week, says the Citizen.

Last week at the Purinton gravel mine, 4 miles from Angels, the 1100 foot tunnel was finished. The tunnel tapped the channel near the old workings, in which a great deal of water had collected. No more work will be done until after the channel is drained, says Superintendent F. Purinton.

EL DORADO COUNTY.

The Bryan roller mill at the Game Cock mine, Webber Creek district, near Placerville, was started up last week. Work continues at the Mammoth mine across Webber creek from the Game Cock, the tunnel being in 291 feet. They have a 16 foot ledge; both properties are being developed by the Rustler M. Co.

The El Dorado G. & C. M. Co. has made final payment of $10,000 on the Eureka and Woodside quartz mines, near Georgetown. The company has also bought the Modoc, the Van and the Bilger quartz mines adjoining the Whiteside and the Eureka. A steam hoisting plant will be built. In addition to the gold quartz mines the company owns the Ford copper mine on which development work continues.

The 10-stamp mill at the Jasper mine on Webber creek, near Placerville, is in operation, and in the mine they are drifting on the 100-foot level.

FRESNO COUNTY.

At Coalinga, H. H. Brix, manager of the Coalinga Con. Water Co., has taken an option on the Barker section of oil land.——Additional ground has been bought by the Rhode Island-California Oil Co. and work will be begun this month.

KERN COUNTY.

The Southern Pacific R. R. Co. is reported to have bought forty acres additional of oil lands at McKittrick from the Alta Oil Co. for $2000 per acre. There is one producing well finished on the land and the railroad is expected to drill another, starting operations this month.

The Metropolitan Co. has incorporated at Bakersfield, to operate in oil and mines, with principal office at San Francisco; F. C. Drew and H. Bernard of Alameda, C. B. Gillespie, F. Hall and J. G. Weir of San Francisco.

NEVADA COUNTY.

Electric machinery for the Brunswick mine, near Grass Valley, is on the ground. The insulated electric cable for the main shaft is 1250 feet in length and weighs 1430 pounds. The three electric pumps have a capacity of 1200 gallons per minute. The work on the 16x16 duplex compressor is finished.

The Grass Valley Con. mine at Grass Valley has been sold to J. M. O'Brien of San Francisco. G. W. Root is manager of the company which has been working the mine under bond. He says development will be increased.

The Centennial mine on Osborn hill at Grass Valley is reported sold to G. W. Root, manager of the Grass Valley Con. M. Co. In addition, Manager Root also bought for his company the Dewey, Electrum and Pinnacle mines.

The Zeibright M. Co. has been incorporated at Nevada City to operate the Zeibright mine south of Grass Valley and near the Placer county line. F. Zeitler, W. F. Englebright, J. J. Jackson, F. Searls and J. Spaulding are directors. Work is in progress at the mine putting up buildings and an air compressor and the tunnel will be driven ahead.

The Potosi Orleans M. Co., operating the Federal Loan mine in Willow valley, near Nevada City, have put in three more machine drills. As soon as repairs are made the 10-stamp mill will be started.

PLACER COUNTY.

The Chicago mine, near Penryn, is being reopened by H. B. Hilgeman of St. Louis, Mo., with J. M. E. Manley of Penryn as superintendent.

The Hidden Treasure M. Co., operating the Hidden Treasure drift mine at Centerville, has 20 men at work.

PLUMAS COUNTY.

H. Gobert, part owner of the Crown Point mine on Squirrel creek, 12 miles from Quincy, reports their 10-stamp mill, on a ten days' run on seventy-five tons of ore, working nine hours a day, produced ninety-eight and three-fourths ounces of gold, valued at $2000.

Operations were begun at the Claybank tunnel, near Laporte, last week, says Superintendent D. Corbett. Two shifts are driving to tap the channel.

SAN MATEO COUNTY.

At Half Moon Bay, at 1520 feet, the Paxton Oil Co. report striking stratum carrying 50° gravity oil of a light color.

SANTA BARBARA COUNTY.

An oil well has been brought in near Careaga Rancho, in the northern part of the county, the first flow being at the rate of thirty barrels per minute, say the reports. Oil shut 50 feet above the top of the derrick. The depth of the well is 2000 feet.

SANTA CRUZ COUNTY.

(Special Correspondence)—J. Enright is operating the Stribling mine, about 5 miles northwest of Santa Cruz. The mine until recently had been idle for many years, though at one time equipped with a mill. The formation is granite and a vein of quartz reported to have been rich was discovered and worked to shallow depth when the vein pinching work was discontinued. Mr. Enright is doing development in search of new ore bodies.

Santa Cruz, June 30.

SHASTA COUNTY.

At the Conner gold mine on Salt creek, near Redding, a shoot has been opened up in the main vein. The streak was struck in the drift being run from the hanging wall of the main vein and 100 feet from the mouth of the drift. The tunnel being run on the hanging wall of the main ore body will be driven ahead 800 feet, cutting a series of veins. The last or most westerly will be cut at depth of 500 feet from the surface.

The work of rebuilding the dredger of the Detroit-California Dredging Co., destroyed by fire, on Clear creek, near Horsetown, near Redding, has started this week, says President Heintz. The total loss was $80,000 and $30,000 insurance was held.

SIERRA COUNTY.

Operations have been resumed at the Kenton mine, at Alleghany, says Superintendent A. Fitzgerald.

The Wild Boar mine at Gibsonville is putting in machinery, including an electric plant, to furnish power to sink the incline to show the depth of the channel struck last month.

SISKIYOU COUNTY.

At the Blue Ledge group of copper mines on Joe creek, near the Oregon line and near Jacksonville, Or., Superintendent J. P. Harvey says a smelter will be built. The group is owned by P. Clark and M. Kingsbury of Spokane, Wash.

Hadley & Co., who have a bond on the Parks placer ground at Yreka, have placed a pump with engine and boiler for drainage of same while sinking shaft and hoisting pay gravel from bedrock.

TRINITY COUNTY.

At the Three Peaks mine, on Battle creek, in Coffee Creek district, near Carrville, owned by the Three Peaks M. Co., operations have been resumed, the snow having melted sufficiently. G. Hurst of Redding, superintendent, is putting in additional machinery, and the mill is expected to be ready for the stamps to drop next week.

TUOLUMNE COUNTY.

(Special Correspondence)—The old Golden City mine, near La Grange, is in operation after an idleness of many years. Naylor Williams is opening the mine under bond and is prospecting for new ore bodies by means of crosscuts, and is reported to have made important discoveries.

La Grange, June 29.

Superintendent W. P. Miller, at the Keltz mine, near Columbia, has sixteen men at work and five stamps are dropping in the mill. Prospecting is being done farther to the north along the line of the lead.

More men have been put on at the Mazeppa mine, near Stent, making twenty men at work. The 10-stamp mill is running steadily.

Development work is progressing at the Shoenberg mine, near Groveland, says Superintendent Dale. A crosscut at depth of 80 feet shows the vein to be 7 feet between walls. Drifting is being done east and west on the vein. It is proposed to put in a hoist and continue explorations to greater depth.

YUBA COUNTY.

Machinery is on the ground for the gold dredgers building at Camptonville. They will operate along the North Yuba river, handling the sands and gravel as well as the tailings from the hydraulic mines. The prospecting drills have shown pay dirt on the bottoms of the old channels.

COLORADO.

BOULDER COUNTY.

The Montgomery M. & M. Co. of Colorado Springs, owning fifteen acres of land at Ward, has decided to build a cyanide mill to handle the tailings from its 10-stamp mill. The mill is handling thirty tons a day, concentrating twelve into one. Tables are used. The company has developed the mine to depth of 240 feet by two shafts and two tunnels. The ore is free milling. R. Mullen of Colorado Springs is president.

CUSTER COUNTY.

Lessee Murphy of the Vanderbilt mine, near Custer, is putting in machinery. In one of the open cuts has been started a shaft that will tap the ore body.

CHAFFEE COUNTY.

The Independence mine at Turret will have a 50 ton leaching plant, work on which has started. It is expected to be ready by August 1. The principal values are in copper.

FREMONT COUNTY.

The Keystone Oil Co. near Florence struck oil at depth of 1700 feet in well No. 6 last week. This oil body will produce twenty barrels per day, but as a larger supply exists 1000 feet lower, the hole will be deepened.

The Portland Cement Co. has men at work in its gypsum deposits at Coaldale, which have been opened up so that fifteen carloads are daily sent to the cement factory, 6 miles east of Florence.

GILPIN COUNTY.

C. S. Palmer of Kansas City, Mo., owning the Sarah Jane mine, in Pine mining district, near Central City, says the Sarah Jane has been consolidated with the Mackey group, owned by L. J. Mountz. Arrangements have been made to build a mill of thirty tons daily capacity at the junction of Elk and Pine creeks.

Omaha, Neb., men, interested in the Electric Spark G. M. Co., have taken the Shamrock group, near Russell Gulch, under lease and bond and have put up a shaft building and a steam plant of machinery. The main shaft is 350 feet deep and is being retimbered. J. C. Martin is manager.

The Blue Grass M. Co., near Central City, will build a stamp mill this summer, says R. L. Parish of Leon, Iowa, president and manager of the company. It will be a 10-stamp rapid-drop mill with 800-pound stamps, and will use table concentrators. It will be on the millsite owned by the company on Beaver creek, and 1700 feet distance from the mines. Water is coming in at the Lone Star mine and the 200 gallon water skip in order to handle 30,000 gallons each day has to be used steadily for six hours. The company will put in a pump.

T. K. Brooks has a lease and bond on

the German and Phœnix claims in Phœnix district, near Central City, and is arranging to put up a hoisting plant on the German.

W. H. Myers & Co. have a lease and bond ou tbe Gold Anchor mine midway between Perigo and Wide Awake. There is a tunnel in 300 feet which will be retimbered and 600 feet of track put in.

The Edna G. M. Co. has its concentrating plant, below the junction of Russell and Lake creeks, near Russell gulch, in operation. Water for the plant is pumped out of the Edna tunnel. The ore is coming from the Mida G. M. Co.'s ground, operated by the same parties, with E. C. Miles superintendent of both mines and the plant.

GUNNISON COUNTY.

Operations on the Hercules and Ajax lodes at Elko are under way. Development work so far shows a vein 4 feet in width and assaying $2 in gold, 26 ounces in silver and 4% copper.—The Elk Basin M. Co. reports work progressing on its group of claims in Elk Basin, near Irwin.—The North Pole M. Co. continues development on its group in Crystal district, near Elko. Copper ore is showing.

The Mono mine, near Pitkin, is in operation by J. M. Gardner & Co., who hold a lease from the Mono M. Co. They have low-grade ore contracted for from several properties, also there is an ore body showing in the Mono tunnel, which will be treated at the mill. The Mono tunnel is in 500 feet. — Ore is being taken out of the Jessie and Hill Top mines by T. Stanley for treatment at the Mono mill. There are 2½ feet of mineral showing that runs $16 per ton in gold. The pay streak in the Hill Top is a foot in width and runs $25 per ton. — The Whig Co. continues development work. Its shaft has passed through a stratum between the oxide and sulphide zones.

At Vulcan, the Dubois Tunnel Co. last week crosscut the Pride of Denver vein for 50 feet, and at a depth of 450 feet, says W. S. Chenoweth, of Davenport, Iowa, manager. Chenoweth is also interested in the Davenport and Adair group in the same district, on which two tunnels are being driven to cut a series of veins. When these veins are developed sufficiently to warrant a heavy output, a concentrating plant will be built.—The Headlight M. Co. is sinking its shaft near Spencer, which is down 180 feet, and it will be continued to 200 feet before the first level is run on the vein. The vein has been followed from tbe surface, and carries values in gold, says Superintendent Ehlerding. — Progress is being made in sinking the Good Hope shaft. It is down 500 feet, and will be continued farther before the level is run into the ore shoot.

HINSDALE COUNTY.

(Special Correspondence). — For some time the large mines around Lake City have been contemplating tbe erection of a smelter to handle their ore. D. A. Farrell, manager of the Red Rover mine, is at the head of the project. The smelter will be built during the summer at Gunnison.

Lake City, June 29.

JEFFERSON COUNTY.

The Clear Creek M. & R. Co. reopened its smelter at Golden last week after a shut down of three months, on account of repairs and difficulty with the union. By a compromise the labor trouble has been settled. The company intends to build a refinery.

LAKE COUNTY.

Leadville advices estimate the output of the camp for the month of June at an average of 2800 tons a day, and in July this is expected to be increased to 3000 tons. The most of this will come from the Coronado and the Ibex mines, as the shaft of the latter company is being connected with the Yak tunnel. Tbe Western M. Co. is shipping 500 tons daily, and next week this will be increased to 650 tons. Tbe ore is coming from the Wolftone, Midas, A. Y. and Minnie. The pumps at the Wolftone are raising 1000 gallons of water per minute.

The Leadville-Oro M. & L. Co. will begin operations next week to develop the ground between the Carbonate fault and the Bon Air and P. O. S. mines at Leadville. This includes tbe Oro and the O'Donovan Rossa claims. It is intended to sink a shaft to depth of 600 feet and drive a drift northwest from that depth to cut the ore shoots developed by the Bon Air and P. O. S. Machinery will be placed, and tbe work of excavation for foundation for boilers and engine is under way. A shaft, 3½x7 feet, is already sunk to depth of 320 feet. This will be enlarged and sunk to tbe proposed depth. The company is composed of Texas and Denver men, with W. G. Nicholson of Denver as president and J. R. Curley as manager.

LA PLATA COUNTY.

The Tenbroeck, near La Plata, has been leased to L C. Williams, who will drive a tunnel 200 feet under Lewis mountain, obtaining a depth from surface of 1000 feet. — The Bay City mine, under lease to G. Dotson, has begun shipping ore to Durango. The mine is within 200 feet of the wagon road and 7 miles from Hesperus station on the Rio Grande Southern. It also has milling ore. — The Bonnie Girl Co., operating near La Plata, are increasing development work, says Manager McLeod. They will remodel the stamp mill to include cyaniding.

MINERAL COUNTY.

Manager J. Nause of the Nelson Mountain M. Co. bas work under way on their group of claims on Nelson mountain, near Creede, which they are operating under bond and lease.

SAN MIGUEL COUNTY.

The Keystone Hydraulic M. Co., operating the Keystone placer on San Miguel river, 5 miles below Telluride, began washing gravel last week. C. M. Coleman is manager. The gravel at the bottom of the pit at bedrock, where the washing is going on, carries 50 cents per cubic yard, and 25 cents near the surface.

The Tom Boy G. M. Co., near Telluride, has put three of the seven Huntington mills in the old plant, which has been idle since December, 1902, by reason of the lack of water for milling purposes, in operation, and later the others will be started, says the Times. The capacity of this plant is 225 tons daily, and is supplied with mineral from the Tom Boy mines proper. The company has bought the Mountain Chief claim, adjoining the Belmont on the north, which adjoins the Tom Boy, for $100,000. This claim is on the Tom Boy vein and is thought to contain a continuation of the ore shoot that exists in the Belmont and Tom Boy. It will be opened up and the ore handled through the Belmont and Tom Boy workings. The company's other plant has sixty stamps dropping regularly, crushing 175 tons per day. Its supply of ore comes from the Argentine and Cincinnati.

There are 450 tons daily of mineral being sent down over the wire rope tramway from the Smuggler-Union mines, near Telluride. This supply is keeping the new 60 stamp mill and forty stamps of the old mill dropping regularly. The main portion of the gold values are saved on the mill plates by amalgamation, and the concentrate shipments from the two mills amount to two and a half carloads daily, says B. Wells, manager. The company has 400 men at work.

SUMMIT COUNTY.

At the Cashier mine in Brown's gulch, near Breckenridge, Manager Wood says he will reduce the cost of mining (breaking) the ore by putting in a steam shovel. To provide room for working this machine, a tunnel, 12x14 in size, is being run from the surface to the ore, which is but 50 feet under cover. The ore body will be exposed and worked like a quarry. The shovel will be operated by electricity supplied by the power house.

TELLER COUNTY.

(Special Correspondence).— The Ajax G. M. Co. at Victor has struck a flow of water in the 1200-foot level and will put in pumps before it can work at the level. It is now operating on the 1100-foot level.

The Woods Investment Co. at Victor expects to have its power plant and line completed to Pueblo by July 15th.

Cripple Creek, Colo., June 29.

It is proposed to build a cyanide mill on the east slope of Bull hill, Cripple Creek, for treatment of ore of the Uncle Sam mine. This mine has a vein 3 feet in width of $6 ore, and tests have shown it susceptible of cyanide treatment.—Lessees on the Rose Maude mine have unwatered tbe shaft. The shaft is 100 feet in depth with drifts 180 feet. Development work has started from the bottom level, where they will crosscut in two directions.

The April Fool claim on Squaw mountain, Cripple Creek, owned by the Squaw Mountain M. Co., will be developed through the Columbine-Victor tunnel, that is driven through Squaw mountain from the Eclipse gulch side to the Gold Coin mine. At present the April Fool claim is being operated through the 666-foot level of the Golconda mine.

The Prudential Gold Extraction Co. has been incorporated at Cripple Creek by T. Cornish, J. A. Dunwoody, E. P. Arthur, Z. E. Funk and J. Stovekin, the last-named being manager. The process to be used is a modified form of the cyanide process, says the Cripple Creek Times, and ore containing as low as $4 in gold can be treated at a profit. The ores will be ground to pass through a 150-mesh screen. Tbe ore is first crushed and then set into the rolls, where a weak solution of cyanide is permitted to run. After passing through the rolls, tbe pulp passes into a tube mill, 22 feet long and 5 feet in diameter, and containing five tons of steel balls. Leaving the tube mill, the pulp passes into agitation tanks (four in number). Before the pulp reaches the agitation tanks, however, it is said that 75% of the values will have been extracted. In these tanks agitation will keep the pulp in constant motion, and there will be no chance for the pulp to cake or settle and it will be exposed to the free oxygen in the air that it is constantly in contact with. After passing through the agitation tanks the pulp is conveyed to a large settling tank and from there passed through a filter press, in which 80% of the solution is secured with the first pressing.

The Accident mine on Gold hill, Cripple Creek, adjoining the Pointer and Mint groups, is being worked under a bond and lease by B. F. Hickman through the third and fourth levels of the Pointer group. The lessee is following an 18-inch shoot of ore that runs three ounces gold per ton, and is making shipments.

It is reported the Stratton Cripple Creek M. & Dev. Co. intends to build a cyanide mill on Globe hill, near Cripple Creek, to treat bodies of low-grade ore exposed in the various workings of the properties owned by the company. It is claimed no leases will be granted on the parts laid out on this hill.

E. M. De La Vergne, president of the Mary Nevin G. M. Co , reports two leases granted on their ground on Beacon hill, Cripple Creek. The first lease was to the Hanover L. Co., H. Granfield manager, on the south 100 feet of the Mary Nevin and Hibernia claims for three years. It is the intention of the lessees to sink a shaft 300 feet and from that depth prospect the property. The second lease was to Coe & Co. of Cripple Creek on the north 500 feet of the group for two years at 25% royalties.

At Victor the El Paso-Gold King mine in Poverty gulch is making steady shipments of ore, although the lower levels are filled with water. As soon as the pump, capable of hoisting water at the rate of 1500 gallons a minute from depth 1000 feet is set up, the shaft will be drained to the 900-foot level, when drifts will be extended on the shoot.

Nearly all the men at the C. K. & N. group at Cripple Creek were laid off temporarily last week, as ore blocked the bins. Besides the congested condition of bins, water is proving a hindrance.

The month of June showed a total of 650 feet additional driven on the Cripple Creek drainage tunnel, leaving 1035 feet to complete by August 25, the time limit. S. S. Bernard of the El Paso M. Co., which has the contract, has fifty-five men at work on the drainage tunnel and 180 men in the El Paso mine and tunnel. The entire length of the tunnel, south of the El Paso mine, is 4063 feet. They are driving all the headings under company contract, two sub-contracts having been canceled.

Development work will be increased on the Sunshine and Sedan mines, on Galena hill, near Cripple Creek. Shafts are being straightened and enlarged. Ore of both mining and smelting grade is obtained.

IDAHO.

BANNOCK COUNTY.

A strike of copper ore is reported to have been made in the Fort Hall group, 8 miles southeast of Pocatello. The strike was made in a tunnel at 650 feet and at depth of 250 feet from the surface.

BOISE COUNTY.

A Chilean mill has been set up at the Engle Co. mines near Grimes Pass, near Idaho City. Its capacity is sixty tons per day.

At the Twin Sisters mine at Centerville the mill has been shut down temporarily pending changes in equipment.

W. Frame, foreman of the Golden Chariot mine, on Rock creek, near Idaho City, says the shaft is down 150 feet. A crosscut will be run to the ledge from the 100-foot level. Ore is coming from one of the tunnels on the Cleopatra claim. A raise will be driven 100 feet to connect with the shaft.

IDAHO COUNTY.

Manager H. D. Rankin, of the Rankin R. Co., in Rapid River district, near Warren, says they expect to have their mill and electrical plant in operation by July 15th. All their buildings will be lighted by electricity. He proposes also to introduce electric amalgamation. The dynamos will be connected with the amalgamating tubs. An 8 H. P. ammonia compressor will also be added, by which the water which cools the acids used in the process can be cooled to near the freezing point.

D. McKenzie reports sylvanite found in the Independence mine on Big creek, in Thunder Mountain district, near Roosevelt.

KOOTENAI COUNTY.

A. Klockmann, managing director of the Idaho-Continental mines, on Mount Klockmann, near Port Hill, reports the lower drift in the Blue Joe tunnel in 600 feet, and a vertical depth of 400 feet obtained. The ledge is 30 feet wide, and outside of a streak of high-grade galena 1 foot wide, it is all concentrating ore. The shoot averages $40 per ton. In the upper levels at top of hill he has suspended development, as a large body of galena has been shown, and it is intended to open the mine at depth. It is proposed to build a railway from Port Hill and a concentrator near the mine.

OWYHEE COUNTY.

Further equipment is being put in by the McKinnon G. M. Co., near Silver City. The company's group is on War Eagle mountain. A tunnel has been started to tap four veins of ore.

Work is under way on the Fourth of July group of claims on War Eagle mountain, near Silver City, and owned by J. C. Connors, E. E. Beebe, J. Hogan and W. D. Evans. They report having a 6½-foot vein that assays $15 and shows free gold.

SHOSHONE COUNTY.

An electric transforming station will be built at the Hecla mine at Gem, says Superintendent F. Phair of Spokane, Wash., and power will be obtained from the Washington Water Power Co. There are 130 men and teams at work on construction of the electric line between Gem and the Spokane power station.

The vein on the Alameda mine on the east fork of Nine Mile, 5 miles from Wallace, was struck last week and the full face of the tunnel is showing galena. The tunnel is in 480 feet at depth of 300 feet. Development work has also been carried on in the upper workings. W. Farmer is principal owner.

KANSAS.

MONTGOMERY COUNTY.

J. M. Parker of Colorado Springs, Colo., manager of the Vulcan Oil & Gas Co., operating near Independence, says they have three drilling outfits at work. They have three wells down, two of which are yielding a flow of 1,500,000 cubic feet of gas a day and one well which is pumping ten barrels. There are twenty-two brickyards alone operating in the gas belt, every one using gas for fuel. The Panther Place well is yielding 15,000,000 cubic feet of gas a day with a natural pressure of 630 pounds. The Independence Oil & Gas Co. has six wells that are supplying the town of Independence with fuel and light. In addition, around Peru, there are twenty-five wells that have been pumping five years and are yielding 350 barrels a day. The Standard Oil Co. has laid a 125-mile pipe line through the center of the oil and gas belt and is running laterals out to all the adjacent country to collect the oil for the 5000-barrel-a-day refinery.

MICHIGAN.

KEWEENAW COUNTY.

The Miskwabik Dev. Co., the Federal Copper Co. and the Union Land & C. M. Co. have been consolidated in Boston, Mass., as the Miskwabik M. Co., with H. F. Fay, president. Work has begun on the mines with L. L. Hubbard as manager.

MISSOURI.

JASPER COUNTY.

A good body of zinc ore is being opened up at depth of 15 feet on the Hannum & Hayworth lease, near Alba, 12 miles northeast of Joplin. — A strike is reported on the Pin-Mays lease near the South Carthage mines, 4 miles southeast of Carthage, where an ore body was opened at 15 feet and extended to the 100-foot level.

The Moss Rose mine, owned by Joplin men, with W. Armington as manager, is reported making $500 a week with six hand jigs. The Moss Rose is on the Granby land, near Joplin, and has four faces of lead and zinc ore.

New zinc mines are being opened up in Grove Creek valley, near Joplin, in a section noted for its shallow lead diggings in the early seventies, says the St. Louis Review.

MONTANA.

CARBON COUNTY.

In order to provide additional dumping ground for the waste from the mine, the Rocky Fork Coal Co., near Red Lodge, have changed the channel of Rock creek so as to cause the waters to flow 300 feet farther to the westward of their former course, leaving the old channel to be utilized by the company in its future operations. Besides furnishing a dumping ground for three years at least, it does away with the complaint from ranchers along Rock creek of injury caused by the dumping of coal slack into the stream.

CASCADE COUNTY.

J. L. Neihart of Neihart is making shipments of high-grade silver-lead ore to the smelter.

The Home M. Co., which is to develop claims at the head of Pilgrim creek, has

been incorporated at Great Falls. The group is of thirteen claims and the values are in gold and silver.

DEERLODGE COUNTY.

The Anaconda C. M. Co. at Anaconda reports the chimney which will carry off all the smoke and gases from their works completed. The stack is 300 feet high and the main flue is 25 feet high and 40 feet wide. The Washoe smelter was closed down July 1st in order to make the connections between the smelter and the flue. This throws 1000 men out of work at Anaconda and 2000 out in the company's mines at Butte. They will resume September 1st.

FERGUS COUNTY.

F. Wright of Lewistown, part owner, has men at work on the Santiago mine, near Kendall. B. Losinger of Malden is superintendent

The Judith M. Co. has been organized to develop mining properties in Fergus county, with headquarters at Lewistown. F. E. Smith, W. E. Wilson, A. Hayden, A. P. Pendleton, A. W. Bulkley, R. J. Walsh and J. H. Mauritius are directors.

GRANITE COUNTY.

It is reported work will be resumed on the copper mines on Copper creek, at Royal, near Philipsburg, owned by the Lexington Co. of Butte.

JEFFERSON COUNTY.

The Pittsburg-Montana D. Co., composed of Eastern men, are putting up a hoisting plant on the Evening Star mine in Cataract section, near Basin.

The Chicago and Alta-Extension M. Co. has been incorporated by H. H. Ebert, of Helena; J. W. James and C. B. English, of Anaconda; J. K. Harris, J. Leavitt, C. R. Swartout, D. C. Schnell, C. F. Craver, Chicago, Ill., to develop the Alta-Extension in Wicks district. The Alta-Extension is 1½ mile west of Corbin.

The Colorado M. & D. Co., which owns the Hidden Treasure and Copper King mines near Corbin, has arranged to put in heavier machinery and sink 200 feet and crosscut at that level. The company is composed of Butte and Chicago men.

LEWIS AND CLARKE COUNTY.

The Bismarck group of claims, 17 miles east of Helena, is being developed by K. Reeves, who has men at work taking out ore, the values being in gold.

MADISON COUNTY.

The Verna lode on Mineral hill, near Pony, is being worked by J. H. Miles, C. S. Shoemaker and W. Watt, and is developed by a tunnel and shaft. A crosscut 18 feet long has been driven to show width of the vein, which assays $8 gold and eleven ounces silver. The tunnel will be continued 150 feet farther. They also own an adjoining claim, the Jim, on the south.

R. R. Smith and F. B. Feetham of Grand Forks, North Dakota, have bought a controlling interest in the claims of Siegfried, Port & Derat, near Alder gulch. They intend to build a mill should development work warrant. All of the claims are gold bearing.

L. D. McCall of Chicago, Ill., and W. M. Brown of Virginia City, Mont., owners, will put up a 15-stamp mill to treat the ore of the Gold Coin, U. S. Grant and Fairweather mines, near Pony.

MISSOULA COUNTY.

The Golden Chance M. Co. has been incorporated, with headquarters at Wallace, Idaho. J. B. Phinney, T. H. Thomas, C. A. Stillinger, N. A. Moderi and W. Beach are directors. The company owns a group of claims in Missoula county.

PARK COUNTY.

The 80-stamp mill and cyanide plant of the Kimberly-Montana M. Co., at Jardine, is in operation and work resumed at the mines. The Kimberly-Montana Co. is composed of Chicago men and is a reorganization of the Bear Gulch Co.

The St. Julian G. M. Co. will build a 10-stamp mill on their group at Emigrant, near Livingston, this summer. They expect to be able to handle 100 tons of ore daily.

NEVADA.

LANDER COUNTY.

Superintendent Simpson has the cyanide works at Pittsburg, near Battle Mountain, treating the tailings of the Pittsburg Co. mines.

The Marysville mines, owned by R. Kirman and C. E. Mack, are being worked with J. A. Logan of Carson as superintendent.

At the Dean mine (the Morning Star mine), at Battle Mountain, owned by W. E. Dean of San Francisco, Cal., the 10-stamp mill is running steadily, crushing thirty-five tons a day. It is proposed to increase the capacity, says Manager D. J. Bousfield.

LINCOLN COUNTY.

At Pioche, S. Bamberger of Salt Lake City, Utah, has bought a one-half interest in W. H. Clark's Great Eastern paint mine and all of the Richman mine (formerly the No. 9) Bamberger also bought the Black Prince mine.

NYE COUNTY.

G. W. Wood, manager of the Piute M. Co. of Mammoth district, 3½ miles west of Ellsworth, says the company has men on contract in crosscutting and doing development work, and will put on more men this month. A mill will be erected at the mine during the summer. Wood and water are plentiful at the mine.

The Le Beau mine, east of the Piute, was sold last week to C. Peters of Tonopah for $30,000. The ore in the Le Beau is free milling and averages $50 in gold. The development work consists of a 40-foot shaft.

WASHOE COUNTY.

J. Mack has bought a half interest in the Lion mine east of Reno, F. Knoblock being the other owner. It is a copper mine and work will be resumed in the tunnel next week.

WHITE PINE COUNTY.

Machinery for the stamp mill for the Wide West M. Co. is being set up on the millsite at the mouth of Egan canyon, near Cherry Creek, says Superintendent Leisman.

OREGON.

BAKER COUNTY.

The E. & E. mine, at Bourne, will resume, says Superintendent J. Thomas, after being idle four years. Repair work is under way and full operations will begin by Aug. 1.

The Gem mine and mill, near Baker City, has been bonded to H. T. Hendryx of Sumpter for $90,000.

Superintendent H. W. Nelson of the Alpine M. Co., near Sumpter, reports preparations being made to put in additional machinery.

W. C. Bass, superintendent of the Maxwell mine, near Sumpter, says operations have resumed at the 10-stamp mill.

Superintendent J. J. Hennessey of the Gold Bug-Grizzly mine, near Sumpter, finished last week and is sinking an additional 200 feet. They will cut out stations on the 200-foot and 300-foot levels. No effort will be made to crosscut to the vein while sinking.

GRANT COUNTY.

Two tunnels are being driven on the Big Producer group, near Alamo, says Manager W. H. Chambers. The crosscut on the Moulder Boy is in 500 feet, cutting three veins in that drive, and the drift on the Boston vein is 300 feet long.

Near Susanville, the Badger Co. will put a mill on the Bull of the Woods mine, adjoining the Badger, which they also own. The Badger plant is running full capacity.

JOSEPHINE COUNTY.

The Alameda M. Co. report developments progressing on their gold-copper mine, near Galice.

MALHEUR COUNTY.

At the Black Eagle mine, near Malheur, Superintendent J. F. Meikle says the 20-stamp mill will be increased to forty stamps.

NEW MEXICO.

GRANT COUNTY.

J. C. Woodward has sold a three-quarter interest in his Casino group of mines to Los Angeles men for $110,000. There are fourteen claims and a millsite in Bald Mountain mining district, 9 miles southeast of Silver City. Further development work will be done, with Woodward in charge, and they will build a mill.

A. R. Gibson of the American Con. C. Co., operating near Lordsburg, says at the Atwood mine, owned by the company, machinery has been put in, including pump, boiler, pipes and tanks. Reduction works are proposed to be built in the fall. A road has been built, shortening the haul between the mine and Lordsburg.

SOCORRO COUNTY.

The Cavern G. M. Co. has been incorporated at Albuquerque by G. L. and H. O. Brooks of Albuquerque and B. A. Statz of Kelly, to operate near Kelly.

SOUTH DAKOTA.

LAWRENCE COUNTY.

C. E. Heizer, of the Spearfish G. M. & R. Co., near Spearfish, says they are successfully treating the low-grade deposits of ore of that section. The company propose considerable deep development and will sink several shafts to depth of 400 feet to open and explore the limestone existing at that depth. The Portland mine, adjoining the Spearfish, has cut the zone with its workings and opened good ore.

The Big Four M. Co., operating on Deadwood gulch in the phonolite belt, near Deadwood, says Manager J. P. Beach, are putting in a steam hoist, boilers, air compressor, air drills and an electric lighting plant. Sinking will be resumed in the shaft, which was put down with a whim. P. T. Bird of Deadwood is superintendent. It is intended to go down 500 feet and explore the phonolite bodies that appear at the surface.

PENNINGTON COUNTY.

The Grizzly Bear mine, near Hill City, has been cleared of debris and caved earth by the Lakota Co. of Peoria, Ill. The 10-stamp mill has been torn down and the company is preparing to build a 20-stamp mill on the site, to be connected with the mine by aerial tramway. The mine workings have been straightened and extended and made ready for permanent work.

UTAH.

BEAVER COUNTY.

President S. Newhouse says excavation work will be started next week for the 1000-ton concentrator and smelter to be built to treat the ores of the Cactus mine, near Frisco. They will also lay a pipe line to convey the waters of Wah Wah spring across the desert valley below to the smelter site.

President A. B Lewis, of the Imperial M. Co., operating near Frisco, reports an ore strike in the shaft which is going down at the mouth of the Massachusetts tunnel in Lœber gulch. The ore body shows assays of 10% copper, with 20% lead, 18 ounces silver and $3 gold. The Comet shaft has been unwatered, and at the 200-foot level crosscutting to the ledge begun, the shaft also to be sunk.

The Royal Co. has taken an option on the Lindsay group of ten copper claims in Rocky district, near the Old Hickory and Montreal mines near Milford, for $10,000.

SALT LAKE COUNTY.

The Butler-Liberal Con. M. Co. has been incorporated at Salt Lake City, being a consolidation of the Ben Butler M. & M. Co. and the Chicago & Bingham M. Co., both of West Mountain mining district, near Bingham. A. L. Jacobs, C. N. Strevell, E. D. N. Thompson and W. S. McCornick are officers.

SUMMIT COUNTY.

At Park City work is under way on the site of the former zinc plant for the erection of two temporary buildings for working the ores that were in the building at the time of the fire. One will contain the rock breaker and other machinery, while the second building will contain the electrical apparatus for separating the metals, etc. This plant, says the Record, will be operated until the contracts with the mining companies expire (October 15). In the meantime it is expected that satisfactory arrangements will be reached by the Park City Metals Co. and the Park City mine owners, who will furnish the necessary ores, in which event plans will be prepared and a large plant built.

The remodeled and enlarged mill of the Daly-Judge M. Co. at Park City was started up last week and is handling 300 tons a day, says Mill Superintendent Sherman. Mine Superintendent Dunyon has put on more men underground.

A two-years lease and bond for $100,000 has been given on the Bonanza Con. group of claims, near Park City, and the Imperial M. Co. incorporated by A. B. Taylor and W. D. Sutton to work the group.

WASHINGTON.

FERRY COUNTY.

E. L. Tate, of the Quilp M. Co., at Republic, reports shipments being made at the rate of 100 tons a day, and there are fifty-seven cars now on the road or at the smelter, on which they are waiting returns. Since shipments began in October, 1902, the Quilp has produced 8000 tons, during which period there was the tieup on account of coke famines at the smelters. The ore averages $14 per ton, with one-third of the values in silver. At the 620-foot level the mine is showing a streak 2½ feet wide, of ore which has been drifted on 90 feet, and a winze is being sunk in it. A carload shipment from it assayed $74. It shows native silver.

OKANOGAN COUNTY.

It is reported the Palmer Mountain G. M. & T. Co., on Palmer mountain, near Loomis, is planning to put in a stamp and cyanide plant of 300 tons daily capacity, with electrical power. The tunnel will be driven 5000 feet farther.

Superintendent J. P. Blaine of the Opal M. Co., near Chesaw, says he has two shifts at work in the lower tunnel at the Opal mine. This tunnel is in 175 feet and is being driven towards a point in the ledge under the upper tunnel. The upper tunnel is in 190 feet. The ore shows values in gold, silver and copper. It has been decided to put in a concentrating plant in connection with which will be a cyanide mill.

The shaft being sunk to the 100-foot level in the Great Western mine, near Nespelem, is in ore, says M. L. Pershall of Spokane, president. The lead is 7 feet wide and assays $35. Shipments will be started in August. Besides this high-grade ore the company has a body of $10 ore which can be concentrated.

STEVENS COUNTY.

Work is under way on the Golden Sun mine on Big Sheep creek near Northport, says Superintendent D. Bennett, who is driving the tunnel 100 feet farther into the mountain.

At Newport, the Bead Lake tunnel is in 1400 feet, and work is progressing. Some quartz is being struck and it is expected the main vein will be cut by August 1st. ——The Conquest mine has a double-compartment shaft down 50 feet, and as soon as the machinery is set up development work will be increased.——The Ballerat tunnel is in 220 feet.

R. W. Hunner of Republic, for J. J. Hill of the Great Northern R. R Co., has bonded the Combination and Golden Zone iron claims, in Wolf's camp, on the Colville reservation, and 1½ mile from Curlew lake. The deposit of iron, where the lime capping has been crowded, is shown in places to be 1200 feet wide. The ore is hematite, running 62% iron.

WYOMING.

ALBANY COUNTY.

The Acme G. & C. M. & M. Co., organized to take over the interests of the Wyoming D. & T. Co., which operated at Gold Hill, southwest of Laramie, has been incorporated. The Acme Co. owns the Acme and other mines at Gold Hill. The Laramie, Hahn's Peak & Pacific railroad is being built southwest of Laramie, and as soon as the line is completed to Gold Hill work will be resumed in the mines there.

CARBON COUNTY.

At Grand Encampment, the concentrator of the North American C. Co. was started up last week, and the roaster, briquetter and smelter followed later on. The tramway is bringing the ore down from the Ferris-Haggerty mine at the rate of 200 tons per eight hours, three shifts of men being at work at the mine and at the terminal at Encampment. An air compressor for the Ferris-Haggerty mine is being set up. It has a capacity of 2000 cubic feet of air per minute, and will operate twenty-five drills, each of which is expected to break twenty tons of ore per day. There are three levels in the Ferris-Haggerty mine where the drills will be used.

An explosion of fire damp in mine No. 1 of the Union Pacific Coal Co. at Hanna, June 30, entombed 282 men. Of these forty-eight were rescued alive. Of the remaining, 100 were Finlanders, fifty colored, and the balance white Americans. The mine was not fired, but the explosion shattered the timbers of the main shaft and entrances, and filling the workings with debris. No. 1 mine has twenty-six entries, 15 miles of workings, and a main incline shaft 1½ mile in length. E. S. Brooks is superintendent.

FOREIGN.

AFRICA.

CAPE COLONY.

Copper returns for May show: Ookiep mine, 1816 tons of 16% (270 tons of fine copper); Nababeep mine, 2584 tons of 6% (144 tons of fine copper.

RHODESIA.

Red & White Rose Gold Co. May output: Mill working thirty days obtained 1137 ounces of gold from 3222 tons of ore crushed. Recovered by cyanide 435 ounces from 2201 tons.

Rezende mine, May output: Twenty stamps running twenty-nine days crushed 3350 tons; recovered from mill 1102 ounces fine gold; recovered from tailings by cyanide 107 ounces; in addition 10 ounces of concentrates were produced containing 45 ounces fine gold.

Bonsor gold mine May output was: Fifty stamps ran twenty-nine days, crushing 5010 tons, gained 1091 ounces; treated by cyanide 3190 tons yielding 416 ounces. Globe & Phœnix Gold report during month of May mill ran 28 6 days, crushing 6698 tons of ore; yield 3723 8 ounces bullion; tailings, average assay value per ton 2 61 dwts. fine gold; cyanide, tons treated, 4600, yield 447.3 ounces.

SOUDAN.

A discovery of iron ore is reported in Bahr-el-Ghazal Province. The analysis of specimens brought to the office of Count Gleichen, director-general of the Soudan Government Intelligence office, gives 43.47% of iron. U. S. Consul-General G. Long at Cairo, reports iron is found in the Soudan, in Kordofan, Bahr-el-Ghazal, Darfur Provinces, and on the Abyssinian border. In Kordofan there are two ore beds, one 60 miles northeast of El Obeid and the other 60 miles northwest. The ore is brown hematite (limon-

ite) and is found in small fragments at a little depth in the sand. There is no fuel or material for building furnaces at hand, nor could it be shipped with profit without a railway. It is not worked at present except in small quantities by the natives. ——In Bahr-el-Ghazel the Bongo country lies between 6° and 8° north latitude on the southwestern boundary of the depressions of the Bahr-el-Ghazal basin, and on the lowest terraces of ferruginous crust bordering on alluvial land. Much of the time of the natives is devoted to the working of iron; which is found in great abundance in Bongoland. They manufacture arms and tools of good quality. Their smelting furnaces are made of clay, and the iron is afterwards worked on anvils of gneiss or granite by hammers of stone or iron, rude bellows being used. The Jur country, northeast of Bongoland, now sparsely inhabited, is the lower terrace of the iron-bearing formation, from which the natives extract a large quantity of iron. They produce a metal of good homogeneity and malleability. Iron smelting is done in March, just before the sowing season. In Darfur the method of working the iron ore is identical with that used in Kordofan, but it appears to be inferior in quality and very brittle. On the Abyssinian border iron ore is extracted in the plains surrounding Fadassi (on the Ahyssinian side of the border, south of Beni Shandul) at some depth from the surface. The occurrence is similar to the hog-iron ore found in Kordofan. The Gallas work this ore into iron, as in Kordofan.

TRANSVAAL.

Angelo Gold Co. May report show: Sixty stamps crushed 8178 tons; recovered 3011 ounces; 6963 tons treated by cyanide for 2724 ounces.——Bonanza mine May results were 8120 tons crushed, yielding 4100 ounces; from cyanide and slimes works, 8120 tons treated, yielding 2565 ounces.——The Cassel Coal Co.'s May output was 10,068 tons.——The Crown Deep mine, near Johannesburg, May results give: 135 stamps working twenty-nine days twenty-two hours crushed 21,238 tons, yield 4631 ounces; 14 840 tons of sands and concentrates treated hy cyanide works for 2968 ounces; 5323 tons of slimes treated, yield 423 ounces.——At the Driefontein Con., during May, 110 stamps crushed 13,662 tons for 3870 ounces; 9268 tons treated hy cyanide for 3374 ounces. ——The Ferreira Gold Co., near Johannesburg, report for May eighty stamps running 28 98 days crushed 11,515 tons, yieiding 4757 ounces gold and 210 tons concentrates, yielding 691 ounces; 7560 tons sand treated for 1523 ounces; also 3387 tons slime, yielding 527 ounces.—— The Langlaagte Estate & Gold Ltd., near Johanneshurg, report for May 150 stamps running twenty-nine days crushed 21,784 tons for 5731 ounces gold: tailings cyanided, 14,850 tons for 1616 ounces; concentrates cyanided, 566 tons for 1082 ounces — total gold value, £35,823.—— The Robinson Gold, near Johannesburg, May results were: 135 stamps crushed 18,832 tons, yield 8809 ounces; yield from tailings hy cyanide, 3606 ounces; yield from concentrates (by chlorination), 840 ounces; yield from purchased concentrates, 869 ounces.——Jumpers Deep, Ltd., May results show: Ninety-five stamps working thirty-one days crushed 15,633 tons; yield, 2952 ounces; 9950 tons of sands and concentrates treated hy cyanide for 1988 ounces; 5367 tons of slimes treated for 376 ounces.

At the Durban-Roodepoort Gold, near Johanneshurg, May results were: Quartz milled, 8540 tons, seventy stamps, twenty-seven days, 4298 ounces gold produced; tailings treated, 5865 tons for 965 ounces. ——Transvaal Coal Trust report May output at 26 900 tons.——The Van Ryn Gold Co., near Johannesburg, report crushing begun with thirty head of stamps June 1.

The May output for the gold mines amounted to 234,125 ounces, being 224,409 ounces from the Witwatersrand and 9716 ounces from outside mines. This gives a total for 1903 to June 1 of 1,075,253 ounces.

WEST AFRICA.

Ashanti Gold Fields Corporation, Ashanti, report, May crushings: Ohuassi mine, 1540 tons for 2310 ounces gold. Development work, 1230 tons crushed for 530 ounces ——Ashanti Sansu crushings for May, 1800 tons, producing 1910 ounces.

AUSTRALIA.

VICTORIA.

The gold yield of Victoria for 1903 to June 1 amounted to 308,733 ounces—an increase of 31,169 ounces compared with the corresponding period of 1902.

WEST AUSTRALIA.

The Kalgurli Gold Co. at Kalgoorlie report that during the month of May 4050 tons were treated for a return of 3878 ounces of gold of standard fineness (£15,028); expenditure for the month as follows: Working expenses £5817 10s; development £545: capital expenditure £490. On the 1000-foot level north drive the stope in the back of the level is producing ore assaying 2 ounces gold; 850-foot level east crosscut, south drive, is in ore of 17 dwts. per ton; width of ore is 27 feet; west crosscut is in ore of 19 dwts.

At the Sons of Gwalia, Ltd., mines at Leonora the 60-stamp mill crushed during May 8018 tons of ore for 4444 ounces of gold, value £16,872; tailngs treated by cyanide 4500 tons for 1381 ounces of gold, value £5227. Working expenses for May were £8428 (21s. per ton), divided as follows: Mining (including pumping) 11s. 10d.; treatment (including milling, cyaniding and concentrating) 5s. 10d.; general expenses, 3s. 4d.

QUEENSLAND.

The Queensland gold returns for month of May show:

Mine.	Tons Crushed.	Yield in Ounces.
Charters Towers	25,600	40,200
Croydon	4 800	5,700
Gympie	19,100	20,100
Mount Morgan	19,400	10 800
Ravenswood	2,400	4,600
Other fields	4,000	4,800
Alluvial		900
Total	75,300	89,100

BRITISH COLUMBIA.

S. H. C. Miner, president of the Granby Con. Co. of Grand Forks, says within twelve months, when their coke ovens in Alberta are in operation, they will be able to lay down copper in New York at a cost of 7 cents a pound.

The Rossland-Kootenay Co. has men at work at the Great Western mine, near Rossland, which has been idle for three years. There is a mile of underground workings driven and low-grade ore bodies are shown. It is the Rossland-Kootenay's intention to unwater the mine and prospect the ore bodies already blocked out.

The coke shortage at the smelters handling ores from Rossland camp continues to check the output, as well as development work. The Kootenay mine, which had plans prepared for building a $25,000 tramway from the mine to the Canadian Pacific railway, has postponed action thereon, as the smelter is unable as yet to figure on a steady coke supply.

The Perry Creek M. Co., near Fort Steele, has men at work cutting a right of way for a 3-mile flume, for which their sawmill is cutting lumber.

Hydraulic mining on Finley creek, near Fort Steele, is being carried on with a canvas hose and wooden nozzle by Superintendent C. Chapman.

G. B. McAulay of Spokane, Wash., and J. Moran of Greenwood, owners of the Copper Mine mineral claim, 6 miles west of Greenwood, in Copper Camp, will resume work next week. It is also reported D. C. Corbin intends resuming on the King Solomon claim, adjoining the Copper Mine, from which some copper ore has been shipped.

Y. Emery of San Francisco, Cal., is reported making arrangements to open up the Newcastle Island quarries, near Nanaimo, to get out building stone.

The Tyee smelter at Ladysmith, after a successful run of four months, has closed down temporarily, to clean boilers, water-jackets and overhaul machinery, and allow the ore on the roast piles to accumulate for another and longer run. A second cage has been put in at the mine, so that ore shipments will be increased.

W. T. Smith has men at work on the Bell mineral claim, on Wallace mountain, near Beaverdell, on West Fork of the Kettle river.——Tuzzo & Currie have opened up a lead across their Comstock group, also near Beaverdell, and Palmer & Rambo, on the Ella E. claim adjoining, report work progressing.

The work of unwatering the Athelstan mine, in Wellington camp, 3 miles from Phœnix, was finished last week, and Foreman Oxley has men prospecting the surface where it is proposed to open glory holes and ship ore, says the Spokane Review. The Athelstan is owned by the Athelstan G. & C. M. Co., Ltd. The development work on the Athelstan includes two shafts, 60 and 70 feet deep. The ore is an arsenical iron, the chief value being gold, with a little silver.

At the Wilcox mine of the Broken Hill M. & M. Co., near Ymir, the mill is crushing fourteen tons a day with four stamps and is making one ton of concentrates daily. The ore is averaging $15 gold and silver a ton and the concentrates assay $45 in gold, silver and lead a ton. The Ymir mine is dropping seventy stamps and several other properties in the camp are busy.

The provincial mineralogist's annual report for 1902, just issued, says the total output shows a falling off in value of $2,500,000 as compared with 1901, the unsatisfactory state of the metal market being one of the chief causes. Light rainfall and consequent shortage of water diminished the output of hydraulic mines, but in spite of this placer mines showed an increase of 10½%. Vancouver Island coal was affected in California, its principal market, by the competition of fuel oil. Compared with 1901 the value of ore output was as follows:

	1902.	1901.
Gold, placer	$1.073,140	$ 979,100
Gold, lode	4 888 269	4,348,603
Silver, lode	1,941,328	2,884 745
Copper	3,446.673	4,446,963
Lead	824,832	2,002,733
Coal	4,192,182	4,380,983
Coke	640,075	635,405
Other materials	480,051	417,283
Totals	$17,468,550	$20,086,780

In quantity, copper showed an increase from 27,603,000 in 1901 to 29,036,000 pounds in 1902, though there was a decrease in value. By districts there was a falling off in value with the exception of Cariboo and Cassiar, both of which are placer mining districts. Taking all lode mines into account the tonnage of ore mined in 1902 was 998 999, compared with 920,416 tons mined in 1901. This increase is due to Rossland and Boundary. The output of copper by districts was: Boundary, 14,-955,582 pounds; Rossland, 11 667,807; coast, 2,496 681; Nelson, 491,144; other districts, 24,483 Iron ore has been mined on the coast during the past year, but the only shipments made were from Texada island, from which 6290 tons of magnetic iron ore, running 50% iron, were sent out. From the iron mines at Cherry creek, near Kamloops, 3727 tons of magnetite were shipped to Nelson, for use in the smelter as flux. The total number of accidents in metalliferous mines during the year was twelve. In the collieries the fatal accidents numbered 139; of these 125 deaths were due to the explosion in the Crow's Nest collieries in May, 1902. In ten years 321 miners have lost their lives in British Columbia collieries.

At Fernie the Crow's Nest Pass Coal Co. is operating three coal mines and expects to open three more next month, says the Rossland Miner. The production of coal is 1100 tons daily. "The company has 424 coke ovens, of which 144 are not now in use. The wages paid are 75 cents per oven of five and a half tons charge and 95 cents per oven of seven and a half tons charge. A man will ordinarily draw three ovens daily. The company is drawing sixty ovens daily, so that its output of coke is 250 tons. A charge is supposed to remain in the ovens seventy-two hours, but under existing circumstances the ovens are not being drawn regularly, sometimes remaining charged four or five days. Manager Tonkin states he is running short handed.' ——At Michel the company has 212 ovens in continuous operation. The stone bases are laid for 250 additional ovens, and these are expected to be in operation by September. The company has 700 men at work at Michel, of whom 200 are underground. Coke pullers receive the same wages as at Fernie. Three coal seams and two prospects are being operated.

HUNGARY.

There are sixteen copper mining concerns in Hungary, of which two State and three private undertakings supply the greater part of the metal. Formerly 80% of the copper was mined by the Government, but in the past year only 50% was so mined.

INDIA.

The Burma Ruby Co. of Burma report their May production at 94,000 loads washed, yielding rubies valued at $470,450, on which an average royalty of 32% was paid.

MEXICO.

CHIAPAS.

At Palenque the Palenque G. M. Co., an English company, have development work under way.

CHIHUAHUA.

A. H. Kennedy is putting up the electric power plant for the Terrenates Con. M. Co. of Parral. General Manager Husted has the first shipment of machinery for the plant at the mine.

A lease and bond on the Fourth of July mine in Parral district has been taken by the Saginaw M. & M. Co., who contract to sink 200 feet. This mine adjoins the Two Republics.

The English Co. has recently taken over the San Francisco del Oro mine, in El Oro section of Parral, near Santa Barbara, the principal vein of which is the Santo Tomas y Sanas, a producer. An aerial tramway is being built from the mine to the mill.

The new mill and aerial tramway of the Adele mine of W. Petit are in operation. The Cuadras mine of the Guggenheims is the extension of the Santo Tomas y Sanas vein. Both veins carry gold, silver and lead values, with some copper.

J. C. Brooks has commenced work on the San Diego mine, near the town of Santa Barbara. He has shipped two carloads of ore.

DURANGO.

The power plant at Mapimi, for the Campania Minera de Penoles, is finished and will furnish power for the Ojuila mine.

GUERRERO.

Manager E. D. Elson of the Mitchell M. Co., operating a copper group 35 miles inland from Acapulco, says tunnel No. 2 is showing black sulphide assaying well in copper. Shaft No. 2, at depth of 310 feet, cut black sulphide showing 12%, and tunnel No. 8 also has similar ore. Shaft No. 7 has red oxide of copper, giving the company a total along the ore body of 3000 feet, from tunnel No. 2 to tunnel No. 8.

It is reported that from the Inguaran mine the Rothschilds, who have a large body of 2 5% to 3% copper ore, will build a road to the coast at the mouth of the Balsas river, where they will build a smelter.

MORELOS.

In Aldame district the Trinidad M. & S. Co. is putting in a cyanide plant.

SONORA.

(Special Correspondence).—It is stated that mining development of La Cananea property is satisfactory, so much so that the company is making plans for doubling the capacity of its plant, including the building of a large, independent power and crushing plant, and another concentrator of 800 tons daily capacity, which, when completed, will give the works a daily capacity of 1600 tons of concentrating ore. The smelters are producing eighty to eighty-five tons of copper daily. Dust chambers are being built and a large, self-sustained steel stack is also going up. L. D. Ricketts is consulting engineer on concentrating and is in charge of the improvements and extensions now going in.

Cananea, June 29.

N. S. Finch, agent, has bought a prospect called Mulatos in the municipality of Baxiacora, 120 miles south of international line, on the Sonora river.

The Greene Con. C. Co. at Cananea propose to build a brick dust chamber 500 feet square, to be utilized for precipitation of copper particles that have heretofore gone up with the smoke.

It is reported that the customs smelter at San Javier, W. Luebbert superintendent, will be enlarged.

At La Blanca, near Suaqui Grande, F. E. Dickenson, manager for La Blanca M. Co., says work in both the mine and on the reduction plant is progressing. The main shaft is down 175 feet and there are 1300 feet of underground development work connected therewith. The concentrating and smelting plant, with a daily capacity of forty tons, is expected to start up by September 1st.

R. L. Benton, superintendent of the Lucky Tiger-Combination M. Co., operating near Nogales, Ariz., says they are running a tunnel which will tap the main ledge at depth of 300 feet. It is in 120 feet, with 200 feet yet to drive. Some free-gold ore has been struck.

ZACATECAS.

At the hacienda of the mines bought by the Stillwell M. Co., at Zacatecas, they have taken from a fifth of the space, 18x20 feet, formerly occupied by some tanks, 193 flasks of quicksilver. If the rest of the space is equally valuable it is expected $100,000 worth of that metal would be recovered. This does not include what is expected from the old patio, 300x400 feet, where the ores of the district had been treated for nearly a hundred years.

NEW ZEALAND.

The Talisman Con. M., Ltd., May returns show 3300 tons of ore crushed for £6298 bullion. Expenditures for the month were: Mining, £1786; milling, £1943; construction, inciuding cost of alterations to cyanide plant and additions to concentrating plant, £1609; mine development, £825. The mill ran for twenty-six days, and owing to alterations to the treatment plant but thirty-eight stamps were dropped.

RUSSIA.

The British Vice Consul at Poti in his report for 1902, states the stock of ore on Jan. 1, 1903, at the manganese mines at Tchiaturi was 250,000 tons, which is estimated to cost the holders 7 copecks per pood (($2.25 per ton.) The manganese ore produced during the year having been mined with greater care than in previous years, the average quality is higher. There has been no serious attempt made by any foreign or Russian firms to secure manganiferous land in large enough plots to be able to work on an extensive scale. The exporters are numerous, and ore is secured by them in Tchiaturi from the small dealers and land owners. Steamers at Porti are almost entirely loaded direct by ore wagons from Tchiaturi.

PERSONAL.

H. T. HENDRYX of Sumpter, Or., is in the East on mining business.

J. A. VEATCH, a mining man of Beaumont, Tex., is in San Francisco, Cal.

J. M. HENTON of Deadwood, S. D., is examining mines in Durango, Mexico.

J. THOMAS is superintendent of the E. & E. mine, near Bourne, Baker county, Or.

W. B. PITTMAN of Tonopah, Nev., is in San Francisco, Cal., on mining business.

M. D. STACKPOLE of the Gold & Silver Extraction Co. is in Montana from Denver, Colo.

F. F. ARCHIBALD of London, England, of the Tarsis C. Co. of Spain, is at Clifton, Ariz.

A. FITZGERALD is superintendent of the Kenton mine at Alleghany, Sierra county, Cal.

J. L. BRYSON, superintendent of the Mazeppa mine, near Stent, Cal., is in San Francisco, Cal.

C. C. SHUBERT, manager of the Jualpa mines, near Juneau, Alaska, is at Juneau from the south.

R. D. YOAKUM of St. Louis, Mo., returned last week from a trip through Sonora, Mexico.

W. H. MARTIN has resigned as superintendent of the Sierra Queen mine, near Nevada City, Cal.

F. M. STONE, manager of the Alaska Treasurer Co., is at their mines on Douglas Island, Alaska.

G. W. SMITH of Florence, Colo., manager of the Ojo Calientes M. Co., is at their mines in Mexico.

W. B. DOUGALL, JR., of the Ima M. Co., returned last week to Salt Lake City, Utah, from New York.

W. H. SPRINGER of Spokane, Wash., has returned from an examination of mines at Rossland, B. C.

W. MCDERMITT returned to Salt Lake City, Utah, last week from an examination of mines at Pioche, Nev.

P. L FEARN of New York of the White Knob C. Co. is visiting the mines and smelter near Mackay, Idaho.

G. HURST of Redding, Cal., is superintendent of the Three Peaks M. Co. near Carrville, Trinity county, Cal.

W. T. WATTS has returned to San Francisco, Cal., from examination of oil territory in Marin county, Cal.

D. D. MILLER is superintendent of the Sierra Queen mine, near Nevada City, Cal., vice W. H. Martin, resigned.

C. C. DERBY, manager of the Mariposa Estate Co., is in San Francisco, Cal., from Mt. Bullion, Mariposa county, Cal.

JOHN B. FARRISH, E. M., of Denver, Colo., has returned from Mexico to San Francisco, Cal., and left for Denver.

J. W. TRUSCOTT has resigned as superintendent of the South Eureka mine at Sutter Creek, Amador county, Cal.

WALDEMAR LINDGREN, of the United States Geological Survey, is at Cripple Creek, Colo., from Washington, D. C.

T. L. WISWALL of Denver, Colo., is in Salt Lake City, Utah, in the interest of the Green Reduction Co. of New York.

PRESIDENT E. M. HOLBROOK of the Horsesboe M. Co. returned to Deadwood, South Dakota, last week from the East.

W. M. LUCAS of St. Louis, Mo., is at Juneau, Alaska, superintending the erection of a stamp mill on the Jennie Reid mine.

D. MCVICHIE, manager of the Bingham Con. M. & S. Co., returned to Salt Lake City, Utah, from an Eastern trip last week.

W. B. MUCKLOW of Hartford, Conn., president of the Majestic C. M. & S. Co., is at their mines near Milford, Beaver county, Utah.

W. W. WHITING, Western manager of the Diamond Rubber Co. of Akron, Ohio, has returned to Denver, Colo., from San Francisco, Cal.

G. B. CROOKS of San Francisco, Cal., representing F. W. Braun of San Francisco and Los Angeles, Cal., is in Salt Lake City, Utah.

J. M. PARKER AND S. R. BARTLETT of Colorado Springs, Colo., of the Vulcan Oil & Gas Co. are visiting the oil fields at Independence, Kan.

H. R. HAWKINS of St. Louis, Mo., is at San Quentin, Lower California, Mex., putting in a hydraulic plant on the Socorro placer claims.

F. L. RANSOME, of the United States Geological Survey, is in Cripple Creek, Colo., assisting Waldemar Lindgren in a resurvey of the district.

W. H BREVOORT of the Siberian M. Co. has gone to New York from the Greenback M. Co mines at Grant's Pass, Or., on his way to Siberia.

H. MOORE, late of the Mazeppa mine, near Stent, Tuolumne county, Cal., is superintendent of the South Eureka mine at Sutter Creek, Amador county, Cal.

J. R. CURLEY, formerly superintendent of the Iron Silver Co. and the Houghton Co. mines, is manager of the Leadville-Oro M. & L. Co. at Leadville, Colo.

C. E. HEIZER, assistant treasurer of the Spearfish G. M. & R. Co., returned to Colorado Springs, Colo., last week after a year's stay at the mines at Spearfish, S. D.

FORMER SUPERINTENDENT THOMAS of the Highland Boy smelter at Bingham, Utah, returned to Salt Lake City, Utah, from a trip to Idaho, examining mines.

MANAGER G. H. ROBINSON of the Tintic M. & D. Co. interests at Bingham and Eureka, Utah, has returned to Salt Lake City, Utah, from the East, via Chicago, Ill., and Butte, Mont.

ROBERT FRAME, formerly superintendent of the Smuggler-Union mill at Telluride, Colo., has accepted the position of foreman of mill of the Socorro G. M. Co. at Magdalena, New Mexico.

PRESIDENT MCNAIR of the Michigan School of Mines at Hougbton, Mich., returned last week after an extended trip through the copper camps of Arizona, California, Utah and Montana.

G. R. POTTER of Stevens' Point, Wis., interested in the Storm King mine and vice-president of the Enterprise M. Co, operating in southern Oregon, is at the Storm King mine near Sumpter, Or.

D. COLE of Aspen, Colo., has taken the superintendency of the concentrating plant at La Cananea, Sonora, Mexico, assuming his duties July 1. He was formerly with the Smuggler M. Co. of Aspen, Colo.

O. C. ZINNS, formerly chemist and assayer with the Penn M. Co. at Campo Seco, Calaveras county, Cal., has been appointed assistant superintendent of La Zublate mines, near La Colorada, Sonora, Mexico, and leaves for the mines on the 27th inst.

HERMAN KELLER, of the Engineering Company of America, New York, is making an examination of mining properties and smelters in Idaho, and J H. Pratt, Ph. D., of the same company, has left San Francisco, Cal., for Arizona via Los Angeles, Cal.

Commercial Paragraphs.

THE Stirling Boiler Co., Edgar Kidwell, Pacific coast manager, have moved their San Francisco office from 330 Market street to 32 First street.

HENSHAW, BULKLEY & CO. of San Francisco, Cal., report preparing a Kinkead mill for shipment to the North Star mine at Grass Valley, Cal.

THE Mine & Smelter Supply Co., Denver, Colo., through their Salt Lake City, Utah, branch, report selling a 100-ton concentrating mill for Park City, Utah.

CHAS. C. MOORE & CO., engineers, San Francisco, Cal., are in their new offices at No. 63 First street. They are contractors for complete power, lighting, heating, mining and pumping plants.

T. R. GOTH & CO, manufacturers of centrifugal pumps, in connection with the J. C. Howlett Machine Works, will occupy the new four story brick building at Nos. 256-260 Fremont St., San Francisco, Cal.

THE Jeanesville Iron Works Co. of Jeanesville, Pa., report that the Copper Glance M. Co. of Bisbee, Ariz., is putting in a Jeanesville compound condensing station pump, also a large sinker in their mine.

THE Redfield Drill Co, 1606 Blake street, Denver, Colo., report receiving orders for one of their drills to be shipped to E. P. Baker, Laramie, Wyo., and one to W. L. Harraman, Alma, Colo. This company reports an increasing trade from all over the country.

THE Byron Jackson Machine Works of San Francisco, Cal., report shipping last week a 35 H. P. Olds crude oil engine and a 7-inch centrifugal pump to Guadalupe, Cal; also one 10-inch compound centrifugal pump direct-connected to 50 H. P. water wheel to Honolulu, H. I.

THE Pacific Gear & Tool Co of San Francisco, Cal., has moved its works from 523 to 529 Mission street, occupying the first floor and basement, gaining thereby greater space necessitated by the growing business, and the installment of several new and up-to-date machines for its special line of work.

Obituary.

T. C. MCGOVERN, a pioneer miner on the Comstock, died in Reno, Nev., June 24th. Deceased was a native of Canada, aged 58 years. He leaves a wife and three children.

Catalogues Received.

"Power Pumps" is the title of Catalogue No 52 of the Stilwell-Bierce & Smith-Valle Co. of Dayton, O. In it are described the pumps of various design manufactured by them. These pumps are particularly designed for heavy service, large capacity and high head "How We Heat and Purify Water for Steam Boilers" is the title of a supplementary catalogue issued by same firm, and treats of boiler waters, the correction of their impurities and heating for steam making.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR WEEK ENDING JUNE 23, 1903.

731,651.—BICYCLE RACK—J. J. Allen, Portland, Or.
731,742.—WELL LINING—J. W. Beaumont, Los Angeles, Cal.
731,661.—DISTRIBUTING SYSTEM—F. C. Birch, S. F.
731,859.—TOOL—W. R Clark, Tehachapi, Cal.
731,875.—STEERING DEVICE—Elfler & Nauman, Oxnard, Cal.
731,569.—DRILLING MACHINE—J. G. Heimrich, Seattle, Wash.
731,570.—NOZZLE—G. J. Henry, Jr., S. F.
731,571.—TESTING APPARATUS—G. J. Henry, Jr., S. F.
731,681.—CANDY PULLING MACHINE—W. E. Henry, S. F.
731,777.—MATTRESS—J. Hoey, S. F.
731,465.—HARVESTER—F. L. Kincaid, Stockton, Cal.
731,918.—OIL TANK—G. B. Landers, Bakersfield, Cal.
731,793.—JAR CLOSURE J. A. Landsberger, Alameda, Cal.
731,590.—LEACHING ORES—C. W. Merrill, Alameda, Cal.
731,610.—FUMIGATING TENT—W. H. Payne, Monrovia, Cal.
732,628.—COMPOSITE BAR—R. H. Raphael, Los Angeles, Cal.
731,594.—TROLLEY FINDER—G. T. Roberts, San Diego, Cal.
731,628.—BRAKE—J. W. Spencer, Lagrande, Or.
731,631.—EXTRACTING GOLD—J. T. Terry, Jr., Altar Mex co
731,976.—DREDGER—Thunen & Cheshire, Oroville, Cal.
731,978.—JOURNAL BEARING—J Tobin, S F.
731,634.—ORE MILL—G. R. Tuttle, Grass Valley, Cal
731,641.—BABY JUMPER—G. W. Wheeler, Everett, Wash.
731,727.—ROCK DRILLS—W. W. Word, Soulsbyville, Cal.
731,728.—ROCK DRILLS—W. W. Word, Latrobe, Cal.

Notice of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S and Foreign Patent Agency, the following are worthy of special mention:

BED OR COUCH MATTRESS.—No. 731,777. June 23, 1903. John Hoey, San Francisco, Cal. This invention is designed to produce a mattress of greater softness and durability than has hitherto been made, by preventing the slipping and matting of any of the materials of which the mattress is composed. The mattress is formed with a central body of laminated cotton or cotton felt and inclosing layers of silk floss at top and bottom, the structure being afterwards stitched and tufted.

CANDY PULLING MACHINE.—No. 731,681. June 23, 1903. Wm. E. Henry, San Francisco, Cal. The object of this invention is to provide a machine for rapidly and economically pulling candy so as to work it into the proper condition during its manufacture. It consists in a machine having parallel shafts with intermeshing gears, cranks upon the outer ends of the shafts and outwardly extending hooks or arms thereon, fixed supports or hangers exterior to said hooks with pins projecting into the space between the pair of revolving cranks, and means by which said intermediate pins may be adjusted up or down.

DISTRIBUTING SYSTEMS FOR LIQUIDS.—No. 731,661. June 23, 1903. F. C. Birch of San Francisco, Cal. One-half assigned to A. Lackman of same place. This inven ion relates to improvements in means for distributing liquids into tanks, vats and the like and to prevent loss by leakage or overflow by reason of the troughs becoming clogged. The tanks or reservoirs are arranged radially in nests, and the liquid pumped through mains and delivered by a peculiar valve mechanism into swiveled lateral discharge pipes, whereby each tank in a nest may be filled successively and whereby tanks in succeeding nests may be charged from the same main without interrupting the pumping operations.

Latest Market Reports.

SAN FRANCISCO, July 3, 1903.

METALS.

SILVER.—Per oz., Troy: London, 24½d (standard ounce, 925 fine); New York, bar silver, 52⅝c, refined (1000 fine); San Francisco, 52⅝c; Mexican dollars, 41c San Francisco, 41½c New York.

COPPER.—New York: Standard, $14.37½; Lake, 1 to 3 casks, $14.37½@14 62½; Electrolytic, 1 to 3 casks, $14.50@14 75; Casting, 1 to 3 casks, $14.00; San Francisco: $14 00. Mill copper plates, $17.00; bars, 18@24c. London: £57 10s spot per ton.

LEAD.—New York, $4 12½; Salt Lake City, $3.50; St. Louis, $4.00; San Francisco $4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 5½, sheet 6, bar 5½c; pig, $4.75. London: £11 16s 3d per long ton=2.75c per lb.

SPELTER.—New York, $6 25; St. Louis, $4.85; London, £20 5s 0d per ton; San Francisco, ton lots, 6½c: 100-lb lots, 7c.

ANTIMONY.—New York, Cookson's, 9¾c; Hallett's, 8½c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

TIN.—New York, pig, $28.12½@28 27½; San Francisco, ton lots, 29½c; 500 lbs., 30c; 200 lbs., 30½c; less, 31c; bar tin, ℔ lb, 32½c @35c. London, £127 5s spot.

PLATINUM.—San Francisco, crude, $18.00 ℔ oz.; New York, ingot, $19.00 per Troy oz. Platinum ware, 75@80c per gram.

QUICKSILVER.—New York, $44 50@46.00; large lots; London, £8 15s; San Francisco, local, $45.00 ℔ flask of 76½ lbs.; Denver, $49.50. Export, $43.50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 34c.

SOLDER.—Half-and-half, 100-lb. lots, 19½c; San Francisco, Plumbers', 100-lb. lots, 16c.

NICKEL.—New York, 50@60c ℔ lb.; ton lots, 45@48c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, $19.50@19 85; gray forge, $18 60; San Francisco, bar, 3c ℔ lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $29 50@30 50; open hearth billets, $31.50; San Francisco, bar, 7c to 12c per lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer	$20 50@21.00
Foundry Northern 1	20 00@21.00
Northern 2	19 50@20.50
Northern 3	19 00@20.00
Southern 1	18 85@ ——
Southern 2	18 35@ ——
Southern 3	17 85@ ——
Forge	17 35@ ——
Charcoal	23 00@24 00
Billets, Bessemer	31 50@32.00
Bars, iron	1.70@ ——
Bars, steel	1 75@ 1.80
Rails, standard	28.00@30 00
Rails, light	34 00@40.00
Plates, boiler	1.90@ 2.00
Tank	1.75@ 1 80
Sheets, 26 store	2 90@ 3 00
No. 27	3 00@ 3.10
No. 28	3 00@ 3.10
Angles	1.75@ ——
Beams	1.75@ ——
Tees	1.80@ ——
Zees	1.75@ ——
Channels	1.75@ ——
Steel melting scrap	16.00@17.00
Relaying rails	30 00@31 00
Dealers forge	13 50@14.00
No. 1 railroad wrought	16 00@17.00
No. 1 cast, net ton	14 50@15 00
Iron rails	22.00@23.00
Car wheels	20 00@21.00
Cast borings	5 50@ 6 50
Turnings	12.00@13 00

LUMBER.—(Retail): Pine, ordinary sizes, $20.00@22.00; extra sizes higher; redwood, $22.00@23 00; lath, 4 feet, $4.25@4.50; pickets, $19.50; shingles, $2.35 for No. 1 and $2.00 for No. 2; shakes, $13.50 for split and $14.50 for sawed; rustic, $26.00@32.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, $3.25; Cut, $3.35; 10d to 16d, Wire, $3.35; Cut, $3.35; 8d, Wire, $3.40; Cut, $3.40; 6d and 7d, Wire, $3.50; Cut, $3.50; 4d and 5d, Wire, $3.60; Cut, $3.60; 3d, Wire, $3.75; Cut, $3.75; 2d, Wire, $4.00; Cut, $4.00. Special rates for carload lots.

LIME.—Santa Cruz, $2.25; Rocbe Harbor, $2.25 per bbl.

GENERAL SUPPLIES.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder

in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10½c ℔ set; 14 oz., 40s., 9½c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 24@25c ℔ lb.; carloads, 23@24½c; in tins, 35c; soda ash, $2.00 ℔ 100 lbs.; hyposulphite of soda, 2½@2¾c ℔ lb.; caustic soda, in drums, 3@3½c ℔ lb; Cal. s. soda, bbls., $1.25@1.50 ℔ 100 lbs.; sks., $1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb tins; borax concentrated, 7@8c ℔ lb.; roll sulphur, 4@6c; powdered sulphur, 2@3c; flour sulphur, French, 2@3c; alum, $2.00@2.25; California refined, 2@2½c; sulphide of iron, 9c ℔ lb.; copper sulphate, 5@7c; chloride of lime, spot, $2.50@2.75; sulphuric acid, in carboys, 66% B, 2½c ℔ lb.; nitric acid, in carboys, 8c ℔ lb.

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6c; less than 500 lbs., per lb., 6½c; in 25-lb. tin pails, ½c per lb. above keg price; in 1 and 5 lb. tin cans, 100 lbs. per case, ½c per lb. above keg price. Dry Lead—In bbls., 1 ton and over, 6c; do. in kegs, 6½c.

RED LEAD.—500 lbs. and over at one purchase, per lb., 6c; less than 500 lbs., 6½c.

LITHARGE.—Pure, in 25-lb. bags, 8@9c per lb.

BONE ASH.—Extra No. 1, 5@6c per lb. No. 1, 4@5c.

BORAX.—Concentrated, 7@9c per lb powdered, 9@12c; fused, 25@30c.

BORAX.—Crystal, 7c; calcined, 25c.

MANGANESE.—Pure, ℔ lb., 60c.

MOLYBDENUM.—$2 per lb.

CHROMIUM.—(90% and over) per lb., $1.00.

BISMUTH.—Subnitrate, per lb., $1.60.

SODIUM.—Metal, ℔ lb., $1.00.

MERCURY.—Bichloride, ℔ lb., 90c.

PHOSPHORUS. — (American) ℔ lb., 75c.

SILVER.—Chloride, ℔ oz., 90c@$1.00; nitrate, 55c.

ALUMINUM.—No. 1, 99%, small lots, 37c ℔ lb.; 100 lbs., 35c; 1000 lbs., 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

URANIUM.—Oxide, ℔ lb., $3.50.

ZINC.—Metallic, chemically pure, ℔ lb., 50c; dust, ℔ lb., 10c; sulphate, ℔ lb., .04c.

COAL. — San Francisco, coast, yard prices: Wellington, $8.00; Seattle, $6.50; Coos Bay, $5.50; Southfield, $8.00. Cargo lots, Eastern and foreign: Wallsend, $6.50 Brymbo, $7.50; Pennsylvania, hd., $14.00 Scotch, $8; Cumberland, $12; Cannel, $9.00; Welsh Anthracite, $11.50; Rock Springs, $9.50, long ton; Colorado Anthracite, $14.00. Coke, $10.50 per ton in bulk, $13 in sacks; Sunnyside, $8.50, long ton.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

THE CALIFORNIA DEBRIS COMMISSION having received application to mine by hydraulic process from W. S. Kerr, in Old Stiff Gravel Mine, near Vallecita, Calaveras County, Cal., draining into Wades Gulch Creek which reaches Stanislaus River, gives notice that a meeting will be held at Room 96 Flood Building, San Francisco, Cal., July 20, 1903, at 1:30 P. M.

WANTED.

WANTED--MILL TAILINGS,

Gold, silver or lead, in New Mexico, Arizona or old Mexico. Will buy or lease. Give location, quantity and value. A. E. VAN VELSAN, Telluride, Colorado. Box 181.

GypsumWanted

I desire to learn of accessible tracts of land containing first-class gypsum deposits. Those near water transportation preferred.

T. B. JOSEPH,
405 Montgomery St., Room 6. San Francisco.

MINING STOCKS WANTED.

If you are a stockholder in any good going mining company and want to sell your shares

WE CAN GET YOU CASH.

Send for our price list of 500 stocks. It tells what we will buy and what we will sell.

CATLIN & POWELL, M 94, 35 WALL ST. NEW YORK.

SITUATIONS WANTED.

A YOUNG MAN WITH 12 YEARS' PRACTICAL mining experience wante position where the ability to do things and doing them will lead to advancement. Can aesay, survey, run engine or pumps, sharpen toole, or do anything ahout a mine. Have some mill experience. References given. Address R. J. S., care of this office.

ASSAYER AND CYANIDE MILLMAN DEsires position. References. Address "Aesayer," care of Mining and Scientific Press.

CAPABLE ENGINEER OF GOOD STANDING and experience would like to purchase an interest in an established engineering husiness—mining or civil. Only a husiness capahle of expansion and doing high grade work is desired. Address "Experience," care of Mining and Scientific Press.

EXPERIENCED ANALYTICAL CHEMIST. ASsayer and Millman desires position. Address H. T. S., thie office.

FIRST-CLASS METALLURGICAL CHEMIST and Assayer desires position. Can furnish hest of reference, etc. Address C. W. L., this office.

FIRST-CLASS MINING AND LAND SURveyor, Draughtsman, etc., desiree position. Address H. W K., Box 74, Long Beach, Wash.

MECHANICAL ENGINEER—HAVE A UNIversity education and am an all around practical mechanic. Four years experience in steam and hydraulic engineering; have designed an up-to-date hlast furnace; have heen connected with large copper mine for two years: good references. Prefer large gold or copper mine; foreign country preferred. Address A. B. C., care Min. & Sci. Press.

MINE SUPERINTENDENT WANTS POSITION with a suhstantial company that has a mill on property. A qualified mining engineer who can run a mine or mill, cyanide plant, asseying and surveying. Address "Mining," this office.

MINING MAN OF 14 YEARS' EXPERIENCE. Thoroughly familiar with modern mining methods. Expert mill. cyanide and chlorination man. References. Address B, this office.

MINING ENGINEER, 26, GRADUATE MINING Department University of California; for pest thirteen months employed hy one of largest mines in Mexico as head assayer and chemist, also mill assietant; after took cherge of 60-stemp mill and hacienda. Has had some experience in mining, cyaniding, surveying, drafting, and good experience in pan amalgamation. Best of references from hoth general manager and superintendent where last employed. Address 1666 Page St., San Francisco.

HELP WANTED.

WANTED--An Experienced General Superintendent and Foreman for Large Construction Contract Near City.

Must he a man of vast experience and great ability, and one thoroughly able to handle men to the hest advantage; familierity with timher and concrete work neceeesry; hest references will he required; high salary to the right man. Box 39, this office.

ASSESSMENT NOTICES.

MARINA MARSICANO GOLD MINING COMpany.—Location of principal place of hneinece, San Francieco, California; location of worke, Sunny Hill, Shaeta County, California.

Notice is hereby given, that at a meeting of the Board of Directore, held on the 4th day of June, 1903, an aeeeeement (No. 26) of ten ecente per share wae levied upon the capital stock of the corporation, payahle immediately in United Statee gold coin to the eecretary, at the office of the company, 415 Front street, San Francieco, California.

Any etock upon which thie aeeeesment ehall remain unpaid on the 1et day of Auguet, 1903, will he delinquent, and advertieed for eale at public auction; and unless payment ie made hefore, will he eold on MONDAY, the 31et day of August, 1903, to pay the delinquent aeeeeement, together with the coete of advertieing and expeneee of eale.

By order of the Board of Directore.

CHAS. BOVONE, Secretary.

Office—415 Front etreet, San Francieco, California.

EUREKA CONSOLIDATED DRIFT MINING Company.—Lccation of principal place of husiness, San Francisco, California; location of works, Placer County, California.

Notice is herehy given, that at a meeting of the Board of Directors, held on the 15th day of May, 1903, an assesement (No. 37) of one-half (½) cent per share was levied upon the capital stock of the corporation, payahle immediately in United Statee gold coin to the secretary, at the office of the company, 214 Pine street, San Francisco, California.

Any stock upon which thie asecssment shall remain unpaid on the 20th day of June, 1903, will he delinquent and advertieed for eale at puhlic auction; and unless payment is made hefore, will he eold on SATURDAY, the 11th day of July, 1903, to pay the delinquent aeeeesment, together with the coste of advertieing and expenneee of eale.

By order of the Board of Directors.

GEO. W. DIXON Secretary.

Office—Room 31, 214 Pine street, San Francieco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing aseeesment (No. 37) hae been postponed to SATURDAY, the 11th day of July, 1903, and the day of sale from the 11th day of July, 1903, to TUESDAY, the 28th day of July, 1903. By order of the Board of Directors.

Have You Decided to Adopt That Treatment for Your Ore?

Are you sure it will suit? Regrets will not change the machinery after the thing is done. Let us take the responsibility and select, install and put plant in operation under guarantee. Come and have a talk with us about it anyway—or write us. If your present plant don't do the work, let us prescribe for it.

MINES EQUIPMENT COMPANY,
CONTRACTING AND CONSULTING ENGINEERS,
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Takes the place of shingles, tin, iron, tar and gravel, and all prepared roofings. For flat and steep surfaces, gutters, valleys, etc. Easy to lay. Tempered for all climates. Reasonable in cost. Sold on merit. Guaranteed. It will pay to ask for prices and information.

THE ELATERITE ROOFING CO.,
713 Market Street, San Francisco.

SPADONE'S CONCENTRATOR BELTS.

PATENTED.



Thie illustration ehowe the edge flanging outwardly ae it passee over the pulley. Thie relievee the etrain from the top and hottom of the edge hy directing the etrain automatically to the inside face eurface of the edges. Heretofore all helts have heen eo constructed that when they pass over the pulleys or rolle, a direct etrain comes upon the top or at the hase of the edges, causing the edges to hreak away from the hody of the helte in a very short time. *We avoid this Mechanical Defect by our Spadone Curved Edge.* Belte made to fit any machine—4, 5 and 6 feet wide. Prioes and samplee on application.

AMALGAM PLATE CLEANERS.

Our Amalgam Plate Cleanere are made of Pure Ruhher in moulds, thus insuring a plate cleaner which will not ecratch the plates and a perfect edge which will clean the Amalgam plates evenly. They are made 6 inches long, 3 inchee wide and ⅛ inch thick, making a convenient eize to handle. Prioe hy mail to any address, each 75 cents. Correspondence solicited.

Send ne yonr order for Water, Air Drill, Steam, Snction and Fire HOSE, RUBBER BELTING, RUBBER PACKING and LEATHER BELTING.

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26 FREMONT STREET, Telephone Main 1813. SAN FRANCISCO, CAL.

ESTABLISHED 1859.



Hand-Power Mining Pumps.

60,000 Sold in 14 Years.

CAPACITY No. 8—4000 gallons per hour.
No. 10—6000 gallons per hour.

USED BY Calumet & Hecla Mining Co. Temple Iron Works.
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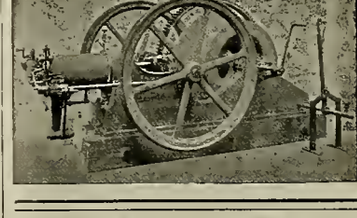
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Are You Confronted With a Difficult Ore-Separating Problem?

THE WETHERILL MAGNETIC SEPARATING PROCESS

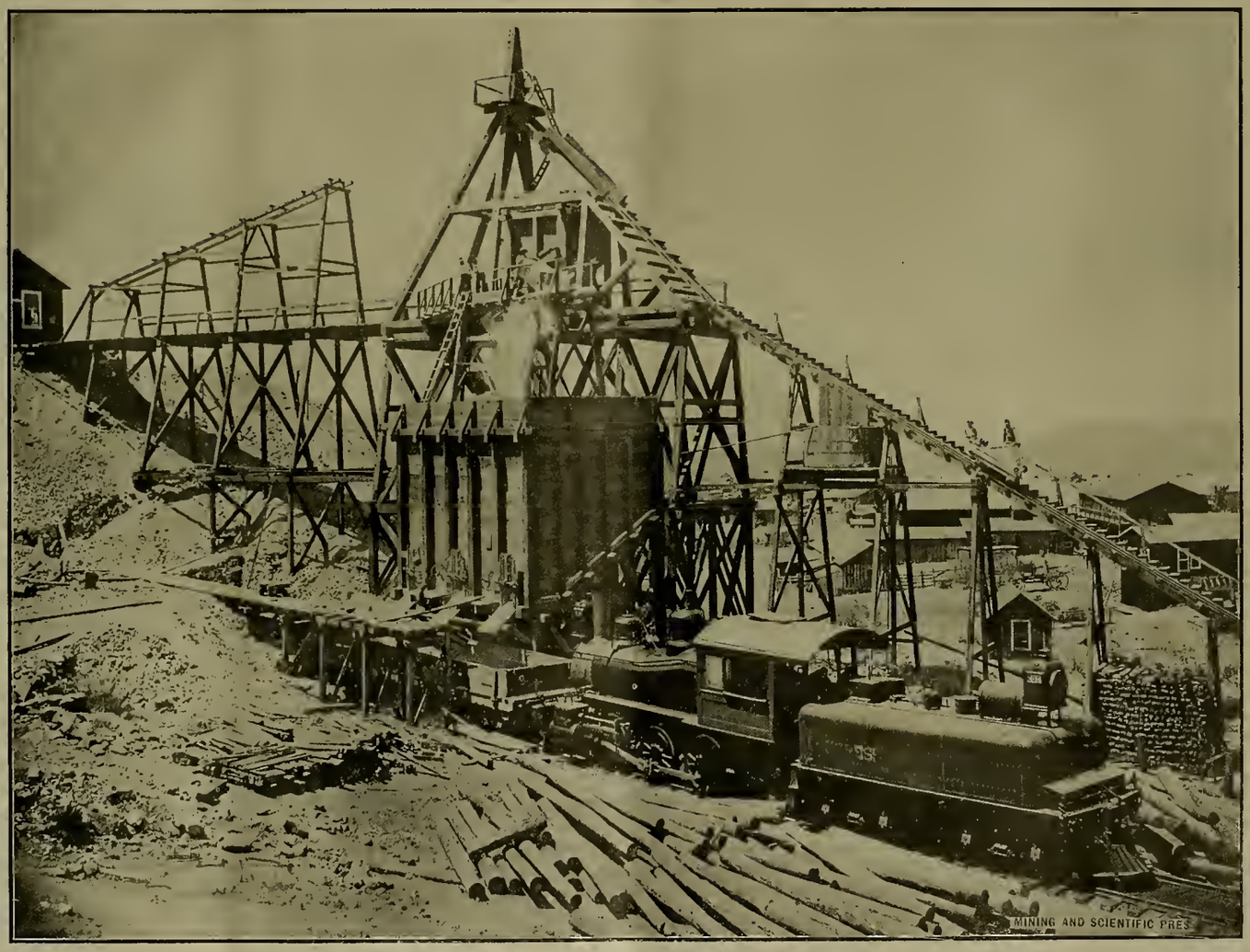
may prove the solution. Apply to Wetherill Separating Company, 68 Broad St., New York.

MINING AND SCIENTIFIC PRESS.

Whole No. 2242.—VOLUME LXXXVII. Number 2. SAN FRANCISCO, CAL., SATURDAY, JULY 11, 1903. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Head Frame Construction.

The designing and construction of head frames under peculiar and unusual conditions is of frequent occurrence. It is not always an easy or inexpensive matter to huild a head frame in such a manner as to make suhsequent operations as economical as possihle. Of course, this is usually due to the relative position of the mine shaft and the mill. Not infrequently a head frame must he built on a substructure of piers or posts, which rest on walls or sills of wood in order to secure dumping room. This occurs when the shaft is sunk on a flat. In case this is not done, then the material hoisted, ore or waste, must he elevated some distance ahove the collar of the shaft and trammed on an elevated trestle to the dump. In other instances the location of the shaft in the hottom of a gulch having steep slopes, or on the side of a steep hill, necessitates the exercise of no little ingenuity in design and construction. The shaft may he placed arhitrarily with reference to certain underground development previously performed, and the hoisting engine must be located in such a manner that the expense of hoisting shall be as low as possihle. In all of these calculations the head frame is an important factor. The accompanying engraving illustrates in a striking manner the ahove statements. It is a view of the incline and trestle at shaft No. 5 of the Congress mine at Congress, Arizona. The sheave wheel is 75 feet ahove the ground. The posts of the suhstructure are 10x10 inches, carefully framed and hraced. Ahove this is the head frame proper, the main memhers of which are of 12x12-inch timhers. A douhle hin with swinging apron, situated in the frame, receives the ore from self-dumping skips of peculiar construction, one of which may he noticed on the incline. The ore or waste is drawn from its separate compartment in the bin into cars. Waste is trammed about 100 feet and dumped; the ore is trammed over the storage hin and any waste present sorted out on the floor across the bin caps. Local conditions prevent the use of chutes direct from the skip. The ore hin holds 250 tons and delivers 125 tons at a trip to the railroad cars for transportation to the mill. The skip holds one and one-half ton. No. 5 shaft is down 1200 feet, and sinking is still in progress. The head frame here described and illustrated was constructed in July, 1902. It is a most ingenious construction, and has overcome the difficulties which the topography of the country placed in the way of ordinary huilding. The ohject in building the frame so high in this instance was to get dumping room for waste and at the same time to make it convenient to fill the railroad bin hy gravity. On page 22 is an illustration of another head frame at shaft No. 4 of the Congress mine. This frame is somewhat similar to that at shaft No. 5, hut is much more simple. There are no posts in a vertical plane except the hin posts, and no outside hraces as such. The sheave is 28 feet above the sill. The bins are of the same height as those in No. 5 frame. The skip shown holds one ton of ore, but the dumping compartment accommodates two tons. All timhers in this frame are 8x10 inches, except two main posts, which are 10x10. As compared with the usual frame of two vertical posts, with cap and hraces, a head frame of the ahove type of construction is more economical, in timber and lahor, while securing greater rigidity, and requires less ground space. An apron is provided at the hack of the shaft, which when desirahle may he lowered and the rock skip run hack on the track shown, and a water skip suhstituted for it. The gates of the ore hins are provided with direct acting levers in place of the rack and pinion so commonly seen. A careful study of the design of this frame will repay all who are interested in head frame construction, as it emhodies engineering features not commonly ohserved in frames of the rectangular type, or in tapering frames with four posts.



Incline and Head Frame at Shaft No. 5, Congress Mine, Congress, Arizona.

There is a tendency on the part of those designing head frames, who are not technically educated mechanical engineers, to put much more timher into a head frame than is really necessary. Some of these frames cost 100% to 300% more than is actually required. Western miners generally would he surprised to see some of the frames huilt over shafts in the lead and zinc regions of Missouri. Some of these frames have a rectangular or square hase, tapering somewhat toward the top and are constructed of lumher —not of timhers 10x10 or larger. In some of these frames there is not a piece of lumher larger than a 2x8-inch stick.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION.

United States, Mexico and Canada.....$3 00
All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

BRANCH OFFICES:

NEW YORK CITY, 720 Park Row Bldg. BOSTON, 42 Worcester Square.
CHICAGO, 1115 Monadnock Block. DENVER, 606 Mack Block.

J. F. HALLORAN..... Publisher

San Francisco, July 11, 1903.

TABLE OF CONTENTS.

ILLUSTRATIONS: Page.
Incline and Head Frame at Shaft No. 5, Congress Mine, Congress, Ariz.....17
Dredging and Valuing Dredging Ground in Oroville, Cal.....20
Head Frame Shaft No 4, Congress Mine, Congress Ariz.....21
Mining and Metallurgical Patents.....22
Power House and Transmission Line, Cascade Power Co., Cascade, B. C.....23
Sub-Station, Line of Cascade Power Co , Phoenix, B. C.....23
Filter-Press Treatment of Gold Ores and Slimes by Cyanide.24-25

EDITORIAL:
Head Frame Construction.....17
A Duty on Nitro Powder.....18
White for Black Labor on the Rand.....18
The Copper Outlook.....18
A Uniform Signal Code Needed.....18
Measurement of Undeveloped Ore.....18
Steel vs. Timber Head Frames.....18
Kind of Rock of Small Consequence.....18

MINING SUMMARY.....27-28-29-30-31
LATEST MARKET REPORTS.....32
MISCELLANEOUS:
Concentrates.....19
Dredging and Valuing Dredging Ground in Oroville, Cal.....20
Engines for Deep Winding.....21
Co-operative Mining.....21
Mining and Metallurgical Patents.....22
Cascade Water, Power & Light Co., Cascade, B. C.....23
A Proposed Signal Code.....23
Filter-Press Treatment of Gold Ores and Slimes by Cyanide....24
Direct Steam Ore Stamps.....25
Iron Sands on Lake Superior.....26
Mining Witb Machine Drills.....26
Obituary.....31
Personal.....31
Books Received.....32
Catalogues Received.....32
Commercial Paragraphs.....32
New Patents.....32
Notices of Recent Patents.....32

A Duty on Nitro Powder.

The recent imposition of a tax on nitro powder hy the Republic of Mexico seems to have heen anticipated hy mine managers and dealers in mining supplies. The law hecame operative about July 1, but previous to that date a very large amount of powder was shipped into the country, enough to last for many months, it is said, in view of the tax, which amounts to ahout 4.5 cents per pound, a duty of nearly 45% on first cost of consumer hy the carload in the United States. It is said the Mexican Government has given a concession to certain persons for the exclusive privilege to manufacture nitro powder in the Republic. What the outcome will he is uncertain. It is not helieved, however, that the new concern can operate successfully without this high protective tariff. A large increase in the cost of an article so essential to economic mining as nitro powder has hecome, cannot hut have a depressing effect on the development of Mexico's mineral resources, particularly in that of low-grade mines, which in Mexico, as elsewhere, are run on a close margin. The manufacture of nitro powder is a business requiring high technical skill, years of experience and the most careful manipulation. Where all of these prerequisites are not ohtainahle, and sometimes where they are, the result is not always satisfactory, and in the former case often disastrous, as the repeated destruction of powder manufacturing plants in the United States proves.

IT is stated that if eight companies operating on the Rand, in South Africa, were to suhstitute white lahor for hlack on the hasis that the lahor of one white man equals that of two hlacks, the natives receiving 2 shillings 4.2 pence per day and the whites 12 shillings per day, the excess in cost per ton would exceed $2.50. This is a very suhstantial argument in favor of native lahor. The problem of lahor on the Rand seems to he likely to find a solution in the failure to a great extent of the native meelie crop in Natal, this misfortune having the effect of causing the natives to seek work in the mines of the Transvaal.

The Copper Outlook.

The price of copper is slowly going down, and those interested in the industry, either as producers, consumers or dealers, are watching the market with much interest, if not anxiety. It is thought hy some who are in a position to know the real condition of things, and who are as thoroughly informed as to supply and demand as modern means of information will admit, that the present lowering price is only temporary. Large consumers have not yet made their annual contracts, and are said to he stock taking at the present time. This done, extensive orders are expected, which will stimulate the price, and a recovery to 15-cent copper is anticipated in consequence. The optimistic ones also say that the shutting off of production of about 20,000,000 pounds of the Anaconda, Mont., output, necessitated by the shut-down of those works for several months during summer, to enable them to make improvements in the reduction plant, will have a tendency to aid the market. It is contended that none of the large producers have any considerahle amount of metal on hand. The export trade, however, has fallen off considerahly, and prices in Europe are relatively lower than in New York.

Copper has had a very favorahle year, and the high market price, together with cheapening of cost of production in many districts, has had the effect of stimulating production in a marked degree. The demand for copper has apparently kept pace with the production, however, and there is no immediate indication that there will he a material decrease in the requirement of copper. Throughout the industrial world there is a demand for cheaper power, no matter what the price may have previously heen. In many instances this demand is met hy electric installation which calls for large amounts of copper.

A great deal has heen published of late concerning the copper resources in the Katanga district, in the southeast end of the Congo State, Central Africa. The property is known as the Tanganiyka concessions. The statement that there are already in sight in one of the company's claims 10,000,000 tons of copper ore should he taken with some allowance, though douhtless the mines look promising. Every explorer who has penetrated into the heart of Africa reports copper on the upper Congo and its southern affluents. The Tanganiyka concessions are in this district, lying north of Rhodesia and west of Lake Tanganiyka, one of the sources of the Congo river. For many generations the natives have worked the iron and copper deposits in that region, and it is stated that the large deposit ahove referred to is already honeycomhed with the workings made hy the natives. In addition to this, it is said that there are numerous other copper-hearing deposits in that region. Whatever may be the future of the Tanganiyka concessions, it is unlikely that they will hecome an important factor in the copper world within three years, and it may be still longer, for railroads must he huilt, power controlled, reduction works constructed and many other things accomplished, all of which take time in any country, and it is not to he expected that this large amount of preliminary work can or will be more quickly accomplished in Equatorial Africa than elsewhere.

A railroad is projected into the Katanga region from the west, which will he not less than 900 miles in length. The Congo as a waterway would he the natural outlet, hut the streams in the vicinity of the mines are for the most part unnavigahle. On the main Congo the Stanley Falls form another ohstruction, extending for miles in a series of great falls and cataracts.

A Uniform Signal Code Needed.

A uniform code of mine-hell signals is much to he desired, for the reason that miners are, as a class, migratory, seldom remaining in one locality for any considerahle length of time. After having worked in a district for some months he hecomes thoroughly familiar with the code in use there, but upon removing to another State or district he must, in many cases, learn anew the code of that State or locality, and although this may he mastered readily enough, such a man is at any time liahle to meet accident or cause injury to others by inadvertently ringing a signal previously familiar to him, hut which may mean something entirely different in the new locality in which he is working. Fortunately steps are heing taken to harmonize the conflicting codes of the several States and localities. This matter should he taken up hy the American Institute of Mining Engineers and other mining societies and conventions, when a suitahle code would prohahly result, which would he found applicahle to mines of every class, and in every State or district.

Measurement of Undeveloped Ore.

An ore hody not hlocked out hy actual shafts, drifts, crosscuts, winzes and raises is a most uncertain quantity. The trend of the walls forms no index of the quantity of ore not actually measurahle. An ore body is seldom symmetrical in form, and the shape or dimensions of any one portion of it cannot he depended upon to give even an approximate idea of the extent or value of unseen portions of the same ore hody. Good hodies of ore disappear or come to an end in the most unaccountahle manner. Crossheads or faults cut off veins regular and apparently continuous. Mineralization sometimes stops at a jointing plane, and values hecome impoverished or nil. In other instances the mineralization continues, hut values cease to accompany the ores or drop to a point where profit is no longer possihle. The engineer who not long since said "the average mining report is only a nice fairy tale" was not far from the truth, for there are those making reports on mines in these days of prosperity whose entire mining knowledge and experience has heen gained within a year. The man who wrote in a prospectus that the ore shoot had heen developed 300 feet in length and the shape of the hill indicated that it would he at least 300 feet longer was certainly favored with a "gift" not possessed hy most people—that of seeing several hundred feet into the undeveloped portion of a mining claim. He was frank enough, however, not to include this extension of the vein in his estimate of "ore in sight." A prospect may he poor indeed, hut any prospect deserves a trial; and if an improvement can he noticed, it is safe to follow it as long as it improves, for hefore long it will have developed a paying mine. But this simple fact does not justify misstatements as to ore in sight, nor does any numher of years of experience make a man competent to estimate ore in sight in undeveloped mine workings.

Steel vs. Timber Head Frames.

On the Rand, South Africa, steel head frames are displacing the old timher frames, and new mines are being equipped with steel frames as soon as the permanent plant for deep working is estahlished. In the United States and Mexico a somewhat similar condition is noticeahle, particularly in those districts where suitable timher is scarce and expensive. The weight of a steel frame varies greatly according to design and size, hut usually runs from 25 to over 100 tons. A large and elahorate frame will weigh more than 100 tons. Timher frames are subject to decay, and deterioration otherwise in the course of a few years, and are always menaced by fire, though care is used to prevent such a catastrophe. On the whole, a steel frame is superior in many respects, and it will prohahly be hut a few years when steel frames will be almost as common as timber frames are now. They can he taken down and removed to a new site without damage or loss if properly designed and constructed. Steel frames are in use at some of the deepest shafts in the world. Timber frames are also in use at shafts of great depth—2000 to 3000 feet and over—so from that standpoint it may be said there is no particular advantage to either over the other, hut the reasons already given will eventually make the steel head frame preferred to timher frames.

MANY prospectors lay great stress upon the character of the country rock through which their veins run. As a matter of fact the kind of rock is of small consequence. If the ore in the vein has little or no value, the "kind of rock" through which the vein runs will make no material difference to him. The "character" of the rock rather than the "kind" sometimes affords an indication of the proximity or ahsence of ore hodies, hut not of the value of the ore.

CONCENTRATES.

IN some classes of work spring steel, tempered in oil' it has been found, will draw its own temper by removing the steel from the oil, while still retaining heat.

SYLVITE contains no silver. It is a combination of chlorine, 47.6, and potassium, 52 4, forming potassium chloride; sometimes contains sodium chloride. Sylvanite is a telluride of gold and silver and contains 24.5% gold and 13 4% silver.

DIAMOND DRILLS are made to be operated by hand power, claimed to have a capacity of 300 feet, boring in any direction. It is probable that a drill operated by power would prove more satisfactory in the end, though the first cost would be more.

STADIA MEASUREMENTS may be carried on with a good transit with sufficient accuracy up to 600 feet, and with very high powers somewhat further, but when exceeding 1000 feet the results are sometimes unreliable, excepting possibly under very favorable conditions.

AMETHYST is a purple-colored quartz crystal, in which the color is supposed to be due to manganese. Oriental amethyst is a purple variety of sapphire. It is a peculiar variety of that gem, having a stellate opalescence when viewed in the direction of its vertical axis.

THE fact that a man is an excellent and experienced blacksmith, and is able to fashion and temper drill bits to a nicety, does not necessarily imply that he is a machinist, competent to care for a machine drill. Many drills are ruined through the incompetency of the "machinist."

STEEL is largely employed in construction of mill, smelter and other reduction plants. It is customary to carefully paint all structural steel, and a suitable paint renders the steel impervious to acid fumes and gases, as well as to dampness due to steam or natural humidity of the atmosphere.

THE aggregate power of a fall of water is the product of the weight of water discharged in a unit of time into the total head. The term "head," used in connection with water power, means the difference in height from the surface of the water in the wheel pit to the surface of the water in the penstock when the wheel is running.

A MACHINE DRILL too much worn to be economically valuable in a mine may be fixed up and mounted on timbers on the surface to be employed as an engine for pulverizing samples of rock. One accustomed to its use can pulverize fifty to sixty two-pound samples daily to a condition requiring little grinding on the bucking board.

A MILLING PRACTICE which does not make a satisfactory saving of values should be abandoned, even if it has been in use for over thirty years. It is possible the ore may have changed in character with increasing depth of the mine. This is usually the case, and when this occurs the milling practice must necessarily undergo more or less change.

SULPHUR occurs in iron ores as sulphides, such as pyrite, and in sphalerite (zinc blende), also as sulphate in gypsum, barite and celestite. In iron and steel it occurs as sulphide only. In the gravimetric methods for determination of sulphur it is first converted into a soluble sulphate and the sulphuric acid precipitated by barium chloride and weighed as barium sulphate.

THE "angle of convenience" is the slope angle assumed by loose rock, as that collected at the foot of a precipice or the front of a mine dump. This angle varies slightly with different materials, but is about 35°. Few hills are steeper than 35°, though often appearing to be steeper. The character and dip of the rocks often have important bearing on the slope angle of a hill.

"BLOWING-IN" in blast-furnace parlance means the beginning of smelting operations in a new furnace, or in an old one after a period of idleness. It consists of three operations: Warming the crucible, filling the furnace and beginning the smelting. The process is one requiring good judgment and experience. It should never be hastily undertaken, as by raising the heat too rapidly damage may result to the furnace.

IRON PSEUDOMORPH after garnet may occur, but it is more probable that the crystals of iron ore, said to be pseudomorph after garnet, are only natural forms of pyrite, or of limonite after pyrite. Garnet and pyrite each crystallize in the same system—the isometric, and some of the forms bear a great similarity to each other, and one might easily be mistaken for the other by those not thoroughly familiar with crystallography.

IN cyaniding, the once dreaded slimes are in some localities now created intentionally, for the reason that it has been found that much higher extraction can be generally obtained than when the ore under treatment is not in a fine state of division. In treatment of slimes the filter press is an important factor, though large amounts of slimes are treated by decantation. This has been accomplished successfully on clayey and talcose ores.

OIL WELLS are sometimes drilled under the direction of those having no knowledge of geology, in rocks containing no oil, being hard, crystalline schists, and in which any one acquainted with rocks, or having only elementary knowledge of geology would know that no oil need be expected. Those contemplating the sinking of prospecting oil wells should seek competent advice before undertaking this expense, if not well acquainted with oil-bearing formations.

IN the manufacture of glass, sands of varying kinds are used for the several sorts of glass. Clean sand free from iron is used in making ordinary window glass, but flint is necessary for the whiter and clearer varieties. For bottle glass, such as seen in the green variety, any sand is suitable. Granulite, a micaless variety of granite, is used extensively in glass manufacture, as it naturally contains the necessary ingredients. Moulder's sand has sufficient clay to keep the moulded form.

NITRIC ACID is manufactured by heating a mixture of potassium or sodium nitrate and sulphuric acid, and condensing the acid vapors in a cooled receiver. Acid thus formed contains water derived from that in the sulphuric acid, and also in part from that derived from the decomposition of a portion of the nitric acid by heat. The acid is purified by mixing it with an equal portion of sulphuric acid and redistilled. The distillate is warmed and a current of dry air passed through it to remove nitrogen tetroxide.

CHLORITE is a green iron-magnesian silicate of aluminum with chemically combined water and no alkalies, and is the result of alteration of hornblende, pyroxene, biotite, etc. Chlorite schist is a granular to schistose aggregate of scaly chlorite with quartz grains. It is sometimes accompanied by feldspar, talc, mica, epidote and magnetite. It results from the alteration of greenstones. Chlorite schist is not infrequently gold-bearing, and in some regions large masses are mined and milled at a profit. The rock is usually green, but it is sometimes red, or grayish green.

IN SINKING SHAFTS, particularly inclines, there is little, if any, economy in making the compartments so small that men cannot work freely. An incline having an inclination of 70° should measure at least 4.5 feet from foot wall to hanging wall plate, and if of less than 70° should have not less than 5 feet clear. A good roomy shaft not only becomes safer for the men, but it also makes it possible to hoist a large tonnage should it ever become necessary to do so. The difference in the cost of a large and a small shaft of the same number of compartments is not great, and will usually pay for the additional investment.

PLATINUM is a dense metal of tin-white color, moderately hard, and ranks next to gold and silver in malleability and ductility. It is readily drawn into fine wire and rolled into thin sheets. It is infusible in the ordinary wind furnace and in the flame of the Bunsen burner; but very fine platinum wires may be fused in the flame of the blow-pipe. It is not attacked by any single acid. Liquids containing free chlorine will slowly dissolve the metal. An alloy consisting of platinum and iridium is harder and not so readily attacked by acids as pure platinum, and this alloy is commonly used in the various platinum utensils employed in chemical laboratories.

THE term "mineral zone" as used in contradistinction to a "mineral vein," refers to the fact that a mineral zone is not always clearly defined, as by walls. The mineralization may extend along one or both sides of a fissure having no defining limits, while a vein is presumed to be situated wholly within definite bounding planes and may be easily distinguished from the adjoining country rock. In a zone of mineralization the mineralization may gradually disappear as distance from a central crack or fissure increases until it ceases altogether. A mass of rock within which occurs several veins or ore bodies is also often referred to as a zone.

THAT there is any economy in feeding stamp batteries by hand it would be difficult to prove to a mill man of modern ideas. Hand feeding went "out of style" twenty-five or more years ago, though there are a few isolated localities where it is still practiced. A man who feeds a battery by hand for $1 a day and his board, costs at the end of a year at least $500. This sum will buy six first-class automatic ore feeders, which will feed six batteries of five stamps each, whereas three men would be required to feed this number of stamps at each shift. Comment of the saving effected, to say nothing of the better feeding, is unnecessary.

IT is not to be expected that an ore containing 10% to 15% sulphides, with gold in a very fine state of division, would be treated in the same manner as an ore containing but 1% or 2% sulphides, with a large percentage of gold free in the gangue. These two conditions in the character of the two ores practically represent the difference between the treatment of gold ores in Gilpin county, Colo., and in Amador or Calaveras counties, Cal. The former is slow and difficult to amalgamate, and explains why the high slow-speed drop is employed, and the latter instance indicates the advisability of employing the short quick-drop, the common practice in California. A slow-drop Colorado mill was built on a sulphide mine in eastern San Bernardino county, Cal., in 1892, but did not accomplish satisfactory work. This may have been due to the mill work, rather than to the mill.

ARTIFICIAL DIAMONDS of microscopic size have been produced recently in an electric furnace by fusing iron rods and carbon at a temperature of 3500° C. and plunging the crucible containing the melted iron into a bath of molten lead. The iron breaks into fragments, and being lighter than the lead rises to the surface of the bath in spheroidal forms. Within these spheres are found the microscopic diamonds, some black (bort), others bright, clear and sparkling, some colorless, others yellow, etc. In fact these minute diamonds appear to possess many, if not all, of the physical characteristics of the larger diamonds found in the South African mines. Strangely, however, the artificial stones split after a few months exposure to the atmosphere, though a similar phenomenon has been occasionally observed in diamonds weighing a carat or more, taken from the blue ground of De Beers and Kimberly mines.

A GOOD METHOD of dispelling foul air from a tunnel after a shot is in use by W. M. Bainbridge at the El Paso mine, Cripple Creek district, Colo. A steam pipe is connected with the air line with a valve close to the connection. After shooting, the air is turned off and the steam is turned into the breast of the drift for ten minutes. Then the steam is turned off and the air turned on. The steam absorbs the poisonous fumes in the smoke. The air cools the drift. One half to three-quarters of an hour is saved in time. The blowing of steam into a drift or shaft after blasting will hasten the clearing up of the smoke and gas, whether compressed air be available or not. This practice is detrimental to timbers. However, the damage done to timbers, causing expense in replacing them with new ones, is more than offset by the small loss of time with which men can resume work after blasting.

MACHINE ROCK DRILLS are not a new institution in mining. The first rock drill was put into practical service in the United States in 1838. The first type of rock drill was known as the "drop drill," by reason of the drill bar and bit being lifted by a cam, or crank, and allowed to fall, in the same manner as a mill stamp. Springs were also introduced to accelerate the speed or force of the downward blow, and the elasticity of the air was in some instances employed for this purpose. These machines were first employed upon open canal or quarry work. The first drill which at all resembled, even in a small degree, the modern air or steam drill, was made in 1848. In this machine the drill was operated by steam, the drill bar passing through the piston. It was alternately drawn back and plunged forward against the rock. This drill was not a success, being too cumbersome and expensive to operate, but it was the first step toward the type of machines now in successful use everywhere. A German engineer named Sommeiller was the first to run a machine drill with compressed air, at the Mt. Cenis tunnel, driven through the Alps mountains. The term "Burleigh drill," now applied almost without discrimination to any make of machine drill, is due to the fact that the Burleigh machine was one of the first in practical use, though it was preceded by the Hanson, Brooks and other drills.

THE hydrographer in charge of the United States Survey at Yuma, Ariz., reports that 75,000 cubic feet of water per second is flowing past Yuma in the Colorado river at present, and that the river is unusually high. In midsummer this river is always higher than during other seasons of the year, owing to the melting snows on the high ranges of Colorado and Wyoming, the western drainage of which flows into the tributaries of the Colorado. The vast volume of water flowing past Yuma receives no material addition at any point between Yuma and the San Juan river, in southern Utah. When the river is high it usually overflows into the great depression in southern California known as Salton basin. This basin is about 140 miles in length by about 30 miles in average width, and covers approximately 4000 square miles. At the lowest portion of the basin it is 265 feet below the level of the sea. The ancient shore line can be plainly seen around the greater portion of the basin, the average depth of which below the level of the Colorado river is probably about 100 feet. At one time in the past—but, geologically speaking, at a very recent date—this basin was an estuary or arm of the Gulf of California. The Colorado, which, like all rivers carrying a large amount of sediment, gradually built up bars along its banks and eventually cut off the connection of the interior basin with the gulf, and in succeeding years the basin gradually dried up by evaporation and absorption, until nothing was left of the once great body of water but a salt marsh at Salton. In 1892 the river overflowed, making extensive breaches in the natural levee it had itself constructed. As the river went down, however, this inflow stopped, and since that date no overflow of consequence has been reported. Should the great volume of the Colorado, however, be turned from its present course into the Salton basin, it would probaby require not less than seven years of continuous, uninterrupted flow at the rate of 50,000 cubic feet per second, which is considerably above its average amount of flow, to fill it. This estimate takes no account of absorption or evaporation, which would be excessive.

Dredging and Valuing Dredging Ground in Oroville, Cal.*

Written by NEWTON BOOTH KNOX.

The gravelly bottom land below Oroville, Cal., is being extensively mined for gold by means of dredgers. Upon a strip of land 9 miles long by 2 miles in width, bordering on and adjacent to the Feather river, twenty-one dredgers are at present working. These dredgers are the property of about twelve companies, who own dredging land varying from 80 to 800 acres. The companies are all close corporations, and though the official figures of working costs and profits are difficult to obtain, it is well known that they yield their stockholders excellent dividends. For instance, one company's working expenses, including labor, repairs, power, interest on capital invested, depreciation of plant, sinking fund, etc., amounted to but 32% of the bullion output, leaving the remaining 68% clear profit.

The total general average of the drillings of several of the largest companies' holdings, covering a period of several years, gives the value of the gravel between 17 cents and 19 cents per cubic yard, and average depth of 11 yards. As a dredger handles from 1200 to 2000 cubic yards per day, at a cost of from 5 cents to 8 cents—average 6 cents—per cubic yard, it is evident that the returns in this work are considerable.

HISTORY.—In the early days of California history Oroville district was extensively mined by first the white man and later by the Chinese. It is claimed that $82,000,000 has been taken out within a radius of 8 miles of the town of Oroville. The gravels were worked to water level, and washed mostly in hand rockers. Pits and small shafts were sunk until a rich paystreak was encountered, which was followed, drifted out, hoisted to the surface and rocked. Water interfered greatly with this style of mining, and only the richest streaks could be worked. The gravels left made excellent dredging ground.

THE GRAVELS.—The gravel deposit about Oroville evidently represents the flood plain of an ancient stream of the Sierra Nevada, near the point where it debouched into the gulf which then occupied the present great valley of California. As stated, the gravels average about 33 feet, varying from 28 feet to 60 feet in depth. A false bedrock of lava ash, or volcanic tufa, varying from the consistency of chalk to that of firm sandstone, is encountered at this depth. Below this false bedrock are gravels and sand. In one place a hole was drilled 80 feet below, and showed sharp white sand. In some places the gravel is topped by a red soil overburden, varying from 10 feet to 25 feet in thickness. This overburden and the material below the false bedrock contain little or no gold. The gravel is fairly coarse, large boulders—weighing 300 pounds or 400 pounds—being very exceptional. One-half of the gravel will pass through a ½-inch screen. As a rule the gravel is not cemented, though some dredgers have encountered pieces of ground which had to be loosened with powder.

The gold is distributed more or less equally throughout the gravels. Rich concentrated streaks of from 1 inch to 1 foot in thickness occur, followed by barren sandy areas, which seem to represent varying conditions of flow in the depositing stream. The gold is in a very finely divided state, and easily caught by the riffles, cocoa matting and quicksilver of the dredger. Nuggets are a rare occurrence. The gold found in the boreholes is 922 fine and worth $19 an ounce. The dredger bullion is somewhat lower grade, the base being the surprisingly large amounts of lead in the form of quail, rabbit and duck shot which the dredger digs up.

This fact is interesting and would be hard to believe if it were not very well authenticated. This region has been a great small game country, and during the last fifty years doubtless thousands of pounds of shot have been scattered over the gravels which the dredger is now recovering. Nor does it require such reckless shooting on the part of these old hunters to reduce the bullion grade as would at first appear. Take an 11-yard bank of gravel. This contains 50,000 cubic yards to the acre. A dredger could treat an acre of this a month, producing a bar per month of say $10,000, or, roughly, 500 ounces of bullion.

Now, if the bullion from drillings went $19 = 950 fine, all gold, and if the bullion from the dredger went $17 = 850 fine, all gold, or 50 ounces gained in lead in the 500-ounce bar, fifty ordinary shotguns, 12 gauge, would furnish this much shot. The baseness of the bullion, however, does not truthfully represent the amount of shot, as on most of the dredgers the lead is separated by panning, and carefully picked, before the bullion is melted. On the Butte dredger they have collected about 50 pounds of shot from about 2 acres of gravel.

Occasionally a pistol ball is found, recalling the golden, glorious old days of California history, when some festive "man behind the gun," filled with enthusiasm and "harb wire" whisky, would sally forth in search of trouble and—generally find it.

The Oroville district is peculiarly favorable for dredging, for the following reasons:

1. Bedrock (so called) is soft and easily cut by the dredger.
2. Boulders are small.
3. Water is available.
4. Power (electric) is cheap.
5. Gold is fairly evenly distributed.
6. Climate is such that work can be carried on twelve months of the year.
7. Labor is cheap and efficient, and, finally,
8. The gravel contains enough gold.

TESTING THE GROUND.—In order to ascertain whether a piece of ground is worthy of consideration, the following system is adopted:

The land is first divided, according to its area, into blocks of from 5 to 10 acres, and a hole is drilled in the center of each of these blocks.

The driller generally adopted in Oroville consists of a "walking beam" operated by steam power producing the required motion for raising and dropping the drill. In addition to this is a reel, on which is wound the rope of the sand pump used in pumping out the holes. The drill is suspended by a 2-inch Manila rope, which passes under one sheave on the walking beam over another to the main drum. As the walking beam moves, the rope is alternately tightened and loosened, which raises and drops the drill. The drill itself consists of:

1. Rope socket (Fig. 1).
2. Drill stem—a piece of soft steel about 4 inches in diameter and from 12 to 15 feet long (Fig. 2).
3. The bit, with a single cutting face about 5¼ inches long (Fig. 3).

When ground containing coarse boulders is being drilled there is a liability of the drill becoming wedged in the hole, and in order to prevent this a tool called the jars (Fig. 4) is inserted between the rope socket and the stem. It is like two links of a chain, and when the bit is caught these two links coming together with a shock jar the drill loose.

The whole string of tools, socket, jars, stem and bit weigh about 1200 pounds.

SPEED.—The driller makes about sixty 30-inch to 40-inch strokes per minute.

FUEL.—About a half cord of oak wood is burned per day of ten-hour shift.

WATER.—For drilling and washing the drillings about 1000 gallons of water is used per day.

THE OPERATION.—The land is surveyed and the location of the drill holes staked out and marked by flags. The drill is set up over flag No. 1. A hole is shoveled out to a depth of about 2 feet and the first length of casing is made ready. This section of casing or drive pipe is 5¼ inches inside diameter, ¼ inch thick, and about 5 feet long. It is fitted with a wrought steel drive shoe (Fig. 5) to protect the lower end from injury. This drive shoe is made 7¼ inches in diameter at the cutting edge and is slightly beveled inward. On the other end of this casing is screwed a steel driving head to prevent the threads from being battered during driving. This casing, so mounted, is set up in the hole directly under the suspended drill and tamped around with excavated dirt.

Drilling is now commenced. Water is poured in from time to time to thin out the material. After the ground below the foot of the shoe is loosened for a distance of say 1 foot, the casing is driven down and the loosened and thinned material removed by means of the sand pump (Fig. 6), a hollow pipe supplied with plunger and foot valve.

The driving is accomplished by striking the driving head with a couple of iron blocks clamped to the stem by means of two 1¾-inch bolts (Fig. 7), the weight of the string of tools acting as a hammer. After driving, the driving blocks are removed. When the first length of casing is driven down to head the driving cap is removed, a second section of casing is screwed on the first, the driving cap replaced, and drilling resumed. When the required depth is reached—determined either by striking "bedrock" or passing through the pay stratum—the hole may be considered finished, and the next step is to pull up the casing. This is accomplished by removing the bit, stem and jars, and replacing them by what is known as the pulling or pipe jars (Fig. 8). These consist of an iron boss fixed to the end of a rod 4½ feet long. Above the boss is a 1-inch-thick plate—the "knocking head"—provided with threads which are screwed into the sleeve of the top section of casing. The stem of the boss passes through a square hole in the plate. The walking beam is set in motion and the string of casings is raised by the boss striking against the knocking head. As each section of casing is raised it is unscrewed and the knocking plate screwed on the next. If care is used in keeping the threads of the casing clean, the casing can be used for a long time. It is rarely that a casing is lost. Fig. 9 shows the casing, drill bit, driving cap and driving head in section.

TREATMENT OF DRILLINGS.—The drillings extracted from the drillhole by means of the sand pump are discharged into a wooden trough 12 feet by 1 foot by 1 foot, set on a slight grade. From the trough they are run into the riddle of a rocker and rocked in the ordinary method adopted for washing gravel. Great

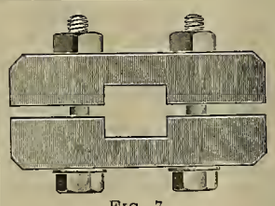


FIG 7.

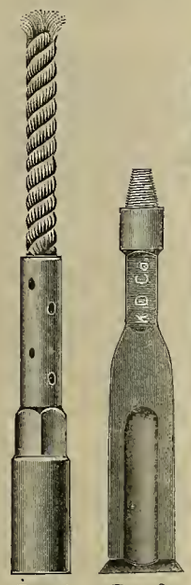


FIG 1. FIG 3

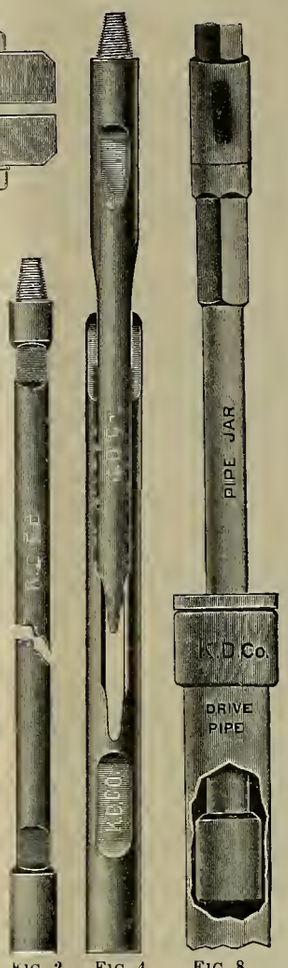


FIG 2. FIG 4 FIG 8

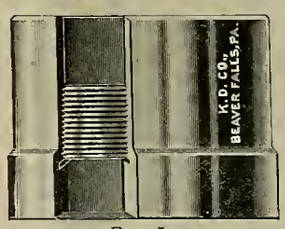


FIG 5.





FIG. 6.

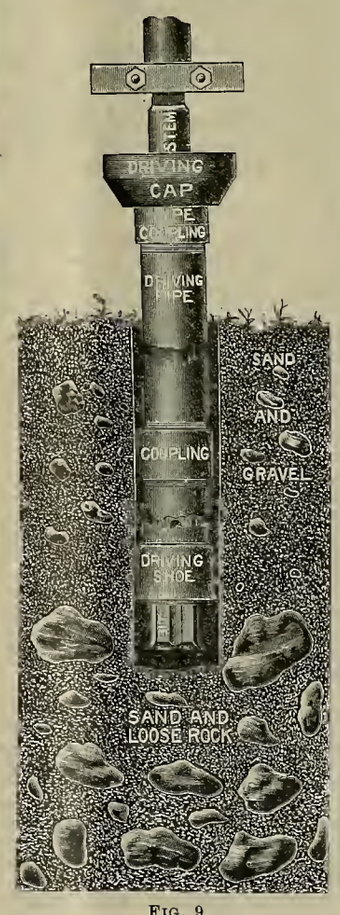


FIG. 9.

*Trans. Inst. Min. & Met.

care is taken to save all the extremely fine particles of gold, as upon this work depends the accuracy of the tests made. It is customary to clean up the results of each pumping, and to carefully note the number of countable colors obtained and the character of the ground drilled through. For instance, a page of the driller's notebook taken from actual practice is as follows:

HOLE NO. 14.

PUMPING.	COLORS.	REMARKS.
Feet.		
00 —10	1 speck	Red soil, clay, sand and fine gravel.
10 —11	22 fine colors	Gravel starts at 10 feet.
11 —12½	52 colors and fine gold	Fine gravel.
12½—13½	14 colors and fine gold	Coarse gravel.
13½—15½	4 fine colors	Gravel softer.
15½—16½	4 fine colors	Gravel softer.
16½—17½	8 fine colors (1 fat one)	Gravel coarse.
17½—18	7 colors and fine gold	Gravel coarse.
18 —19½	6 fine colors	Gravel coarse.
19½—20½	8 colors, some large	Gravel coarse.
20½—23	16 colors, some large	Gravel coarse.
23 —23½	16 fine colors	Finer gravel.
23½—24½	21 colors and fine gold	Finer gravel.
24½—25½	8 colors, fine gold.	Finer gravel.
25½—26½	13 colors, some large	Finer gravel.
26½—28	6 colors and fine gold	Finer gravel.
28 —28½	5 colors, fine gold	Finer gravel.
28½—29½	8 very fine colors	Stopped in fine gravel.

Water level 21 feet.

The term "fine gold" is applied to such specks as are too small to be counted, but which play an important part in making up the total value of the hole. The gold from each cleanup is put in a small dish.

This practice of cleaning up after each pumping (approximately after each foot of hole drilled), instead of one final cleanup, is all-important in furnishing data for a cross-section map, showing occurrence of rich streaks—sandy or clay patches, fine gravel, depth of overburden, of false bedrock and of water level.

After the last cleanup all the gold from the hole is collected by means of quicksilver, forming an amalgam. This amalgam is dissolved in nitric acid and thoroughly washed in hot water. A few drops of alcohol added to the wash water will prevent the spattering and loss of gold when the last drop of water is evaporated. The gold is annealed and carefully weighed. From this weighing the value of the ground at this particular spot is calculated, and the result given in cents per cubic yard.

Calculating the values is best shown by an example. The gold from say hole No. 14 weighed 2.22 grains; this at 3.95 cents per grain equals 8.76 cents—the value of gold from hole No. 14. The cubic contents of the hole is next calculated. To do this, a factor called the "pipe constant" or "pipe factor" is applied. The inside diameter of casing is 5⅞ inches; the outside diameter is 6½ inches. It is the practice of the district to use the outside diameter of the pipe as a basis for calculating its contents, the local engineers holding that it is the displacement of the pipe and not the cubical contents that should be used. Figuring the cubic contents per foot of pipe, with a diameter of 6½ inches, would give .23 cubic foot. In practice it is found that .23 is much too small, giving values too high, values not borne out by subsequent dredging.

Some engineers use .25 as a factor. "Radford's factor" is .27—a factor obtained by W. H. Radford, a mining engineer of wide experience in this class of work, by the following method: Mr. Radford sunk a hole 3 inches in diameter, using a drillhole as the center, to a depth of 34 feet. The gold obtained from the shaft corresponded almost exactly with the gold obtained from the drillhole when using .27 as a factor in the calculation. This factor is very important, as on it depends the value of the holes and consequently the final value of the ground. The difference in the results obtained by using either the factor .25 or .27 is sufficient to change the value per cubic yard from net to gross—i. e., a difference in some cases of 6 cents to 8 cents per cubic yard.

Continuing the calculation: Hole No. 14 was 29½ feet when drilling was stopped; 29½ × .27 gives 7.965 (cubic feet in the hole drilled). Now, we have the simple proportion, 7.965 (cubic feet of gravel drilled) : 27 (the number of cubic feet in a cubic yard) : : 8.79 (the value of gold obtained) is to X = the value per cubic yard, whence X = 29.69 cents per cubic yard.

(TO BE CONTINUED.)

Engines For Deep Winding.

During the course of a recent lecture in London, before the Institute of Civil Engineers, H. W. Maw, speaking of winding from great depths, said:

"No general solution to the problem of deep-level winding appears to have yet been arrived at. The author would refer those interested in this question to a paper by Mr. Hans Behr, read before the Institute of Mining and Metallurgy in May, 1902. The tendency is, however, to avoid stage winding, unless absolutely driven to it, on account of the double handling of the rock and multiplication of parts; and, by the use of tapering ropes and conical drums, to provide for such depths as are likely to be reached during the next few years. Neither the Koepe nor the Whiting system allows of the use of tapering ropes, nor do they permit of winding from single compartments in case of necessity. It may not be out of place to mention some winding engines now being built in this country under the supervision of the author, to wind from shafts 5000 feet deep on the incline, corresponding to a vertical depth of about 4000 feet. The load will consist of 12,000 pounds of rock, with a skip weighing 6000 pounds, the rope tapering from 4½ inches to 3⅝ inches circumference, and weighing 13,750 pounds. The engines are cross compound, each having one H. P. and one L. P. cylinder, 30 inches and 48 inches diameter, respectively, and 60 inches stroke, fitted with 'Corliss' gear. On the crank shaft are mounted two drums, each running loose and driven by friction clutches. These drums are partly parallel and partly conical, the latter portion tapering from 12 feet to 20 feet in diameter, and holding 1250 feet length of rope, the parallel part holding the remaining 3750 feet of rope, which coils once back upon itself. There are separate steam auxiliaries for operating the reversing and clutch gears and holding off the post brakes, which are put into action by heavy weights."



Head Frame, Shaft No. 4, Congress Mine, Congress, Arizona (See Page 17.)

Co-operative Mining.

TO THE EDITOR:—It is a singular fact that no instance of co-operative mining on a large scale exists anywhere to-day in California where the organization is composed entirely of white men.

It was a common thing during the past twenty years to find Chinese companies engaged in wing-damming and mining the rivers of this State, sometimes as many as fifty or more Chinamen being employed for months in building "cribs," filling them with rocks and boulders, connecting the cribs together, setting "bullwheels" and China pump, arranging dip wheel and flume for washing the gravel and, lastly, raising the derrick, fastened on either shore with its long guy-ropes; when all was ready to hoist out the gravel from the pit that was then sunk to bedrock.

During all these months of monotonous and uncertain preparatory work, all was under the direction of the "bossy-man," who, seated upon some high point commanding a clear view of the work, usually smoking from a hamboo pipe with a thimble-sized bowl (which never seemed to need refilling nor lighting), gave his orders in shrill-sounding "hi yas" and "muck-a-hi-los" to the slow moving but ever going colony of busy ants who, never questioning the wisdom nor shirking the unpleasantness of his orders, kept steadily rolling and lifting, picking and shoveling until all was complete.

The first clean-ups were devoted to paying expenses incurred for lumber, material and supplies; after these were paid, the money obtained from sale of gold was divided. If the claim proved a good producer, a barrel or two of "China brandy" (equivalent to our Jersey lightning), chickens by the dozen and hog, roasted a-la-barbecue, would be speedily forthcoming for, contrary to usual impression, John Chinaman is a good liver in his own way.

The Chinese system of mining in California has been on the co-operative plan, even in the many enterprises backed by the so-called "Chinese Six Companies," and many millions in profits have gone back to China although the placer beds and rivers were stripped of their richest values before the Chinese came on the scene, and they worked what was left by the white man.

It is said that "a wise man can learn from a fool." If so, he may also be taught something by a Chinese.

If co-operative mining is ever made a success by the white race, it will be when carried out along the lines followed by the Asiatics. If there is an instance on record where twenty, or as few as ten, white men in moderate circumstances have ever formed a mining company and hung together under adverse conditions, following the direction of a chosen leader for a year's time without disrupting, such combination has not come under the writer's notice. On the other hand hundreds of instances are known where valuable properties are lying idle, former fast friends now bitter enemies; properties now paying well that were abandoned or sacrificed, owing to non-agreement of co-owners.

The trouble is that none of us are as infallible as we think ourselves to be. The courage which permits one to say "I have made a mistake" is rare; the sensible and forgiving spirit which replies and

says, "All right, you'll know better next time," is still rarer. To know that it is better for one man to make one mistake than it is for twenty men to each make one mistake, a certain thing amongst twenty men, requires—well that requires horse-sense; something not taught in books. CHAS. L. LANG

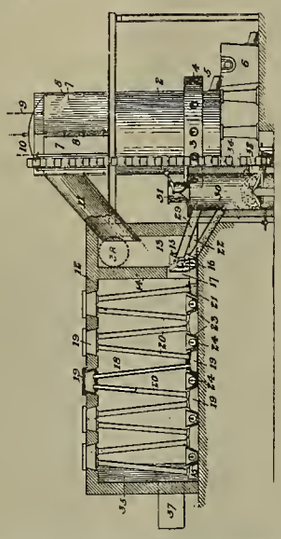
Sonora, Cal., June 29.

Mining and Metallurgical Patents.

PATENTS ISSUED JUNE 30, 1903.

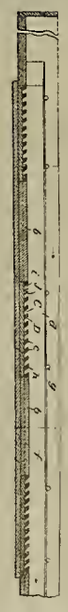
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

SMELTING PLANT.—No. 732,084; W. E. Koch, Pittsburg, Pa.



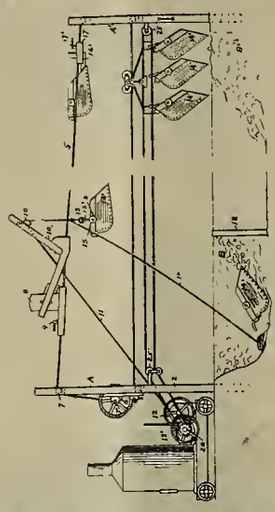
Combination with stack smelting furnace of dust-catching chamber connected with offtake of furnace, fritting furnace adjacent to and arranged to receive heated material from dust-catching chamber and mechanism for feeding fuel into fritting furnace in contact with heated material.

GOLD SEPARATOR.—No. 732,149; B. Westhaver, Mahone Bay, Canada.



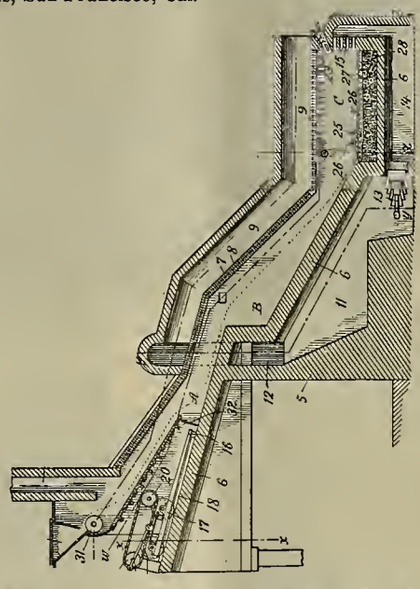
Separator comprising dump box A, removable sluice box, plain surface sections arranged in sluice box, having rabbets f, removable riffle bar sections arranged in sluice box, alternately with plain surface sections, and and flush with plain surface section and bottom of dump box; riffle bar sections each having bed plate, and parallel, transverse riffle bars, upper and lower sides of which are straight, having riffles, between bars, bottoms of which are straight and parallel to surfaces of riffle bars, upper and lower sides of bars being inclined in a common direction from riffle bottoms, upper sides in a less degree than lower sides, whereby spaces of acute angle shape are formed between riffle bottoms and upper sides of riffle bars to retain gold, and riffles rendered wider at top than bottom to permit of free escape of pebbles, retaining strips bearing on bottom of dump box, in rabbets of plain surface sections and on riffle bar sections at ends of riffle bars, pins removably securing strips in sluice box.

EXCAVATING MECHANISM.—No. 732,172; W. Cole, Olympia, Wash.



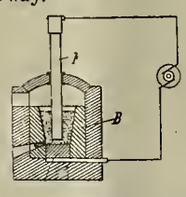
Excavating apparatus comprising removable supporting frames located a predetermined distance apart, inclined trackway suspended therebetween, excavating scoops, means for drawing scoops against the earth to load same and elevating filled excavating scoops and placing same onto suspension trackway, means adjustably connected to trackway for regulating the length of cut for scoops, devices located at lower end of trackway for causing scoops to automatically discharge excavated material carried thereby when end of trackway is reached.

METALLURGICAL FURNACE.—No. 732,264; M. P. Boss, San Francisco, Cal.



Metallurgical furnace, comprising inclined calcining chamber, inclined reducing chamber, horizontal oxidizing chamber, chambers connected at progressively lower levels; means for producing required atmospheres in chambers, and means for heating air fed to oxidizing chamber, means consisting of chambers located over and under oxidizing and reducing chambers.

MANUFACTURE OF SILICON AND ALUMINUM FROM SILICATES OF ALUMINA.—No. 732,410; C. H. Homan, Christiania, Norway.



Method treating materials containing silicates alumina, such as clay, for obtaining silicon and slag containing aluminum oxide consisting in mixing material with metallic aluminum in pulverized form, exposing mixture to high-temperature electric or other furnace, thereby reducing silicic acid and other reducible bases and finally tapping off resulting products.

PROCESS OF LEACHING ORES OR TAILINGS WITH SOLUTIONS OF ALKALINE CYANIDES.—No. 731,590; C. W. Merrill, Alameda, Cal.

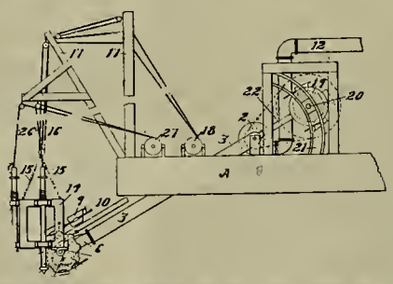
Improvement treating ores or tailings containing reducing agents with solutions alkali metal cyanides which consists in oxidizing reducing agents with alkali metal or alkaline earth metal hypoclorite, subsequently treating ores or tailings with solution of alkali metal or alkaline earth metal cyanide.

ORE CONCENTRATOR.—No. 732,319; E. B Rogers and F. P. Hanson, San Francisco, Cal.



Laterally inclined, vibrating ore concentrating table having surface divided by riffles extending longitudinally thereof, and in general direction of vibratory movement, riffles at high end of table being arranged uniformly close together for short distance, remaining riffles upon table being arranged uniformly comparatively far apart, and intermediate riffles arranged to extend from line extending diagonally across the surface of the table, over portion thereof containing widely arranged riffles.

DREDGER.—No. 732,538; W. H. Fulcher, Oakland, Cal.



Combination in dredger of suction apparatus and chain buckets traveling proximate to inlet of apparatus, buckets having open-work girds to allow finer material enter suction pipe and arrest coarse material.

EXTRACTING GOLD OR SILVER FROM SLIMES.—No. 731,631; J. T. Terry, Jr., Altar, Mexico.

Improvement separating precious metals from slimes, consisting forming solution with water, spraying solution into tanks containing cyanide solution made dense by addition salt, allowing slime to settle through and into solution, then drawing clear liquor from top through vertically disposed filters and discharging sludge from bottom into succeeding tanks containing similar cyanide solution, allowing it settle and again drawing off clear liquor.

SULPHURIC ACID PROCESS OF EXTRACTING PRECIOUS METALS FROM SOLUTIONS.—No. 731,839; G. A. Bahn, Austin, Tex.

Process precipitating precious metals from solutions thereof, consists producing cyanide solutions of precious metals, acidulating with sulphuric acid, immersing zinc in sheet, plate, or other form in acidulated cyanide solution containing precious metals; chemical action thereupon taking place in solution, dissolving zinc and precipitating precious metal; recovering from precipitate of preceding operation, precious metals, by filtering and melting, or other process.

GOLD-EXTRACTING PROCESS.—No. 732,639; T. B. Joseph, Mercur, Utah.

Process extracting gold and silver from ore when in suitable condition, by subjecting ore to leaching action of solution containing water, cyanide of potassium, bromine, hydrate of calcium, peroxide of barium and carbon dioxide, and simultaneously agitating ore, by compressed air forced upward through same.

Cascade Water, Power & Light Co., Cascade, B. C.

Written by W. G. McConnon.

The recently completed plant of the Cascade Water, Power & Light Co. is situated at Cascade, B. C., and owned hy the London & British Columhia Goldfields Co., Ltd., representing an investment of $500,000.

Cascade is a small town on Kettle river, 12 miles east of the town of Grand Forks, and ahout 30 miles directly west from Rossland, B. C. Flowing from the west, the Kettle river descends 120 feet in passing through a half mile of narrow, rocky gorge in a series of rapids and falls. For the utilization of this natural power, the Cascade Water, Power & Light Co. has huilt a large dam, waterway, pipe line, power house and transmission line from Cascade to Phœnix, where the largest copper mines in the Boundary district are situated.

The dam, placed ahove the entrance to the gorge, is of timher crih work, with a 40-foot hase and 24-foot top. The midsection is 50 feet high, tapering to 25 feet at the sides, while the total length is 400 feet. It is huilt on solid rock hed to which the foundation timhers are holted, and filled with 10,000 cuhic yards of rock. This dam raises the water 36 feet ahove the natural level, giving an effective head at low water of 156 feet.

The permanent water level is 10 feet helow the top of the dam, heing controlled during high water hy twelve sluice ways, which can he opened to 12 feet helow the natural river level, giving a passway of ahout 2000 square feet. These sluices are closed hy means of 12x12-inch squared timhers in grooves, operated hy a traveling winch running on a track over the top of the dam.

From dam to power house the water first passes through a 225-foot open rock cut from which it enters a tunnel driven through 410 feet of solid rock and into another open rock cut 500 feet in length, at the ends of which the hulkheads and controlling gates are located. These cuts and tunnel represent an excavation of ahout 35,000 cuhic yards of rock.

From the gates the water is conveyed through a wooden pipe, 7 feet in diameter, for ahout 1400 feet. This pipe is constructed of Oregon fir tongued and grooved staves, 2¼x7 inches, cut in circular segments and machined to the radius of the pipe. The staves are hooped at 12-inch intervals, with ¾-inch round steel hands, with cast-iron connecting shoes for clamping.



Sub-Station, Line of Cascade Power Co , Phœnix, B. C.

Provisions have heen made at the hulkhead and in the width of the cut for the installation of a similar and additional pipe.

From the stave pipe the water is carried through 250 feet of circular steel pipe, 7 feet in diameter, resting on concrete piers and anchored into solid rock to avoid end thrust. At the power house, three 4-foot pipes and one 2-foot pipe are taken off helow the floor level to supply three 36-inch turhines for generators and two 12-inch turbines for exciters.

The engraving gives a general view of the power house showing the stand pipe at the junction of the stave and steel pipes.

In the interior of the power house the three generators are standard Westinghouse, three phase, two-hearing, direct-coupled, 2200-volt, 750 K.W. at 80% power factor, or 940 K.W. at 100% power factor, 60 cycles per second, 300 R.P.M. The two exciters, each capahle of exciting all three generators at one time, are 45 K.W., 120-volt, shunt-wound dynamos, self-contained, two-hearing type, direct coupled to independent turhines, with 500 R.P.M.

There are in all nine transformers, which are Westinghouse, self-cooling, oil-insulated type, having a capacity of 250 K.W. at 80% power factor, or 312½ K.W. at 100% power factor, "Star" connection, and wound for a ratio of 2000 to 20,000 volts, on hoth high and low tension windings, with full load efficiency of 97.6%.

There are six lightning arresters, located just ahove the switches in the gahle of the roof, of the low equivalent style, giving protection against lightning discharges for transmission at 20,000 volts.

A right of way 132 feet wide is cleared, and transmission lines erected from Cascade via Grand Forks to Phœnix, a distance slightly over 21 miles.

The high-tension circuit consists of two separate three-phase transmission lines, each carrying three No. 3 B. & S. copper wires, with room on each line for another circuit.

The poles are heavy cedar, and on tangents are spaced not over 100 feet apart, on curves at less distances, in some cases as low as 50 feet. No angles are turned, but all changes in direction of line made with easy curves. No side or head guys have heen used except at extra heavy spans across rivers, etc.

The work on this line, as well as all construction of the plant, was designed and executed hy William Anderson, the company's engineer.

A 3-mile feeder is taken off at Grand Forks, 12 miles from Cascade, to the Granhy smelter, where current is used for driving Westinghouse induction motors of sizes ranging from 3 to 700 H. P., and of an aggregate capacity of 2400 H. P.

One of the accompanying engravings is a view of the suhstation at Phœnix, located at an altitude of ahout 3500 feet ahove the power house. The huilding is of hrick, with one end left for future extension, and contains the transformers, line switches, fused circuit hreakers, switchhoards, etc., suhstantially duplicating those at the power house. This suhstation, for the present, will supply current for two 700 H. P., Westinghouse, type "C" motors for driving two large compressors, a 100 H. P. motor for stone crusher, and a 150 H. P. motor for hoist, as well as furnishing the current for lighting the town of Phœnix.

The Cascade Water, Power & Light Co. estimates that it will have a supply at low water for ahout 6200 H. P. This will enahle the douhling of the present output.



Power House and Transmission Line, Cascade Power Co., Cascade, B. C.

A Proposed Signal Code.

The following is reported to he the signal code officially adopted hy the Western Federation of Miners at their recent national meeting in Denver, Colo., which they desired to he used in all the mines west of the Missouri river and in British Columhia:

1 hell, hoist or stop if in motion.
2 hells, lower cage.
3 hells, hoist men to surface.
2–1 hells, lower to next level.
1–2 hells, hoist to next level.
4 hells, hlasting signal. Engineer raise cage few feet to show attention, then 1 hell, hoist men from hlast.
5 hells, turn on steam.
6 hells, shut off steam.
7 hells, turn on air.
8 hells, shut off air.
9 hells, danger signal.

A code of special signals was also adopted for special work.

[One would suppose that a committee presumahly comprised of practical miners would devise a more satisfactory code of hell signals than that ahove given, which is defective in many respects. One hell to hoist, or to stop if in motion, is all right, and two hells to lower empty cage, skip or hucket is as good as could he devised, hut the proposed code makes no provision hy which the engineer may distinguish hetween a vehicle carrying men and one going down empty. The signal 3–2 is hetter, and to hoist men the signal 3–1 fulfills every requirement, as it signifies to the engineer that human lives are dependent upon him and he will naturally exercise more caution than he would with a load of rock. The third signal in the ahove code, 3 hells, hoist men to the surface, is also defective, as it only indicates that men are to he hoisted and gives no premonitory signal. When men are to he hoisted the signal 3–1, as ahove indicated, is a good one, as the engineer not only knows he has men to hoist, hut knows hy the final single hell when they are ready. The chief fault, however, lies in the fact that it is unlike any of the codes already in use in many regions and in no particular is hetter than any other code. The necessity for a universal hell signal code has long since heen recognized, and this action on the part of the Western Federation is in the right direction, hut it could he amended greatly to its advantage, or at any rate to the advantage of the thousands of miners who are ohliged to depend upon hell signals in mines for safety.—Ed.]

Filter-Press Treatment of Gold Ores and Slimes By Cyanide.

NUMBER II.—CONCLUDED.

In the construction of the filter press there have been taken into consideration every factor that has led to the successful treatment of the finely pulverized ores by filter-press cyanidation in the Kalgoorlie gold fields of Western Australia.

There are so many different types of filter presses used for various purposes throughout the world in the manufacture of different products, that the first originators of the process had a large range to select from; but it was found that the proper form of press adapted for this work is that known as the "flush plate and distance frame" form of construction.

That is to say, a series of plates or filter frames, covered with filter cloth, having distance or cake frames to hold them apart and to form the depth of the chamber; these are screwed up between the head and the follower of the press so tightly that all the joints around the rim of the plates and frames are water and air tight under the working pressure of the machine.

This gives a battery of filtering cells, lined on the interior with filter cloths, and having under the filter cloth on the surface of the plates a drainage for the liquid which filters through at the back of the cloth.

The mode of the construction of the filter frames to allow ready drainage of the fluids is important, as the efficiency of the machine to a considerable extent depends thereon.

There are three principal forms used. One is the plain channel surface that has the center of the plate, beyond the joint surface, channeled with grooves from top to bottom, all over the surface of the plates, and a cross groove or two collects the filtrate from the vertical channels to deliver it to the outlet. Another is the pyramidal filtering surface, formed by having the whole of the surface dotted over with small flat-topped pyramids, over which a cloth is placed.

But these are defective systems, because the filtrate, in passing through the cloth, has to pass along the grooves formed by the channels between the pyramids, down to the point of exit, and any fine particles of pulp which may be forced under pressure through the cloth collect and form obstacles for the free passage of the fluids.

Another objection is that the cloth stretches and sinks between the channels, making an irregular surface for the pulp, and also considerably diminishing the area for the free discharge of the fluids.

There is another system that has been used heretofore, of utilizing perforated sheets laid over a corrugated or grooved surface, the chief objection to which is the small area that these grooves give to the discharge of the fluid, and should any clogging occur at the back of the perforated plate it effectually prevents a uniform filtration.

In this filter press and process herein described—that of the American Filter Press Co. of Denver, Colo.—improvements have been made based upon long experience of the company in filter press cyanidation. The filter frames are formed with solid rails, having transverse and longitudinal ribs placed about 2 inches apart. These ribs are again cored internally with a series of slots.

The perforated steel plate is placed over these ribs,

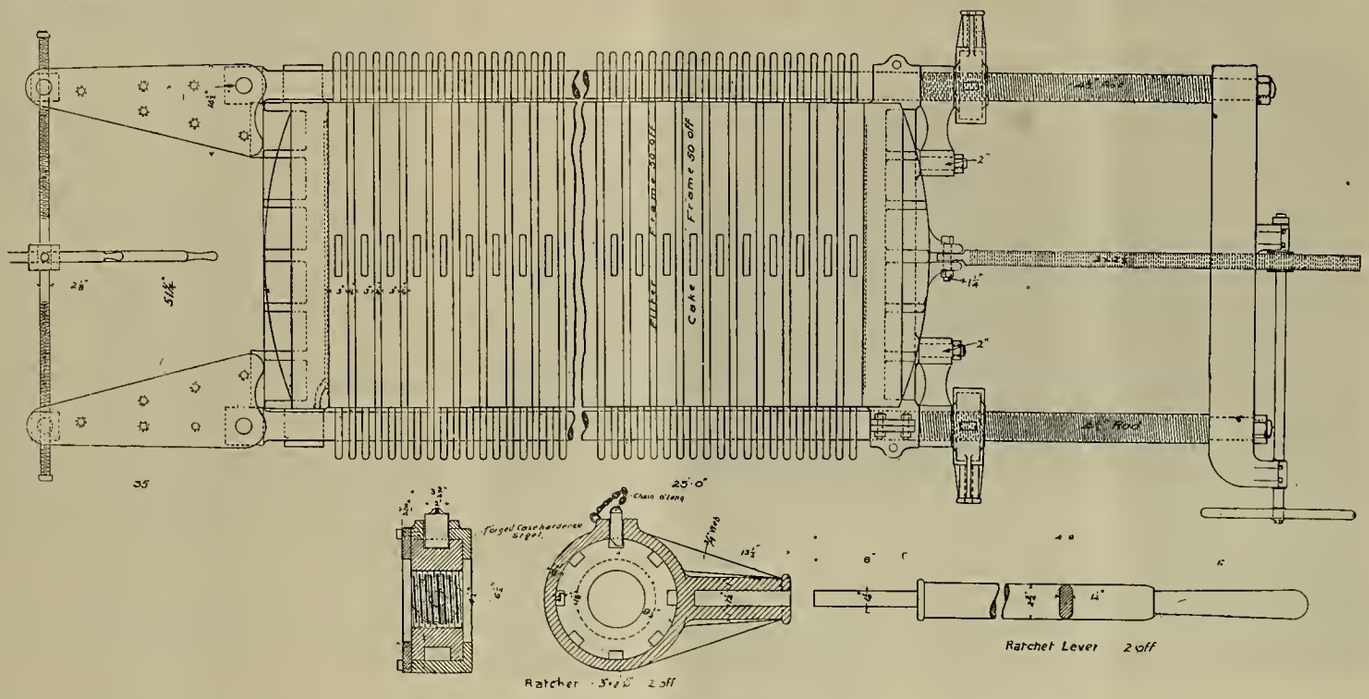


FIG. 1.

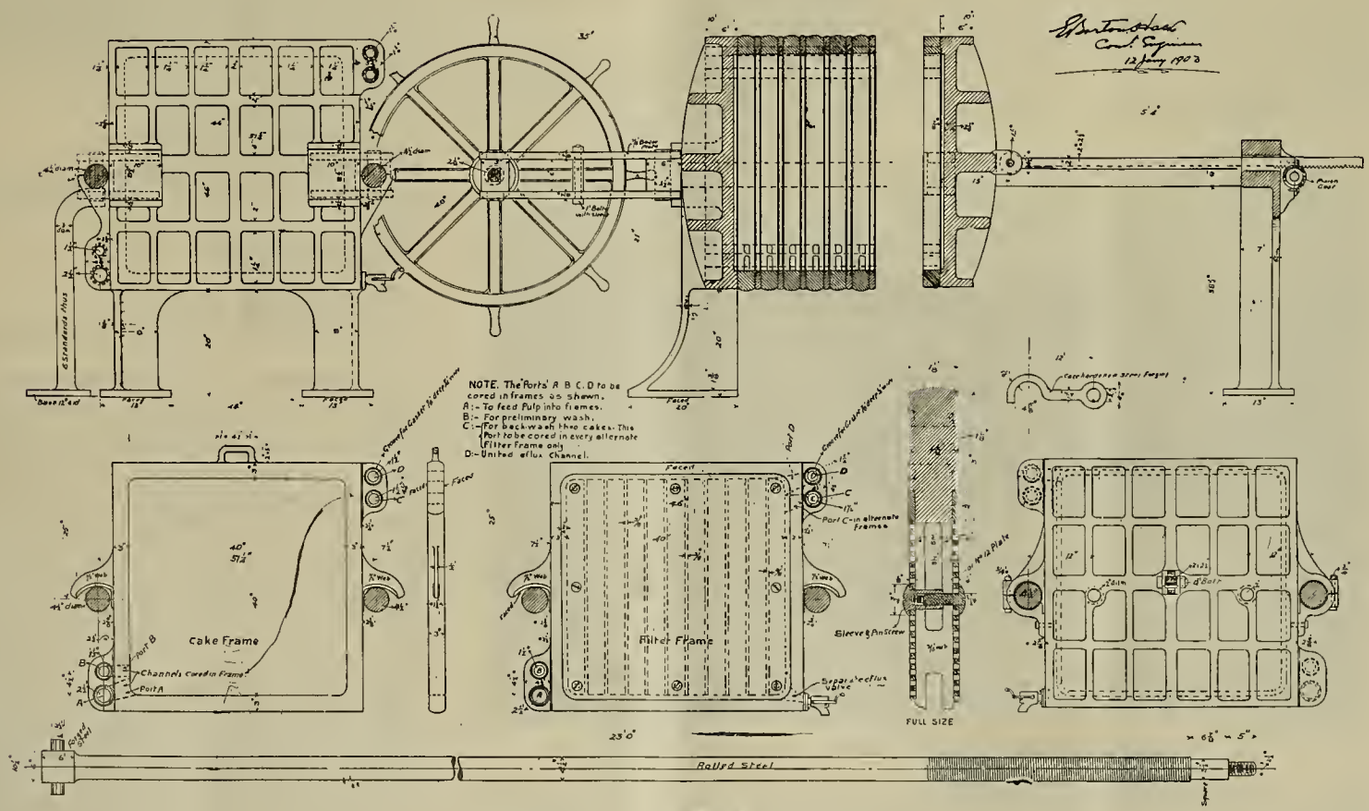


FIG. 2.

one on each side, and fixed with flush-headed sleeve and pin screws. The formation of the internal ribs allows the fluid passing through the plates a large area of exit, with no possibility of any accumulation forming at the back of the perforated plates, while the flush surface of the filter frame, over which a cloth is placed, gives a minimum friction and wear to the cloth.

The objection that the perforated plate gives a smaller area to filtration than the pyramidal form of surface, is of little effect. Long experience and tests of both methods have proved that the perforated sheet filtration is of far greater service in the life of the cloth and economical working of press than any other form and gives as efficient extraction.

The next point of importance is the construction and arrangement of the different passages for charging the chambers of the filter press, for drawing off the filtration therefrom and for introducing the wash fluid at the back of the cloth in one series of the chambers, so as to press through the cake, thus forcing out the gold-bearing cyanide solution from the cakes.

The system of construction for all these passages is a continuous channel formed by the juxtaposition of a series of holes formed in the plates and frames, which when placed together form a pipe passing from end to end of the machine.

This pipe has cored passages or ports, either through the distance frames, or in connection with the internal portion of the filter frame, according to the purpose for which they are intended to be used. There are four channels to each plate, each of which has a specific purpose.

These channels are formed two to each side of the frames, the lower channel at the bottom being for charging the chambers; the second, immediately above, for the washing fluids and for compressed air; the third, being the lower of the two upper channels, for passing the washing fluids into the back of the frames; the fourth, or upper channel, being a common efflux for the fluids.

There is also attached to each filter frame a separate discharge valve of special construction, an easily opened and simple mechanical device which will add to the facility of working the press. By this means the filtrate can be run off in full view of the operator.

The joints between the plates and frames immediately around the channels are made by means of round rubber rings let into cored channels just the right depth to allow the rubber to project sufficiently to make a tight joint.

The whole of the channels are projected beyond the main face of the frames, so as to allow the filter cloth being passed over the filtering surfaces without the necessity of cutting or trimming.

The next point of importance is the construction of the framework of the machine.

The tension rods on each side are round, supported intermediately with cast iron standards. These efficiently counteract the sagging that would be caused by the great weight of the chambers of the machine. The tension bars are threaded at one end, on which a friction saddle piece travels, connected with the end plate of the chambers; and beyond this again is a pawl-and-ratchet arrangement for the preliminary tightening up of the frames. At either end of the tension rods there is a lever arrangement attached to each rod.

The fulcrum of this lever engages with the end plate of the machine, while the two ends of the levers are joined with a right and left hand screwed rod, to which is attached a large handwheel. By screwing up this rod, the two ends of the lever travel towards each other, drawing the side tension rods towards the end of the press, at the same time forcing the end plate inversely towards the opposite end of the machine. An enormous purchase can be obtained by this means, insuring absolutely close joints to all the frames.

The whole of the tightening up of the press occupies but a few minutes, and the workman is in the best position possible to exercise his strength most effectually for the work intended, one man being able to attend to at least three machines.

It is unnecessary to do more than merely refer to the use of filter presses for the purpose of extracting the superfluous fluids, or washing the sulphate of zinc from gold-zinc slimes. Presses have been used for this purpose in so many mills throughout Colorado,

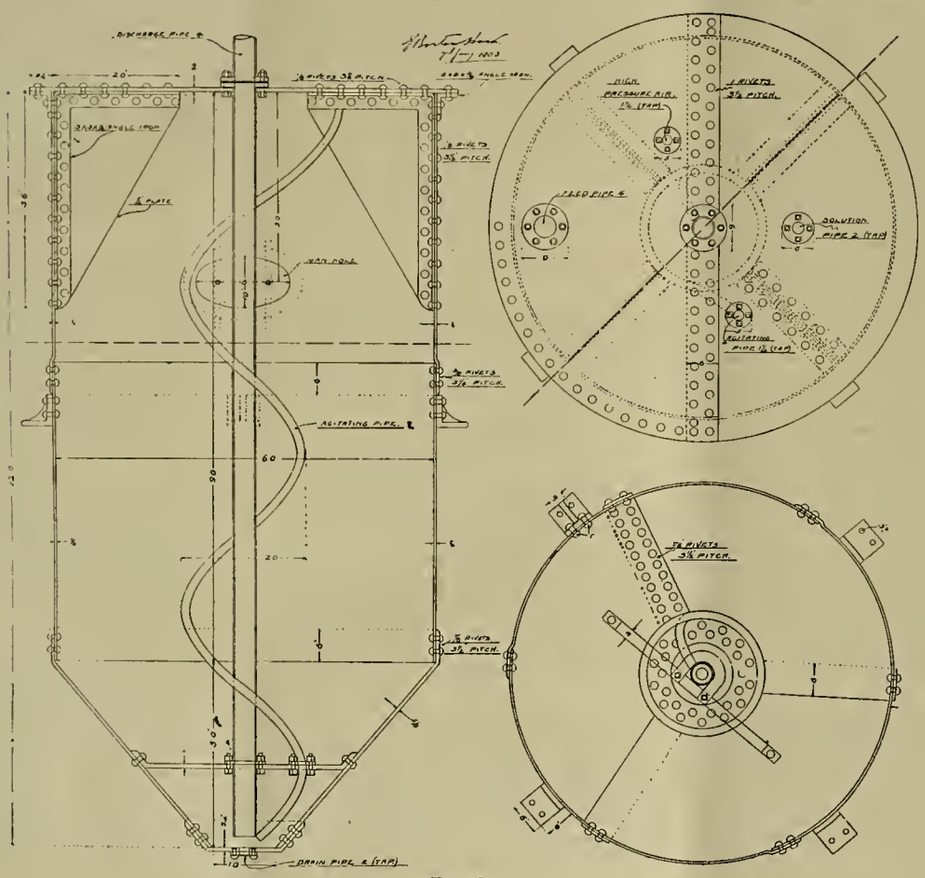


FIG. 3.

Wyoming and Utah that most metallurgists understand and realize the value of them in the "clean-up."

The accompanying drawings show the construction of a full size 40x3-inch fifty-chamber filter press of about five-ton per charge capacity, the position and uses of the feed and wash channels and the devices for closing and opening the frame, also the pressure tank, or Monteju, fitted with agitating voluted perforated pipe and other fittings.

Direct Steam Ore Stamps.

Written for the MINING AND SCIENTIFIC PRESS by CHARLES H. FITCH.

A little boy going through a cemetery with his mother read the praises of the deceased engraved upon marble and granite and asked her if only the good people died. Steam stamps as machinery on a commercial basis for milling gold ores are dead. When they were a live issue and an effort was being made to make a market for them by good advertisers no sweeping words of criticism were in order. We perceive this distinction, that fair words are spoken of deceased people but of live machinery.

So long as manufacturers were trying to make the direct steam stamp a success in competition with gravity stamps conservative men were willing to await the issue, thinking that something might be worked out which would be a practical success, and enable mines to be developed with greater economy.

One of the brainiest independent engineers this country has produced is John Richards of San Francisco, and when he discontinued the publication of his monthly magazine, "Industry," it was a calamity, a calamity which might have been averted if he had enlisted a good advertising man in the management of that interesting publication. A long time ago I clipped from "Industry" a brief editorial by Mr. Richards calling attention to the indirection of milling ore as it is usually done under gravity stamps, and commending the idea of direct steam stamps.

The great steam stamps used on ores of copper in the Lake Superior region may be considered successful, as they are in large use and nothing succeeds like success. They are, however, open to criticism on several grounds, and the precedent of using them was inaugurated by companies of great wealth having "money to burn." In this article I do not consider these stamps. A few of them were used on gold and silver ores, but sliming and the difficulty of connecting them properly with amalgamating appliances and concentrating machinery soon "killed them."

I kept John Richards' editorial stuck up before me, thinking that I would some time design a steam stamp, very much in the spirit of that modest Texan editor who proposed to eclipse old Shakespeare "when he had time." I may yet design the stamp and there is a Kentuckian named John Fox, Jr., who may yet give Shakespeare a run, and again we may not.

There are two features which I think would go far toward making a success of a small steam stamp. In the first place it must have an economical engine. The most economical small direct-acting engine ever built was one designed by Elihu Thompson. It had four 2½-inch by 3-inch cylinders, realized 5 H. P. and used only twenty and one-half pounds of water per horse power per hour, a good enough performance for a large compound Corliss engine. It had four single-acting trunk pistons, puppet valves, and carried 160 to 200 pounds pressure, steam always flowing one way without reversal of flow. It was a simple engine, and might have given better results with one larger cylinder. I would get some points of design from this engine.

And I would use cam path and wiper to work the steam valves. This valve motion has done more than any other feature to make the steam hammer the wonderful success that it has been. The "Wood" stamp put upon the market some years since by Henry A. Newkirk & Co. had a valve gear approximating this idea. This stamp "died a-horning," although several of them were put to use, including a battery of several by the Dwight Furness Co., Guanajuato, of which a favorable report was made after a short run.

The beauty of the cam path and wiper device is that it does in a simple way a thing which is otherwise very troublesome and difficult to do—that is, times the valve action to the fall of the stamp or hammer so as to open the steam valve after the falling weight is down. The descending weight outruns the wiper, and the latter from lagging has a small movement of "catching up," which is a deferred motion derived from a motion which has ceased. The hammer ram impelled by weight and steam pressure falls more rapidly than the wiper impelled by weight alone. If, however, a steam stamp was allowed to operate by gravity, only being lifted by steam, the fall of the wiper might be retarded by a small spring.

The Tremain mill, the most widely used of small steam stamps, had some success. The struggle to make it a success by a strong company having excellent engineering talent was a determined one. Adjustment of valve gearing to work of stamps as the shoes and dies wore required careful attention, and the whole mechanism was too complicated and liable to balk. Yet with judicious care it would work perfectly on long runs. The design suggested a duplex vertical steam pump, and steam pumps are notoriously great eaters of steam. A large battery of these steam stamps put in at the Regina mine in Ontario gave them the greatest trial they have ever had. The result was a low economy, so that the selection of these stamps was branded as had management. This blind-sight evidently served as foresight to discourage further investors.

The American steam stamp had one excellent feature, the wedge base by which the height of die could be readily adjusted without disturbing the valve relations. This stamp was the successor of the Wood stamp, but to make a difference of design the wiper was abandoned and valves were operated by rocking toggles. The first stamps had 12-inch stroke and delivered up to 200 heavy blows per minute. But the valve motion was defective in its proportions and breakages of valve and stem occurred. Then stamps were built with a shorter stroke—only 8 inches. The result was disastrous, as the valve motion would only then give a maximum of 150 strokes, and the blows were light and comparatively ineffectual. A few inches of ore banking upon the die would bring the stamp to a stop. The defects were those of design and proportion. With plenty of steam hammers in the same shops operating with cams and wipers so as to maintain any desired stroke, it was alleged to be impracticable to run a

steam stamp this way, and a small Brotherhood three-cylinder engine was rigged up to run the valve gear. This was both unnecessary and unsuccessful, as the engine was not properly governed, and the speed not heing controlled nor co-ordinated with the time of drop, the action of the mechanism was erratic and discontinuous.

None of the steam stamps described are heing actively manufactured and pushed on the market, and yet it is not improhahle that other attempts will he made to introduce these machines. It seems, therefore, a good time to call attention to some inherent disadvantages of these stamps.

The first is lack of steam economy. The only way to overcome this is to use superheated high-pressure steam in a special engine. The steam ahout mines is usually wet, and low pressure, and economy in the generation and piping of steam is a general improvement to he made in small mining outfits. But such outfits must he cheap in first cost and this makes them dear in running cost. As a rule, small steam engines are extravagant in the use of steam.

The second is complication of function. It may look more simple to stamp direct than to have an engine, helting, tightener and cam shaft, hut the latter arrangement admits of analysis and separate treatment. The direct stamp puts too much into a compact space, too many vulnerable and conflicting points of attention. The taking up of wear of shoes and dies, replacement of cams and stems, piston rings, stuffing hox packing, guarding against steam leaks under vihration, and the insidious escape of oily particles from steam or luhricant, provision for amalgamation and cleanup, valve adjustment and adjustment of feeding ore—these are hunched together, and if anything gets out of order the chain of trouhle hegins. There is usually plenty of room for a simple engine, helt and cam shaft with stamps, and each can he put right without involving any other feature, which is in much hetter shape for the millman to handle. The rule is, divide, classify and conquer. But with the steam stamp we comhine, complicate and perhaps swear horribly when some little essential piece is hroken and we are "40 miles from any place" where good repair facilities are to he had.

Another thing is to he noted, not as a disadvantage, hut as an overrating of advantage, the advantage of cheapness. A direct steam stamp to he thoroughly satisfactory has got to he a higher class of machinery than a plain throttling engine and a cam shaft. If made chiefly of steel and carefully fitted it will cost nearly if not quite as much as a gravity hattery and engine of the same capacity. And the remaining equipment, hoiler, stock, plates, concentrating tahle, huildings, tramway connections, quicksilver and supplies cost just as much with a steam as with a gravity stamp, and a saving of 25% in the cost of stamps is reduced to a saving of perhaps 8% or 10% on mill equipment complete. If the gravity stamps involve less risk, this small per cent is a good insurance. Nor is there much saving in foundations. Among some millmen it condemns a thing to call it self-contained, they have heen so often misled hy representations in this respect. If the mill is properly placed, and the approaches properly graded, the necessary excavation, cement work, retaining walls and timhering cut a figure which makes any difference in cost of foundations of the two kinds of mill comparatively insignificant. In short, the steam stamp for small prospecting mills has heen unsatisfactory. If improved in weight and design to he more satisfactory, the gain in cheapness disappears.

The idea of direct stamping is an idea of simplification of mechanical power, but the prohlem is like an algehraic expression containing several quantities to be solved of which this is only one. The attempt at solution hy means of steam stamps reduces one quantity to simpler terms of solution, hut the others, amalgamation, luhrication, adjustment, continuous repairs and automatic feed, are left in no hetter shape for solution, but in a more troublesome form.

Pencellier and Lupkin separately discovered their celebrated exact parallel motion immediately after a German engineer had written a "scientific paper" proving to his satisfaction that an exact parallel motion could not he made from the elements they used. So, while we are pronouncing against the steam stamp, some one may he working out some clever device which will "do the trick," justify Mr. Richards' editorial opinion, and confuse our negative argument, showing us that there are "more things than dreamed of" in our philosophy. I do not expect it, hut for mining interests would be pleased to have it so.

Iron Sands on Lake Superior.

On the north shore of Lake Superior, on the Canadian side of the lake, east of the Nipigon river, are large areas of hlack magnetic sands, rich in iron, and it is reported to he the intention of Philadelphia men to develop these beds of iron sand, and if found feasible, to dredge and concentrate the sand and ship the concentrates to iron furnaces, says the American Manufacturer. The ore can, it is stated, be made very pure hy washing from it the silica. The Eastern men interested have secured concessions from the Canadian Government on shore and other necessary rights.

Mining With Machine Drills.

Written for the MINING AND SCIENTIFIC PRESS by E. L. LE FEVRE.

It is not intended in this article to technically discuss the construction or theoretical efficiency of the various types of machine drills actively exploited hy manufacturers. The rapid advancement of the mining industry, particularly the metalliferous branch, has hrought out in a forceful way the necessity of ahandoning the old "single jack" with two holes resultant from a shift's work, and suhstituting therefor a power equipment capahle of largely increasing the tonnage output with a minimum expenditure for lahor.

A decade ago an ore hody must needs run up in the "pictures" to gain the title of honanza for a mine. Now the great fissures, contacts and chimneys of ore, low in grade, hut vast in extent, are eagerly sought after hy shrewd mining investors.

The ownership of a giant fissure vein does not necessarily imply wealth to the corporation or individual possessing title, even if the values be in the rock.

A close proposition may make or break a company through its management. A superintendent may possess technical qualifications in extenso; he may he soher, honest and energetic and yet fail to produce results and dividends. He lacks that rare faculty of grasping the essentials of economic mining. Men possessing this trait can command their own price. In the light of modern progress no manager can ignore the advent of an economical agent replacing the "single jack" and its two holes a shift.

When careful investigation shows that a great tonnage can he outputted with unfailing regularity, and equally rigid testing proves the possihility of milling this product successfully, then, and not before, is the property ready for the installation of power drills.

The source of power is a matter for the competent mining engineer; its application specifically to rock hreaking is the superintendent's husiness.

Having the requisite conditions and an intelligent directorate, a careful manager huilds for time, knowing well that a hig repair and depreciation dehit is not relished hy the stockholders' auditing committee. The power plant should he modern in every respect, with an emergency factor of at least 25%.

The use of air power heing justly prominent, I propose treating the suhject from this view point.

The machine drill is nothing more than a strongly constructed engine, calculated to furnish a maximum efficiency from a minimum of power.

For practical work in stoping out a vein, it may weigh from 95 to 400 pounds. For driving tunnels or levels the small, or "chippie," machines are rarely used. Primarily the efficiency of all standard piston machines depends upon ample power and efficient handling.

Various distinctive features, such as throttles, valve action, springs or rubber huffers to secure resiliency in the hack head and ingenious devices for regulating the air cushion inside the cylinder are ably presented to mine owners hy the manufacturers of standard machines. For the purposes of this article it is unnecessary to go into details of various types or draw comparisons between good and poor machines, as hardly a drill on the market is without some redeeming feature.

In deciding on a drill equipment a mine manager unfamiliar with the suhject in minute detail should never hesitate to call in the professional services of some one capable of giving skilled technical and practical advice absolutely unhiased. Any drill offered for sale must he safe to handle; the operating mechanism heing held together by side rods, the breaking of which stops the machine instantly with no further harm than a slight delay to replace the broken stay, makes runners confident to a degree.

For a guide in selecting a type of machine no general rule can he laid down. Broadly speaking, a 3 to 5 foot vein of medium hard rock, uniform in structure, can generally he worked to the best advantage with small machines. They require only one man to run them, are easy to set up and take down and require only a moderate power to run a dozen. They are designed to do about the same class of work as single jack miners, the economy in their use resulting from an increased tonnage hroken. Approximately, a "chippie" machine will do the work of three good miners. Still there is room for improvement in this class of drills, as at present the power required to operate one is too great. The hest field for the electric drill is in naturally ventilated mines, suhstituting small air drills on the class of work to which the latter are adapted.

The "chippie" drill, using ¾-inch to 1-inch steel, must have a homogeneous rock and requires an arm to the bar, as slight variations in the texture of rock, within limitations, may he drilled successfully if the machine has universal motion, and erratic action is at once corrected; on the other hand, a slippery formation with intrusions of varying hardness requires the highest skill in the machine runner, and is frequently worked at a loss with machines weighing up to 150 pounds, compared with hand work.

The large machines, weighing from 275 to 450 pounds, are good for any size of vein over 4 feet wide. The harder the rock the greater the economy from their use.

Some machine makers lay great stress on rapidity of action with short stroke, and quote figures in suhstantiation of their claims. In all instances coming under my notice exceptional conditions ohtained to produce such superior results. It is a patent fact that a given piston area suhject to impulse from air, moving ahead 6 inches at a stroke, will cause the drill to do more execution in rock than one moving 4 inches, even when the speed of the short stroke machine is accelerated 50% over the long stroke engine, all other conditions heing equal.

The question is frequently asked a maker, "How much will your machine do?" Results of trials under exceptionally favorable conditions are usually handed out with a flourish. While these statements are strictly true, yet they are misleading in that the same drill won't do within 50% of that work in general, practical use inside a mine.

While there is no hard and fast rule for estimating the rock-hreaking capacity of a drill, still a reasonable approximation is possihle; for instance, a first-class machine weighing 300 pounds, working under 100 pounds air pressure 16 hours a day, should hreak 1000 tons of quartz ore a month on a vein averaging 7 feet and should easily keep the stope filled in with waste in addition. No machine should he selected for stope work that will freeze up when cold, moist air is used, nor should one he used that has a multiplicity of delicate parts liable to hreak from the rough usage to he expected in a stope. Broadly stated, the choice should he confined to those that can he completely adjusted mechanically, with ordinary wrenches inside the mine. No matter how good the machine, its use is an expensive investment unless it is efficiently handled.

A man to whom a machine drill is intrusted should he a strong, active rustler. He should know enough ahout applied mechanics to readily grasp the working principles of his engine, and he ahle to diagnose the dozens of ailments to which it is liahle, and cure them at the least cost of time. He should he fertile in expedients, cleanly in hahit, clear headed in emergency, careful of his tools, and ahsolutely devoid of passion under stress of work. No angry man can reason clearly, nor should a valuahle machine he given into the care of a person suhject to violent displays of temper.

It is the runner's duty to direct the setting up of the machine, point the holes, correct adjustments, supervise every detail of drilling, see that the machine is in proper order, repair breakage and load and spit the holes. He should take a persoual interest in educating his helper up to a high standard of excellence, for the cogent reason that he lessens his own lahor therehy if for no other.

The helper should he a strong, willing worker, with a thirst for useful information. (If there is a place on earth where a shirker is out of place, it is around a machine drill.) Every detail of his work calls for strength, activity and unceasing application. The helper should learn to do things without heing repeatedly told. Wedges, hlocking, tools for leveling up, oil for machine and drills are things he should provide and put away when "tearing down." He should carefully note the hole angles and cultivate the hahit of observing in minute detail. A respectful demeanor, a willingness to do a little more than is required and a close mouth will soon gain the good will of the runner, hesides making the task much easier for both. After a short service he should take his turn with the runner in picking down and making the "ground" safe. This is one of the most important details of mining and should he given more attention, for personal reasons, than any other. It is a curious fact that few miners, comparatively speaking, know even the rudiments of securing safety without an excessive waste of time and energy.

The suhject of "dressing" a stope intelligently is much neglected and deserves more attention from miners. Every machine should have a full complement of first-class tools. The hig machines should have two chuck wrenches, 24 to 28 inches long, made of high-grade mild steel, and hent at an angle of 20° 5 inches from the tip of the jaws; a 16-inch Coe wrench for bolt nuts and hose couplings complete the hose equipment. The hars should he straight welded and riveted wrought iron pipe with the shoes and jack screws securely holted into place; a hent har will not remain rigid no matter how tightly it is jacked.

A scraper of proper length for cleaning out holes and a small rod of ⅝-inch iron, sharpened at one end, and 4 inches long should he with every outfit. Where wedges must he made, a short-handled axe should he provided. A well-made flat oil can, holding 4 ounces, that will fit into the jumper pocket completes the ordinary equipment where water holes are not drilled. In the latter case a piece of ¾-inch pipe with proper connection and hent at a right angle 1 foot from the end attached to the hose comes handy for blowing mud out of holes.

(TO BE CONTINUED.)

Mining Summary.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

An extensive plant is being put in by O. H. Sleeper on Bear creek in the Cook Inlet district.

ARIZONA.

COCHISE COUNTY.

(Special Correspondence).—The Contact group of claims are 1½ mile west of Bisbee, in Warren mining district, and consist of twenty claims. The Higgings group, 1800 feet east of the Contact, was recently sold for $650,000. The Red Jacket, Wolverine and Clark groups have all been floated in Michigan within a month.

Bisbee, July 8.

The work of dismantling the Copper Queen plant at Bisbee was begun last week. this being the first move in the transfer of the reduction of Copper Queen ores from Bisbee to Douglas. The smelter will be kept in operation at Bisbee until the Douglas reduction works are ready to receive and handle the daily output from the various shafts of the Copper Queen mines. A great deal of work is yet to be done on the new plant, but it is expected it will be in operation January 1 next. Not only will all the machinery be taken away, but the old slag on which it stands will also be blasted out and put through the Douglas smelter, says the Review. A large amount of this slag will give good copper values, as it came from the old furnaces before later methods were adopted to save the ore values.

GILA COUNTY.

Superintendent E. H. Benson, of the Black Warrior mine, near Globe, closed down the works last week in order to put in a water-jacket furnace of 60 tons daily capacity. The matting furnace will not handle the product to be smelted, the ore from the new opening in the mine having changed and the precipitates from the leacher having increased. It will be two months before they are ready to resume. In the meantime a few men will continue work in the mine

At the Old Dominion mine at Globe development and construction work is progressing. The four-compartment shaft is down 250 feet. The foundations for the smelter are being built and boilers are being set up at the new shaft. All the buildings have been wired for electric lights. The stations in the mines are also to be electrically lighted. The present smelter is making the usual output of copper. Coke shipments have resumed.

GRAHAM COUNTY.

The Clifton Copper Era says the Arizona Copper Co. seems to have entirely recovered from the effects of the recent strike, and are working full handed at all their mines. They are running three furnaces and all of their concentrating tables. ——The Sierra de Oro Co. have begun development of their group near Clifton. They employ American miners and are working three eight-hour shifts.——The Shannon Copper Co. are running full handed at their mines, and also have their smelter and concentrator plant in operation.——The Standard Co. made a shipment last week, the first since the strike.

MOHAVE COUNTY.

(Special Correspondence).—The Daggett property is opened out with a 100-foot shaft on a small vein of ore carrying gold and silver values. Intentions are to sink the shaft 100 feet deeper.

Shipments of raw ore from the Samoa mine continue.

J. Carroll, at the old Juno mine, is sinking on the vein.

L. Hoffman is developing the Paymaster mine and shipping silver ore.

The Elkhart mine closed down on the 30th ult. and discharged its twenty-five men.

Dempsey & O'Dea are sinking a 100-foot shaft on their gold discovery, 9 miles west of Chloride.

Chloride, July 8.

The Elkhart mine, near Chloride, was closed down on the 1st. The management has stoped out all the ore above the 500-foot level, and no effort was made to continue deeper, says the Arrow. C. Barmore is superintendent.

The Mohave G. M. Co., operating the Leland and Mitchell mines, near Kingman, has taken on more men. As soon as their mill is finished the output will be increased.——The Treadwell group of mines will be in operation next week, says Superintendent J. Nevill.

The Homestake and Bi-Metal mines, 3 miles south of Kingman, have been sold to Manager S. E. Adair of a New York company for $75,000. The mine has been exploited to depth of 100 feet by shaft and tunnel, showing 25 feet of ore assaying $8 free gold. A mill will be built, says Manager Adair.

H. H. Smith, of New York, manager of the Great West mine, near Chloride, says he will put in a cyanide plant at the mine.

The shaft on the Copper Pride mine, near Kingman, is down 100 feet and the vein crosscut for 15 feet at that depth. They report having 3 feet of ore that averages 15% copper, $10 gold and a few ounces silver. The mine is owned by S. Butler and E. S. Osborne, and is under bond to B. Blanchard, manager of the Iron King mine in Yavapai county.

PIMA COUNTY.

Work is again under way at the Del Monte mines, 35 miles east of Tucson, in the Catalina mountains.

YAVAPAI COUNTY.

F. Dunham of Los Angeles, Cal., has bought the Katherin group of mines near Cralg for $60,000. Development work began this week.

At Congress three shifts of men are at work on the Alaska mine, and the shaft is down 85 feet.

Manager L. L. White, of the White G. M. Co., operating near Wickenburg (Maricopa county), says there are 1200 feet of development work done. The ore carries $15 per ton gold and is both free milling and concentrating, the ore body being 7 feet wide. The company will put in a mill next fall.

Superintendent C. B. Genung of the Oro Concentrating Co. reports development progressing on the Welcome group of mines in Weaver district, 1½ mile northwest of Stanton.

The Rigby M. & R. Co. have men at work preparing for the erection of their reduction plant at Mayer.

The Burlington M. Co., near Big Bug, will put in a hoisting plant this month.

ARKANSAS.

MARION COUNTY.

At the Climax mine, near Yellville, and owned in New York, they have been producing dirt that yielded from 15% to 20% zinc. Last week they opened up ore that will mill 40% metallic zinc. The mill at this mine, of forty tons capacity, will be enlarged.

CALIFORNIA.

AMADOR COUNTY.

(Special Correspondence).—The Shenandoah mine, 2 miles north of Plymouth, is down 1000 feet in the south shaft, the north shaft being over 500 feet deep. The two shafts are connected at the 500-foot level. The vein varies from 4 or 5 to 25 feet in width. There are several separate ore shoots in the vein. The values are in free gold and auriferous sulphides, principally galena. A new blower was recently put in by Superintendent S. K. Thornton to ventilate the workings below the 500 level. The company contemplates building a mill.

Plymouth, July 7.

At the Fremont-Gover mine, 1 mile north of Amador City, the gallows-frame over the Fremont shaft was finished last week and work on the foundation for hoisting machinery is being done. The mill is going up, says Manager A. Goodall. No rock is being mined at present, but considerable development work is being done. The air compressor has been repaired.

BUTTE COUNTY.

The sub-station of the Bay Counties Electric Power Co. at Oroville was destroyed by fire on the 5th inst. Three 800 H. P. transformers, value $4000, were lost. Twenty-five dredgers, supplied with power by the company, are temporarily idle as a result. A new sub-station was being built and is about finished.

CALAVERAS COUNTY.

W. Morehead, superintendent of the Crystal mine at Angels, says sinking continues in the Crystal shaft, which is down 620 feet.

Superintendent T. Kavanaugh of the Western Mines Co., operating at Rich Gulch, says he has men at work equipping the mine, machinery for which is on the ground. This includes a 6-drill compressor plant and water wheel, ventilating blower and a diamond drill outfit.

At the Lloyd mine at Central Hill, near San Andreas, operated by the Ophir M. Co., Superintendent F. Heath says he is putting in a boiler and other equipment. There is an incline 165 feet in depth, and this will be extended 200 feet deeper to tap the channel. A 6-stamp mill will be built.

At the San Domingo G. M. Co. mine at Dogtown, near Altaville, the tunnel was completed last week. It is 1100 feet in length and 20 feet deeper than the channel. The company has plenty of water for operating the mine, says Superintendent B. Thompson.——At the Bully Boy gravel mine, near Altaville, work is progressing. Two shifts are sinking a shaft to bedrock and are down 120 feet.

EL DORADO COUNTY.

The unwatering of the Havilah mine, at Nashville, is completed.

INYO COUNTY.

Superintendent Flint of the Tuber Canyon group, near Ballarat, reports the stamp mill and cyanide plant running steadily.——The Creed Co. will put in a mill.

KERN COUNTY.

Work will be resumed on the War Eagle mine, near Randsburg. A double-compartment shaft will be sunk, and as soon as sufficient ore is in sight to warrant it a 5-stamp mill and cyanide plant will be built.

Jensen & Hoffman are working on the LaCrosse claim, adjoining the Sunshine mine, near Randsburg, says the Miner. They have sunk a shaft 136 feet and are crosscutting.

L. D. Daves and J. J. Nosser have a lease on the Mabel S. mine, near Randsburg. They have a 14-inch ledge which assays $30. They are sinking on the ledge. The claim adjoins the Yellow Aster on the west.

MARIPOSA COUNTY.

Peregoy Bros. are doing development work on their claim, near Whitlock. They have put in a hoisting and pumping plant. The shaft is showing a 3-foot ledge of pay quartz.

Wood & Maddox have bonded one of the Weston group of claims east of the Imperial mine, near Whitlock. It can be worked from a tunnel which is in 40 feet.——J. Teats has bought the two stamp mills of S. J. Johns and intends milling his ore from the Spread Eagle. The tunnel of the Spread Eagle is in 435 feet.——The Hayseed mine, owned by W. Dolph, resumed operations last week. The second and third levels will be run 100 and 150 feet farther, respectively, and raises driven.

The Diaz copper mine on Bear creek, near Indian gulch, is being worked again.

MONO COUNTY.

Superintendent Pierce, of the Crystal Lake G. M. Co., operating the May Lundy mines at Lundy, says he has seventy men at work. The tunnel is in 3440 feet.

NEVADA COUNTY.

The 300 H. P. compressor put in at the power house of the North Star M. Co. at Grass Valley is in full operation, says Manager A. D. Foote, and, with this running, they are developing a total of 800 H. P.

Fire destroyed the entire upper works at the Seven-Thirty mine, on Deadman's Flat, near Grass Valley, on the 3rd inst., also the timbering for 40 feet down the shaft. The origin of the fire is unknown. J. J. Riley owns a controlling interest.

PLUMAS COUNTY.

G. Gruss, operating the Genesee mine near Genesee, says he is putting through his 15-stamp mill an average of sixty tons per day. Between the slate and the porphyry walls the lode matter consists of a network of small veins, and the entire mass is being quarried and put through the mill. To recover the loss in the tailings, concentrators will be put in and the mill further enlarged this summer.

SAN DIEGO COUNTY.

Manager L. N. Bailey says the company will resume operations in the Kentuck tunnel, between Banner and Julian, this month.

Superintendent Morrissey reports work going ahead in the Alpha mine at Banner and he is driving a level from the 300-foot tunnel to the North Star shaft.

SHASTA COUNTY.

Superintendent C. M. Osborn has men at work on the Mount Shasta May Blossom mine near Bully Hill (Winthrop P. O.)

In Shasta county the two smelters in operation are treating 25,000 tons of copper ore per month, the Mountain C. Co. at Keswick 20,000 tons and the Bully Hill M. & S. Co. at De Lamar 5000 tons. The De Lamar smelter will be enlarged. Besides working its own ore, the Mountain C. Co. treated ore from seventy-six shippers in the county during 1902. One other smelter is going up, the Great Western Co. at the Afterthought group at Bella Vista, and one other is proposed at the Balaklala group at Kennett, says the Redding Free Press.

SIERRA COUNTY.

The Lassiat G. M. & M. Co. has been incorporated at Poker Flat, near Downieville, by J. B. and R. Lassiat, F. P. and A. Roddy and F. Humbert.

SISKIYOU COUNTY.

The McKean mine at South Fork of Scott river, near Callahans, has been shut down for three months, to make improvements for more economical working. Water power will be used in place of steam for the compressors, as there is abundance of water available. The company has a cyanide plant.

The Brown Bear and Hammer Co. claims at Hamburgh Bar, on the Klamath river, from 3 miles below the bar to 1 mile above, have been bonded to L. L. Rees, C. Tucker, J. S. Perky and B. A. Cardwell of Denver, Colo. They will build a 14-mile flume from Scott river. G. Whipp and B. A. Cardwell have bonded the Offield claim, opposite Hamburgh, on the Klamath river.

At the Drummer Boy mine, near Yreka, development work is progressing with a few men preparatory to putting in a stamp mill. Electric power will be used.

TUOLUMNE COUNTY.

A new strike is reported in the Mount Jefferson mine at Groveland, on the 500 level. The same shoot was cut not long since on the 400 level.

The two-compartment shaft on the McAlpine mine, 5 miles southwest of Big Oak, is now down 250 feet. At the 200 level a crosscut will be driven to the vein, which will be explored by drifting. The mine is on the mother lode and has a large vein.

The Mohican mine, on the Tuolumne river, 5 miles southeast of Groveland, and near the Buchanan mine, is running its 5-stamp mill steadily. The mine is developed by tunnels, but a hoist is being put in in a station in the lower tunnel, and a shaft sunk on the vein.

Wm. Floyd is developing the Garfield mine, 1½ mile south of Carters. This mine is said to be on the Providence vein.

The Cosmopolite mine, near Groveland, is equipped with a steam hoisting plant and air compressor, and a mill is in contemplation by the management. In its early history the Cosmopolite was worked as a pocket mine and as such produced largely. It is now considered that the low-grade ore has become available by reason of improved methods and modern knowledge, and will pay to work. H. Argall is superintendent.

Operations in four of Tuolumne county's mother lode mines are suspended, as the miners of the Jumper and Golden Rule mines at Stent and the Santa Ysabel and the App mines on Quartz mountain quit work, because the companies refused to discharge non-union men. The strike affects 300 men. In addition to this, the union has demanded of all the mine managers in the jurisdiction of the Tuolumne union a new wage scale, which is an increase of 25 and 50 cents per day over the rate now paid in most cases. The scale is as follows: Machine men, chuck tenders, hammer men, timber men and pump men $3 a day, and all other skilled laborers not less than $3; muckers, carmen and top laborers, $2 50 a day; millmen and engineers and machinists, $3 50. In the case of machine miners and timber men the new scale is the same as before.

The Tuolumne County Dev. Co. have started operations on the Blue Jay and Jack Rabbit mines, near Carters, and adjoining the Providence mine on the south.

J. McCormick has bought a one-fourth interest in the Eureka quartz claim, at the head of the south branch of Whisky gulch, 2 miles from Jacksonville.

TRINITY COUNTY.

(Special Correspondence).—At the Dorleska mine a strike has been made on the fourth level at a vertical depth of 300 feet. The ore, where first struck, was 4 feet wide, and included a streak of 10 inches of $100 ore. The ore body has widened to 10 feet, then to 15, and on July 1 the walls were 29 feet apart, 20 feet of which is a good grade of milling ore. This ore body has been worked on the third level, 120 feet above, but it was not expected to show such width. On the third level it averaged 10 feet in width, and at its greatest dimensions was 17 feet wide. The Dorleska recommenced sinking the shaft from the third level at depth of 180 feet December 23, 1902, and went to depth of 317 feet. A station was cut and a crosscut west reached the first contact at 45 feet and the second contact at 107 feet A drift north was started 89 feet west of the shaft and the ore body cut in the north drift 75 feet from the crosscut. Ore of milling grade is being taken from another development on the Dorleska, in a north branch of tunnel No. 2, nearly 1000 feet north of the shaft. This is a new source of ore supply. The Dorleska mill commenced working June 3, 1901, and with the exception of four months, when it was shut down by heavy snows—from February 25 to June 19, 1902—it has been running continuously to date. The mill has been enlarged twice, and the developments of the past month, it is stated, add two years supply of ore at the present rate of consumption. The addition of another 5-stamp battery is under consideration, and will probably be made this season. About 4000 tons of ore had been milled to July 1, producing over $100 000. An average of forty men are employed at the Dorleska throughout the year, and

in the summer season, with contractors for wood and timber, the number reaches sixty. During July the company's sawmill will cut lumber and timbers for another year. Union Consolidated G. M. Co. of Los Angeles, owners; H. Z. Osborne, president; M. H. MacIlwaine of Dorleska, superintendent.

Dorleska, July 7.

The ledge in on the second tunnel in the Globe mine, in Canyon Creek mining district, near Weaverville, has been struck at 800 feet, says the Trinity Journal. Heretofore the mill has been run by steam and could only he used five months a year. Compressed air will be used hereafter. Superintendent R. A. Skinner has twenty men at work. It is proposed to enlarge the plant.

YUBA COUNTY.

(Special Correspondence).—A. H. Elftman, one of the directors of the Miller M. Co., is here from Minneapolis, Minn., and proposes having a resumption of work next month.

Brownsville, July 8.

Work on the Yuba debris barriers, near Marysville, is again under way. They have twelve men at work stripping the quarry for barrier No. 1. A ditch 1 mile long has been dug.

COLORADO.

BOULDER COUNTY.

A. S. Wise, manager of the Black Swan M. Co., composed of Meadville, Penn., men, has resumed, and is overhauling the mill. The group is between Sunshine and Salina, containing large veins of low-grade ore. The mill is equipped for concentration and will have cyanide added for saving the values in the tailings.

The Rocky Mountain Fuel Co. began operations last week toward sinking a new coal mine on the Wanaka place east of Louisville. The hoisting apparatus is in place.

CLEAR CREEK COUNTY.

(Special Correspondence) —T. B. Crow of Idaho Springs will add concentrating tables and crushers to his new mill.——F. F Reed, manager of the Bonita mill, states he is getting all the ore he can handle and has had to increase the capacity. He has thirty stamps and a 15-ton cyanide plant, and if the cyanide plant is successful will increase to forty tons. —— The Idaho Springs M. & R. Co. have overhauled their mill and put in additional jigs. Work has resumed full handed.

Idaho Springs, July 5.

(Special Correspondence).—J. R. Elgan, manager of the New Era Co. at Freeland, 5 miles southwest of Idaho Springs, has opened a 3-foot vein of $50 smelting ore. Forty men are employed on the property.

Freeland, July 5.

(Special Correspondence).—G. W. Teagarden, manager of the St. Paul G. M., S. T. & D. Co. in East Argentine mining district, is driving two tunnels. His company will put in a water power plant.—— The main tunnel of the Red Oak mine is in 3000 feet. At the 2500-foot mark they have started to drive a crosscut and expect to cut the Astor vein. Two cars of $100 ore are being shipped from the Sunburst mine each week.

Georgetown, July 5.

The Manhattan Union M. Co. has been organized to work the Kittie Ousley, Big Chief, El Dorado, Mound Builder, Lead Island and Rosalie group of lodes in East Argentine district, adjoining the Waldorf, near Georgetown, by H. W. Preston, D. W. Barkley and E. J. Wilcox. Development machinery will be put in.

The Central tunnel of the Big Five Co. at Idaho Springs will be driven ahead 5000 feet by contract at $10 per foot, the contractor to he furnished with machine drills, steel, air and ventilating pipes, rails and ties, and compressed air. The contract calls for a tunnel 5 feet wide by 8 feet high in the clear, and is in 1800 feet.

Manager J. H. Towne has added another location to the group of claims he is developing for the Indiana G. & S. M. & M. Co. on McClellan mountain, near Silver Plume, making eight in all, besides a tunnel site and millsite. The vein shows values in gold and silver. This lode will he reached in 500 feet by the adit tunnel being driven on the Indiana lode.

CUSTER COUNTY.

J. P. H. Callahan and R. E. Myers of Westcliffe have a bond and lease on the King of the Carbonates group, near Westcliffe, for $50,000.

DENVER COUNTY.

J. B. Grant, chairman of the executive committee of the American S. & R. Co., estimates the damage at the Grant & Globe smelters of that company at Denver, caused by the unexpected strike of the employes at $25,000. All hut two of the eleven furnaces in use were "frozen," and the ore will have to he cut out before the furnaces can again be used. Manager F. Guiterman of the Globe smelter expects to have operations under way again next week.

DOLORES COUNTY.

S. Newhouse of Salt Lake City, Utah, will equip his group of mines, near Rico, with a concentrator.

EL PASO COUNTY.

An attempt was made to blow up the plant of the Colorado Springs Electric Co. on the 5th inst. with dynamite. One hundred and fifty sticks of dynamite were piled alongside the north end of the buildings and a fuse lighted. The explosion of one stick distributed the other sticks over a radius of 200 feet, saving the building and the lives of seventeen employes. The glass in all the northern windows was broken and fires started, which were quickly put out. The company furnishes power to the Standard mill of the United States R. & R. Co., where a strike has been declared by the Western Federation of Miners.

GILPIN COUNTY.

J. H. Wilson, W. L. Shull and C. C. Worrall of Denver have incorporated the Onoko M. Co., to work on the Steady Income group of mines, near Russell Gulch. On the Paola mine they have put up a hoisting plant. The company also owns the Onoko group of mines.

E. S. Moulton of Central City has taken a lease on the Hillhouse mine, near Russell Gulch.

At the Foote & Simmons mine, on Bobtail hill, near Central City, the company will put in a 10x12 hoist and an 80 H. P. boiler, and will use electric drills. The shaft is down 600 feet and the company intends to sink down to a depth of 1000 feet. S. Mellor is superintendent.

The Cadillac M. & M. Co. have a lease and bond on the New Hampshire group of claims, at the head of Lump gulch, and have started operations. The ore will be tested at the Stanley mill, near Gilpin, owned by this company.

During the month of June the shipments of smelting and crude ores, concentrates and tailings from the Black Hawk depot to the smelters and mills made a total of 235 cars, or 4700 tons.

T. George of Denver has a lease and bond on the Howard tunnel group, up Clear creek, in Enterprise district, near Central City.

The Nevada Con. G. M. Co., operating the King, Lamberson & Warren and Oronoake mines on King flats, near Central City, has carpenters putting up buildings for a lead concentrating plant, says President T. Marx. The mill will have a capacity of fifty tons per day. Sinking has been resumed at the Pierce mine at Central City by the English company. The shaft will he put down an additional 100 feet, making it 400 feet deep.

GUNNISON COUNTY.

The Keystone mine, 3 miles above Crested Butte, is to be operated this summer. This property carries silver, lead, zinc and copper values, says Superintendent H. Schraft, who has cleaned out the drifts preparatory to doing further development and taking out ore. A mill is in contemplation.

The Gunnison M. S. & R. Co. has been incorporated at Gunnison. J. J. O'Brien, J. T. Cavanaugh, F. W. Otto, F. A. Whitney and W. H. Baker. The company will put up works for smelting, concentrating and reducing ore.

The Blistered Horn tunnel near Tincup, which is being driven under the Jimmy Mack mine workings is in 400 feet, and will be extended 1100 feet farther. The Jimmy Mack vein carries high-grade copper values; also values in silver and lead. The Brunswick M. Co. of New York and New Jersey is doing the development work.

The West Gold Hill M. Co. will resume operations next week on the J. B. Sellers group on West Gold hill, near Tincup.

LAKE COUNTY.

At the Ibex combination at Leadville 250 tons of ore a day are being mined. Shafts Nos. 2 and 3 are furnishing most of the ore. At No. 4 shaft sinking is going on to complete connection with the Yak tunnel. No. 3 shaft, down 800 feet, will be sunk another 450 feet.

Manager Strong says the Banker mine, near Leadville, will be reopened.

The Fryer Hill M. Co., operating at Leadville, will increase their output until they are shipping 1000 tons a day.

The output of Leadville district for June was 80,000 tons of all classes of ore—this, too, with a large amount of development work under way.

LA PLATA COUNTY.

The Neglected mill, near Durango, is in operation, with a capacity of treating 100 tons daily. They amalgamate before and after concentration. The grinding is done with Chilean mills, the pulp passing over amalgam plates and thence to Frue vanners, the tailings passing over another set of amalgam plates below.

MINERAL COUNTY.

The ore output of Creede district for 1903 to July 1 is as follows:

Month.	Tons
January	5,283
February	5,788
March	7,072
April	5,715
May	5,645
June (estimated)	7,000
Total	36,503

OURAY COUNTY.

A. Van Horn of Ouray has bought the Snowflake mine in Red Mountain district, near Vanderbilt, and is moving up the Paymaster hoist with which to unwater the shaft and start development, says the Standard.

PARK COUNTY.

The placer ground covering 490 acres, near Tarryall, is being worked, says J. H. Weigert of Colorado Springs, part owner. An hydraulic plant will he put in.

The Almaden M. Co., near Tarryall, is preparing to start to work on a 1500-foot tunnel.

SAN JUAN COUNTY.

Preliminary work has been started on the Stony Pass M. Co.'s group, in Stony Pass section, near Silverton.

The Four Metals M. Co, which has a bond and lease on the Lackawanna group, on Blair mountain, near Silverton, has cleaned up the upper workings of the mine preparatory to regular operation. The Lackawanna group is of five claims and contains low-grade silver-lead ore.

The Sturgeon & Gordon lease on the Spotted Pup mine, near Silverton, having expired, operations will be continued by the Contention M. Co., owners. The ore streak is 20 inches wide of high-grade gray copper ore. The Contention Co. will resume work on all of the claims of the North Star group.

The Kendrick & Gelder Smelting Co., the Oliver Reduction Co. and the Paradox Copper-Gold M. Co. have been consolidated at Denver as the San Juan S. & R. Co. It is proposed to build the tramway and additional reduction works. Included in the properties of the San Juan Co. are three groups, one of thirty-four claims in Prospect basin, one of seven claims in Picayune gulch, one of four claims in Burroughs park, and the group of six claims at Silverton. In addition there is the Henrietta tunnel site. The smelter is of 150 tons daily capacity, and is on the Silverton group. F. C. Kendrick is general manager.

SAN MIGUEL COUNTY.

Superintendent G. Land of the Keystone Hydraulic M. Co., operating near Telluride, says he has twenty men at work on eight-hour shifts. Another giant will be put in. Electric lights have been placed about the gravel pit and other workings. Sluicing will continue as long as the water holds out.

SUMMIT COUNTY.

The Ætna and Vesuvius mines, on Fletcher mountain, near Kokomo, will be started up, says Manager V. E. Myer. Both properties have gold quartz.

TELLER COUNTY.

The Cripple Creek Times says, considering the time lost on account of rainy weather during the month and the temporary close-downs in many of the mines, the tonnage of the district for June was higher in proportion than May:

	Tons.	Total Value.
Smelters	12,000	$720,000
U. S. R. & R. Co.	20,000	500,000
Telluride	5,100	153,000
Economic	3,800	83,600
Portland	7,000	210,000
Dorcas	2,900	94,250
Globe	400	1,600
Gillett	450	1,237
Totals	51,650	$1,763,687

The leasing of the Stratton estate, completion of the drainage tunnel, the tax decision and the geological survey are expected to influence important increases in the output of the district.

The Empire State Con. M. Co. is reported closed down. The company owns the groups formerly owned by the Arrow G. M. Co. and Orphan G. M. Co., in all twenty acres on Bull hill, Cripple Creek. N. B. Williams is president.

A complete cyanide mill is being built on the ground of the Doctor-Jack Pot Co., on Raven hill, Cripple Creek, that will treat the low-grade oxidized rock hoisted through the Ingham incline shaft. The operators are Oastler, Tomlinson and Pender brothers. The mill will have a capacity of thirty tons per day.

The Tunnel M. & L. Co., which secured the first lease granted by the Stratton's Cripple Creek M. & D. Co., are putting in additional machinery at the Abe Lincoln mine, up Poverty gulch, near Cripple Creek, says Superintendent W. Swanson. Sinking the shaft another 100 feet has started. While they are required to sink at least 100 feet, they are not restricted as to depth, and can sink to and mine ore at any depth. Five other leases have been granted, says Manager W. G. Rice, covering portions of the Pauper, Monitor, Midget, Silver State and Colorado King claims, on Gold and Globe hills. W. G. Morse, M. Welch and A. C. Mansfield of Cripple Creek, on blocks No. 85 and No. 89, will put in development machinery.

Manager W. E. Lloyd of the Sioux Falls & Cripple Creek M. & Dev. Co., says preparations are being made to put up a cyanide mill on Spring creek at the foot of Copper mountain, near Cripple Creek and below the Fluorine mine, operated by the company.

The Mollie Kathleen mine, adjoining the Gold King on Womack hill, near Cripple Creek, has been bonded and leased for $75,000 to the Creston Big 8 M. Co., of which H. C. Boll is manager. The Mollie Kathleen is developed by a two-compartment shaft 710 feet in depth.

Diamond drills have prospected the ground of the St. Patrick M. Co. at Victor, and a drift is being run north on a vein at a depth of 500 feet. The St. Patrick mine is owned by Clark & Co. of Scotland.

IDAHO.

BLAINE COUNTY.

Superintendent F. S. Adams of the Rosetta M. Co., operating on Little Smoky river, 35 miles from Hailey, says he has fifty men at work. Their sawmill is cutting lumber for a mill, bunkhouse and other buildings. A laboratory will be put up, and also a 20-stamp mill. Ten stamps are being set up to start with. The Rosetta Co., operating the Williams group of claims, near Hailey, has completed a road up Williams gulch to the millsite.

Manager M. H. Lipman says work on the tunnel to tap the Bullion series of veins, near Hailey, will go ahead. Power drills will he used.

BOISE COUNTY.

A. C. Gallupe, manager of the Golden Rod M. Co., operating on Mineral hill, near Placerville, says the development consists of a shaft 130 feet deep on the Don Carlos, adjoining the Mineral Hill claim. A tunnel driven in on the Mineral Hill 1100 feet is within 20 feet of the shaft, though 64 feet below it. Connections will be completed this month. The 5-stamp mill has been overhauled and is again in operation. It will be increased this season to twenty stamps. C. M. Corns is superintendent.

IDAHO COUNTY.

(Special Correspondence) —The Jumbo mine shipped out from Buffalo Hump last week $5000 in bullion as the result of twenty-five days run with their 4-stamp mill. The ore bodies on No. 3 level, 515 feet depth, are reported improving. The additional 10-stamp mill is being set up, and is expected to be in operation by July 15th.

The Cracker Jack mill capacity at Buffalo Hump is being increased. The mortar and additional five stamps are on the ground, having been shipped in via Stites, the railroad terminus.

Moose Creek Placers Co., at Newsome, has made its third partial cleanup in thirty days, yielding $6000 from this ground in that time. Returns from the U. S. Assay Office at Boise gave the fineness of the two former cleanups at 940 and 937½. It is proposed to increase their equipment and extend their ditches. C. P. Richardson of Newsome is president and manager.

Lewiston, July 6.

The Rainbow G. M. Co. has been incorporated to operate the Harrisburg group of three claims in Thunder Mountain district, near Roosevelt. R. F. Agnew, W. F. Lybrook, T. C. Downing, A. C. Buxton and E. M. Evarts of Michigan, with G. Wertz of Boise, who is manager. The three claims taken over by the company are on Rainbow mountain and near the Fairview. Operations have begun. A contract has been let to drive a crosscut tunnel of 300 feet. It is expected the ledge will be struck at depth of 150 feet. It is intended to put in a 20-stamp mill this fall, which will he built 2000 feet from the mine, and an aerial tramway transport the ore from the mine to the mill.

Work has resumed on the Big Buffalo group in Hump district, says C. Sweeny of the Buffalo Hump M. Co. Experiments will be made with a cyanide process to handle the ores. For the present work will be on the tailings, and if the system is successful with them it will be used to treat the raw ores. There is a stamp mill already up. They will drive a drift from the Oro Fino ground 4000 feet along the vein, which will give a depth of 500 feet.

LEMHI COUNTY.

C. G. Reiter and F. R. Abbey of New York and C. Wright of Salmon City have

a bond on the Haldee mine, near Leesburg, and will start development work. This group consists of five full claims. The vein is 10 feet wide, with values in gold and silver.

The coal discovery made near Salmon City is being developed by F. M. Pollard, the owner, who reports having 13 feet of merchantable coal in two veins, with a stratum of 16 inches of shale between.

The Edmund group of mines on Little Deer creek, near Blackbird, has been sold to the Edmund Quartz M. Co. of New York and Boston men. The Edmund mines consist of four quartz claims and 160 acres of placer ground. There are 500 feet of tunnels driven, showing a 6-foot vein of free-milling gold ore. A new tunnel has been started which will cut the ore 100 feet deeper than the present workings, and machinery for both extraction and treatment will be put in.

LEMHI COUNTY.

R. L. Edwards, manager of the Kittie Burton G. M. Co., says work on the Ulysses mine at Ulysses is progressing, and they will put in fifteen additional stamps at their mill, which will give the mill a total of thirty stamps, which will handle ninety tons daily. Grading for the addition to the mill has begun.

SHOSHONE COUNTY.

The owners of the Golden Chest mill, near Murray, propose to build an entirely new mill, which will have fifty stamps, and a cyanide plant. They now have twenty stamps.

The Beartop silver-lead group was sold last week, including the Simmons placer and water rights, to G. E. Myers, C. C. Groesbeck and E. Brucker of Toledo, O., for $250,000.

The International Mines, Ltd., has been incorporated by J. White, J. L. Clark, E. S. Wyman, W. Graham and M. Baumgartner of Burke to operate a group near the Hercules mine, above Burke.

WASHINGTON COUNTY.

The Short's Bar placers, 1 mile above the mouth of the Little Salmon river, near Weiser, have been sold to the Pittsburg M. Co for $12,000. Hydraulic equipments will be put in and a ditch built to bring 1000 inches of water to the ground. Two giants will be operated.

INDIANA.

The Central Oil Co. of Boston, Mass., has sold some of its oil leases in Madison and Delaware counties to the Ohio Oil Co., including 140 wells on the basis of $1000 per barrel capacity. The deal as a whole aggregated $300,000.

KANSAS.

NEOSHO COUNTY.

A zinc smelter company has been incorporated to build a plant at Chanute. H. Hess and J. Rauer, of St. Louis, Mo., with F. W. Stuecke, of Girard, Kan.

MICHIGAN.

HOUGHTON COUNTY.

The Champion mine, near Painesdale, has its fourth head running as regularly as rock can be furnished it by the mine. It is impossible for the mine to make a full showing in rock output until the 100-drill air compressor is completed, says the News.

The Osceola mine, near Calumet, for the first half of 1903 produced 7,000,000 pounds of refined copper. The average price received for the first five months was 13¾ cents; and the June average has been 14½ cents. The entire cost of mining, milling, smelting and marketing is reported at 9½ cents per pound. Seven heads will be kept running steadily, and daily rock shipments average 3500 tons.

The hoist for Baltic shaft No. 4, near Houghton, is being set up and is expected to be ready to go into commission next week.

The output of the Quincy mine at Hancock for June was 1902½ tons of copper.

The Winona mine at Winona for June produced eighty-four and one-half tons of copper; total output since production began in January, 1,007,000 pounds.

The News says, the Atlantic mill, near Houghton, stamped on June 30 Atlantic rock yielding 30,300 pounds of copper. This is the heaviest yield for a single day since the mill has been running, the usual number of stamps being dropped.

KEWEENAW COUNTY

Machinery for the hoist at No. 4 shaft of the Mohawk mine, near Allouez, is being set up. The hoist has a capacity to depth of 4000 feet and is a duplicate of the hoist being put in at No. 4 shaft of the Baltic.

The drain shaft at the Allouez mine, near Allouez, in sinking for the Kearsarge lode, struck the ledge at depth of 41 feet. The work of sinking the main shaft was discontinued temporarily on account of a rush of sand and water, until this drain shaft alongside of it could be sunk to the ledge through the quicksand. Sinking of the main shaft has resumed.

ONTONAGON COUNTY.

It is reported at Mass City the Mass mine management is decreasing the number of drills in use and also the number of men at work.

MISSOURI.

JASPER COUNTY.

The Seven Devils M. Co., operating in South Carthage camp, started a shaft last week for a known bed of ore at the 70-foot level and struck good ore at 6 feet. The company has heretofore taken out ore at the 25 and 40-foot levels.

The Bald Eagle mine, on the Plutocrat lease, southeast of Webb City, has been sold to W. McCulley of Macon, Mo., for $15,000.

The Par Value Zinc and Lead Co. have taken over the Read lease of six lots, near Duenweg, under the supervision of J. G. Dinkelbihler. Cincinnati, O., men are interested. Prospecting will be started at the shaft, formerly known as the Big 20 of Carthage. A 50 H. P. plant is being built.

LEWIS COUNTY.

At the Bunker Hill mine at Bunker Hill, owned by A. Hardy of Webb City, the mills are being repaired. A new shaft will be sunk on seven more lots of the same tract.

NEWTON COUNTY.

The Mears M. Co., who hold a lease on N. J. Parrot's land, 2 miles southeast of Granby, report a strike last week, the drill cutting into ore at 220 feet.

MONTANA.

The metal output for Montana for 1902, as shown by the annual report of the director of the mint, just issued by B. H. Tatem, assayer in charge of the United States assay office, in Helena, was $46,961,-167, a decrease of 22% from 1901. The decrease was due to lower prices for copper and lead. The production for 1902 was as follows: Gold, $4.400,095; silver, $16.622 285; copper, $24,606,038; lead, $332,747. Tatem's report shows that the copper ores of Butte carry more gold than formerly.

FERGUS COUNTY.

The Judith M. Co. has been incorporated by A. Hayden, A. P. Pendleton and A. W. Bulkley of Chicago, Ill. Lewiston will be the principal place of business. The company owns the Judith mine near Lewiston.

GRANITE COUNTY.

In Antelope district, near Phillipsburg, work is again under way on the Mountain Ram group of mines, owned by J. A. Murray and S. F. King of Butte. J. Dixon is superintendent. The Mountain Ram group (the Antelope) is a gold property. It is proposed to put up a cyanide mill.

JEFFERSON COUNTY.

Mulvahill & Ely, lessees of the Daly group at Wickes, are shipping three cars a week of high-grade ore and have several hundred tons of second-class ore on the dump. Their mill, having been enlarged to 100 tons a day, resumed last week.

J. H. McCabe has sixteen men at work on his group near Corbin, and will sink two shafts 500 feet to develop bodies of copper ore. He has located fifty claims in the Corbin-Wicks district.

MADISON COUNTY.

The Little Kid mine, near Norris, has been bonded by Jardine and Livingston men. There is a 10-stamp mill, a 20-ton Bryan mill and sawmill on the property, and it is intended to build a 100-ton concentrator. Negotiations are reported in progress for a lease and bond on the Saginaw.

S. Newhouse of Salt Lake City, Utah, controlling the Revenue group of mines at Norris, says he will build a cyanide plant of 100 tons daily capacity. J. Dederichs is superintendent. In addition to the milling ore, they have some ore which is shipped direct to the smelter.

Manager C. E. Damours of Virginia City says the Damours M. Co. has been organized to develop the Bryson-Damours group of claims in Summit district, near the head of Alder gulch, near Virginia City.

One mile above Pony, in Pony gulch, the Zenith M. Co. of Butte, J. Hilchen president, is operating the Big Timber mine, with P. A. Gamer manager. The mine is being developed by a tunnel.

C. T. Wiedman has a lease on the Oregon mine, near Pony. It is intended to put a 5-stamp mill on the mine, work to begin this month.

The No. 2 dredger of the Conrey Placer Co., near Ruby, is in operation.

RAVALLI COUNTY.

The Boulder Creek Hydraulic M. Co. have been hauling in lumber and supplies to their diggings near Hamilton. They are putting in a sawmill and engine and will cut their own lumber for flumes and buildings. Boulder creek is south of Hamilton across the range east of the Orr-Kendall mine. The company have 3 miles of the main creek and 3 miles of side gulches. A. Koehler is superintendent. The company expect to finish the hydraulic plant this season in time for a full run next year.

SILVER BOW COUNTY.

Improvements are being made at the Butte Reduction Works, owned by W. A. Clark at Butte, the most important of which will be a copper refinery. The refinery will occupy the site formerly covered by the timber-framing plant. Adjacent property has also been bought.

The Reins C. Co., composed of Butte and Pittsburg, Pa., men, operating the Combination mine at Butte, have started to sink the main shaft another 500 feet, which will make the shaft 1000 feet deep.

It is reported W. A. Clark will reopen the Black Rock mine of Butte after a lapse of fourteen years. It is proposed to sink a shaft to 1000 feet depth in hope of uncovering a copper deposit. In former years the Black Rock was a silver mine.

The Nipper mines case, a suit involving a portion of the Nipper lode, near Butte, has been called for trial.

NEVADA.

CHURCHILL COUNTY.

The Territorial Enterprise says a mining rush has taken place to Pedro City, 12 miles southeast of Fairview and 6 miles east of Eagleville. The ledges have been traced for some distance at surface and locations staked off. There are said to be twelve ledges running parallel with each other, covering 1200 feet in width, and two of the ledges are 40 feet wide, the others averaging from 1 to 10 feet. Gold, copper and silver values are found. It is in a rugged country, barren of timber and vegetation, and the nearest water a distance of 8 miles.

ESMERALDA COUNTY.

The Tonopah-South Gold Mountain M. Co. has been incorporated to operate in Gold Mountain district, 4½ miles southwest of Tonopah; D Wilson, J. T. Fogarty, E. Loessel, T. R. Bannerman, C. A. Clinton, A. J. Martin, C. T. Grimes and J. S. Bannerman are directors. The company owns fifteen claims extending southeasterly from the Milbrae Co.'s claims.

C. H. Elliott has bonded the Mary mine at Silver Peak for $75,000 for Salt Lake parties. The property consists of one mineral claim and a tunnel site, equipped with a 10-stamp mill and cyanide plant.

LANDER COUNTY.

The New Pass M. Co. are putting in a pipe line and will build a stamp mill, says Manager W. Snyder of Salt Lake City, Utah. The ore averages $10 per ton in gold.

LYON COUNTY.

The company operating the North Rapidan mine, at Como, has authorized Manager E. Boyle to accede to the demands of the Lyon County Miners' Union to increase the pay to $4 for an eight-hour day, and driving the drain tunnel was resumed this week, says the Enterprise.

NYE COUNTY.

G. Wingfield, J. P. Hennessy and A. Thompson have a bond on the Workman group of mines at Cloverdale, 50 miles northeast of Tonopah, for $30,000. The pay shoot is 15 inches wide in an 11-foot ledge and carries an average of $50 a ton in values. A shaft will be sunk, says Superintendent Thompson.

Wingfield & Hennessy, with J. A. Meith, have bought a group of claims at Lone Mountain, near Tonopah.

F. B. Work, superintendent of the Newhouse properties at Hannapah, reports machinery on the ground, including a pump having a capacity of fifty gallons a minute, to handle the water struck on the 250-foot level. The south crosscut from the 250-foot level is in 55 feet and has cut the foot wall of the vein.

U. B. and G. H. Curtis have bought a group of seven claims at Lone Mountain, near Tonopah, between the O'Meara-Lynch and the Tonopah Alpine groups, and have incorporated the Alpine-Eagle M. Co.

The Tonopah-Ray M. Co. has been incorporated by L. C. Ray, C. H. Hammond, J. S. Cook and A. Kunze, the last named being general manager. The property of the company embraces eight claims at Ray; the main office is in Chicago, Ill. Work has been begun on the Enterprise claim, which shows 5 feet of ore.

T. S. Ford of Grass Valley, Cal., has bought five claims at Lone Mountain known as the Battleax group, which adjoins the Lone Star group on the west.

The Tonopah-Belcher M. Co. has been organized by J. C. Gladden, F. H. Lathrap, C. E. Hudson and J. W. Briggs, to operate the General Thomas group at Lone Mountain, near Tonopah. On the General Thomas claim, at depth of 60 feet, a 4½-foot ledge has been opened up.

Reno men have bought a group of claims adjoining the Alabama-Tonopah and organized the Esmeralda M. Co. to work the property.——The Tonopah-Eureka M. & Dev. Co. has been incorporated to work a group of five claims east of the Tonopah-Great Western. L. L. Mushett is president and J. Galinger secretary.

The Belmont and Minta groups of five claims, which adjoin the King-Tonopah mine on the north, near Tonopah, have been sold and the Utah-Tonopah M. Co. has been incorporated to work them; J. L. Butler, G. A. Whiteford, A. P. Davis, S. Garrison, F. L. Van Duzer and H. C. Marcus. The head office will be in Tonopah.

The Lone Mountain Syndicate has been organized to work a group of seven claims on the western slope of Lone mountain, 2 miles south of Barrel Springs, near Tonopah. There are two ledges, bearing values in lead, silver and gold. R. P. Dunlap, W. J. Douglass, W. H. Foster, F. Thorn, T. G. Elgie, H. Fletcher and W. J. Stoneham are incorporators. They claim the ore can be hauled to Candelaria for $8 per ton.

STOREY COUNTY.

The shaft of the hoisting engine at the St. Lawrence mine in Butte City, near Virginia City, was broken last week and the miners have been laid off for six weeks.

Repairs to the hoisting engine at the main shaft of the Con. Cal. & Virginia mine at Virginia City were completed and operations resumed this week. The superintendents' report for the week ending July 4 show: At the Hale & Norcross the tunnel was advanced 13 feet; total length, 3742; formation, diorite, with slight seepage of water. In the Sierra Nevada, at the S. N., M. & Union shaft, 1600-foot level, the north lateral drift, started from the joint west crosscut, was advanced 5 feet through porphyry and clay; total length, 222 feet. The joint Sierra Nevada and Union east drift from the station advanced 5 feet through hard porphyry; total length, 607 feet. At the Union Con. 1600-foot level, the west crosscut started at the south lateral drift, 200 feet from the joint west crosscut, has been advanced 6 feet through porphyry; total length, 103 feet.

WASHOE COUNTY.

At Olinghouse, near Wadsworth, W. Port, C. C. Howell and D. R. Wilkerson are sinking a shaft on the Gus, one of the group they have under lease and bond. J. C. Effrick and R. Nelson have a lease on the No. 1 mine, owned by Short Bros.

J. Sparks, principal owner, says sinking on the Wedekind group, near Reno, will be resumed and go down to 500 feet. The shaft is 190 feet deep.

NEW MEXICO.

BERNALILLO COUNTY.

R L. Baca of Santa Fe reports locating a group of claims in the Sandia mountains, 7 miles from Bernalillo, which show values in iron and copper ore. He has begun development work.

GRANT COUNTY.

The smelting plant of the Silver City R. Works Co., south of Silver City, was totally destroyed by fire on the 2d inst. It is supposed the fire started from a spark from an engine. The plant was valued at $100,000, with $15,000 insurance. It was owned by the Hearst estate.

In Shakespeare district a 50 H. P. steam hoist is being put in at the Dacotah Pearl mine, owned by the Michigan-New Mexico C. Co. of Lordsburg. The shaft is down 120 feet and the company proposes sinking to 500 feet and then putting in a fifty-ton leaching and cyanide plant. Work in Chloride Flat district, 2 miles from Silver City, was started last week. A. G. Witzel has leased the Baltic mine and started work, with N. Fisher as superintendent. J. R. Brent and J. A. Card have a lease on the '76 and the Bremen group. Near Pinos Altos, at the Mountain Key mine, W. C. Chandler, owner, has fifteen men at work on the 700-foot level, drifting and stoping, and some high grade ore has been blocked out. The ore is a sulphide, carrying gold, silver and copper.——The Shamrock G. & S. Co. has a lease on the Pacific mine, owned by the Hearst estate. The wagon road between the mine and the smelter has been repaired. The company has put in a sixty-ton furnace. Development work in the Silver Cells mines is going ahead.

The Santa Rita M. Co. at Santa Rita report making a steady output of 500,000 pounds of refined copper per month. They are crushing 150 tons of ore per day and the capacity of the mill will be increased.

SOCORRO COUNTY.

Manager J. M. Bryson has bought for the Dividend M. & S. Co. the copper mines at Estey. This group carries sui-

phide ores. The company will build a 500-ton concentrator and make other improvements.

OREGON.

BAKER COUNTY.

Platinum has been found in the Ruby vein of the Standard mine, near Sumpter, says E. W. Mueller, manager.

The McKinley and Roosevelt group, in Cable Cove district, near Sumpter, owned by the Advance M. Co., will begin operations this month. There is a 54-foot shaft on the ledge, with the vein showing 7 feet between the walls, with 4 feet of free milling ore running $15 per ton.

H. D. Nelson, superintendent of the Alpine mine, near Sumpter, says machinery for the stamp and saw mill is on the ground. The saw mill will be set up first to cut timber for the buildings to be erected.

President J. Thomsen, of the May Queen mine, near Sumpter, says he has doubled his working force and will both drive ahead and sink on the mine. As soon as they get down 50 feet on the ore shoot, it is intended to put in a hoist and compressor.

GRANT COUNTY.

O. C. Wright, president of the Blue Bird M. Co. at Sumpter, and E. C. Allen of Portland have bought the holdings of the Black Butte M Co., which include thirty quartz and placer claims (608 acres), 9 miles from the Dixie Butte, in Fox valley. The group has a mill on it with a daily capacity of thirty-five tons. Mr. Allen will have superintendence and a hoist with a capacity of 500 feet depth will he set up, sinking beginning on the Black Butte proper. The company will turn Belshaw creek into the placer reservoirs, which will insure an abundance of water for an entire season.

WALLOWA COUNTY.

(Special Correspondence) —The Eureka M. & S. Co., with offices at Lewiston, Idaho, and operating near Snake river, in Imnaha district, have put in operation their steamer for transportation of ore and supplies between Lewlston and the mines.

Lewiston, July 6.

SOUTH DAKOTA.

CUSTER COUNTY.

The Black Hills-Duluth C. Co. has been incorporated to operate a group near the limestone range west of Custer. The ores carry copper and gold. T. A. Towner, W. A. Nelson, F. M. Hanley and M. J. Bailey, all of Custer, are directors. A diamond drill will he used to prospect the ore bodies. The property adjoins that of the Central Black Hills C. Co.

LAWRENCE COUNTY.

It is reported the Homestake M. Co., at Lead, is preparing to increase its milling capacity by the erection of a 400-stamp mill. The company is dropping all of its 900 stamps and crushing on an average 3600 tons of ore daily. The ore is amalgamated and then submitted to cyanide treatment.

The Jupiter G. M. & M. Co. resumed full operations at its cyanide plant on Blacktail gulch, near Central City.

The Pennsylvania M. Co., on Rutabaga gulch, near Deadwood gulch, near Deadwood, are putting in additional machinery consisting of boiler, air compressor, air drills, steam hoist and pump, and will add several hundred feet to the depth of the workings.——The Big Four M. Co. is also building, across Deadwood gulch, from the works of the Pennsylvania Co. A shaft house is going up and the machinery is on the ground.

A cyanide mill will be erected on the Buxton-Big Bonanza mine, near Lead, says J. Lundberg of Clinton, Iowa, manager.

The Spearfish G. M. & R Co., operating near Spearfish, in its annual report for the year ended May 1, shows that 54,929 tons of dry ore, having an average assay value of $5.285, were treated; loss in tails, $1.20 (8%), leaving a bullion recovery of $223,970.80, or an average recovery of $4.07 (7%) per ton. The total of mining, milling and incidental costs was $143,833.47 ($2 616 per ton).

R. B. Hughes, manager of the Cleopatra Co., on Squaw creek, 10 miles west of Deadwood, says a vein 30 feet wide has been opened up on the quartzite. The ore does not carry sufficient values to pay for mining same, but it is believed that another shoot will be found by sinking. The company will put in an air compressor, air to he used instead of steam for the drills.

PENNINGTON COUNTY.

The Golden West M. Co. started its Chilian mill, 2 miles west of Rochford, last week on free-milling ore running $4 per ton from the Yellow Bird and Benedict mines.

The Ajax M. Co. is putting in machinery at the Standby mill at Rochford, and expect to start up next week. It is intended to put in cyanide vats. J. Baker of Lead is manager. The mine is opened by a shaft 200 feet deep, cut by a tunnel from the level of the mill. The mill is equipped to run by water power, and will have steam also.

UTAH.

The annual report of Assayer B. H. Tatem, in charge of the United States assay office at Helena, Mont., just issued, shows the production of metals in the State of Utah for 1902, valued at $27,882,153, being an increase over the production of 1901 of $790,443. The production of the leading metals follows: Gold, $3,972,235; silver, $16,391,804; copper, $3,015,415; lead, $4,500,618.

The month of June, in the ore and bullion market, closed on settlements aggregating $1,604,510, these figures being independent, however, of those recorded at the Independent smelters that during the same period forwarded to the Eastern refineries 2,546,686 pounds of copper carrying gold and silver, and which had a valuation of $650,000, says the Salt Lake Tribune. On this basis the output of Utah during the year will be made to exceed $25,000,000. During the first half of the year several of the furnaces have been frequently interrupted. Notwithstanding this, the total output for 1903 to July 1 exceeded $11,000,000. The mines are prepared for a greater tonnage and there is to be added to the output of the last half of the year 1903 the product of at least two smelters that are being built.

BEAVER COUNTY.

The owners of the Cave mine, near Milford, will put in a pump on the tunnel level in order that sinking may be resumed on the vein.

BOX ELDER COUNTY.

The Utah-Nevada G. & C. Co., with main offices at Ogden, has been incorporated to operate a group of five claims in Newfoundland mining district, T. Cunningham, J. Chez, D. Jensen, E. P. Stone, E. A. Stratford, J. S. Dee and D. S. Tracy are directors.

CARBON COUNTY.

A. H. Tarbet of Salt Lake City says oil-drilling operations in Dairy Fork canyon, near Price, will he continued and the well completed.

GRAND COUNTY.

The Intermountain Asphalt Co. has been incorporated at Salt Lake City to operate in the carboniferous district of Grand county; W. H. Innes, N. Forsberg, R. W. Schuttler, T. Schenck, A. G. Mahan, R. M. Pope. W. H. Innes of Boise, Idaho, is president. The company has bought 480 acres of land near the headwaters of Willow creek, where is a deposit of asphaltum which can be mined at moderate cost. A 100-ton refinery will be erected. They claim that the entire cost of mining, refining, hauling and freight to Boston, Mass., will be $17.50 a ton, where the market price is $40 a ton.

IRON COUNTY.

Development work will be increased at the Venus mine, near Stateline, and additional machinery will be put in.

The Utah Iron & Coal Co. has been incorporated in Colorado by A. B. Lewis of Salt Lake City, W. A. Clark of Montana, C. C. Parsons of Denver, Colo., et al, and they have bought an aggregate of 5000 acres of iron ore land in Iron county. They propose to spend $25,000,000 to erect a complete steel plant, with railroads and other adjuncts. Purchases of coal lands have already been made. The iron lands bought are the Campbell estate and the Cullen, Ryan, McGarry, Corry, McGurrin and the Duffy holdings, as well as those of the Utah Iron Co., et al.

JUAB COUNTY.

The Illinois M. Co. has given an option on its holdings north of Eureka and adjoining the Raymond group to F. J. Westcott for $200,000.

It is reported the Tintic M. & Dev. Co., which owns the Sioux-Ajax tunnel, near Eureka, has been absorbed by a new incorporation, the Tintic Co., which also succeeds to the Bingham properties and the proposed new smelter, says the Tintic Miner.

The shipments of ores from Tintic district during month of June amounted to 537 carloads, the principal producers being: Bullion-Beck, 21 cars; Continental-Eureka, 138; Dragon iron mine, 91; Eureka Hill, 35; Grand Central, 50; Gemini, 50; Lower Mammoth, 38; Star Con., 24; Victor Con., 12; Yankee, 26.

PARK COUNTY.

E. L. White of Boston, Mass, president of the Bingham Con. M. Co. of Bingham, Utah, and a director of the Montana Coal & Coke Co., operating at Horr, says the No. 4 mine has a vein of coal 5 feet in width. The company has 260 coke ovens in operation.

PIUTE COUNTY.

A group of claims, 12 miles south of Marysvale, on Ten-mile creek, has been sold and the Mining & Water Power Co. incorporated, with J. Patton of New York as president and R. De Witt manager. A tract of land has been bought for water-right purposes on which will be built an electric power plant.

SALT LAKE COUNTY.

The Continental M. & S. Co, H M. Crowther of Salt Lake City managing director, has bought the Regulator, Grizzly, Lavina and Darlington mines at Alta, and will begin development this week. They contain ore bodies averaging $25 a ton in values. In the Lavina tunnel is a vein 30 feet wide, sampling 15 ounces of silver, 0.8% copper, 10% lead and $1 gold; in the Upper Grizzly tunnel a 40-foot vein averaging 4% copper, 9 ounces of silver and $1 in gold; on the 100-foot level of the Lavina an 18-inch vein averaging 16% lead, 80 ounces of silver and .04 ounce gold.

SUMMIT COUNTY.

The Park Record says in Park City district ten shafts have reached a depth of at least 1000 feet, six are down over 1800 feet, and one is 2000 feet deep. There are four drain tunnels, the longest one being the Ontario lower tunnel, which is 3 miles in length.

A compressor has been put in at the Naildriver mine, near Park City. The shaft is down 250 feet.

TOOELE COUNTY.

The Senate M. Co. of Salt Lake City has been incorporated by J. B. Black, C. Reich and W. M. Bradley. The company owns the Dolphin group and has an option on the Index, in the Erickson and Columbia districts.

WASHINGTON.

FERRY COUNTY.

It is reported work will be resumed next week on the California mine, near Republic, which is temporarily closed down. New plans for development are under consideration.

A survey is being made for a ditch from Bridge creek to the Gold Cord smelter site at Keller, where power will be developed for running the smelter machinery, an electric light plant and a sawmill.

Men are at work on the Oversight group, near Republic, and the tunnel is expected to cut the ledge by Aug. 1 at a depth of 150 feet. The work is ½ mile south of the Belcher lead. The mine is owned by Seattle men.

The Waneta G. M. Co. will sink a shaft on the Oregonian claim, one of their group, adjoining the Morning Glory on the north.

SNOHOMISH COUNTY.

It is reported negotiations are under way for the sale of the Everett smelter, owned by J. D. Rockefeller, to a company headed by C. Sweeney of Spokane. The smelter was built by Rockefeller to handle the ores of the Monte Cristo mines.

STEVENS COUNTY.

The I. X. L. group of iron properties in Clugston district, 12 miles east of Bossburg, will be reopened. The group is owned by F. B. Geotter of Colville. The ore is brown oxide of iron (limonite), which is said to average 46% iron, 40% silica, 2% alumina, .3% sulphur and .31% phosphorus. There is also some hematite. The development work consists of two tunnels, a winze and open cuts.

At the Walter Scott mine, near Northport, developments are progressing and additional machinery will he put in. The tunnel will be continued. G. E. Needy of Spokane is president.

WEST VIRGINIA.

PLEASANT COUNTY.

F. R. Anson of New York has bought the holdings of the Octo Oil Co. of Pittsburg, Pa., for $350,000, being a large area of shallow sand territory in St. Mary's district, and the Wolf Creek and Chester Hill districts in Washington and Morgan counties, Ohio. Anson secures the lease on 1500 acres of territory in which are seventy-seven producing wells, having a net aggregate production of 350 barrels a day.

FOREIGN.

AFRICA.

CONGO FREE STATE.

On the Tanganyika concessions Resident Engineer Buttgenbach at Lukonzolwa reports drive at Likasye mine contains 52 kilograms of silver per metric ton. The drive on the Likasye mine is being extended in the copper ore at depth of 100 feet.

TRANSVAAL.

The Middleburg Steam Coal & Coke Co., near Johannesburg, has commenced production.

The Van Ryn Gold Co., operating near Johannesburg, have fifty stamps dropping.

AUSTRALIA.

NEW SOUTH WALES.

In Bathurst district between twenty and thirty claims have been taken up at the junction of St. Anthony's creek with Winburndale creek on the Glanmire estate, 10 miles from Bathurst, near the site of the former Glanmire gold field. The working is alluvial, and wash dirt averages 6 feet and sinking from 16 to 60 feet. The Prospectors' claim runs 8 feet of wash and averages from 3 to 7 dwts. of gold to the load. At the junction of Cheshire's creek with Winburndale, near Dumara, numbers of men are working alluvial ground in shallow sinking.

Driving from the bottom of shaft 270 feet deep in search of alluvial lead, the Newstead M. Co. at Invereil cut a lode 6 feet wide, rich in tin ore. The manager states the lode appears to be nearly vertical, hearing northeast and is in granite.

QUEENSLAND.

The Bonnie Dundee Gold Co., at Charters Towers, report No 2 shaft down 1900 feet, work having resumed June 19th.

VICTORIA.

The value of the gold won during the half year ending June 1 at the Madame Berry West mine at Creswick was £16 340.

The New Dampsey G. M. Co. at Gaffneys during the past half year won gold of value of £15,289, and expended £2897 in getting it. In the northwest stopes the reef is 50 feet high; to the southwest it is smaller, but of better quality. The stone crushed totalled 1140 tons, which yielded 3866 ounces, while the nineteen tons of sand yielded 163 ounces additional.

WEST AUSTRALIA.

Lake View Consols mines near Kalgoorlie report May returns 7541 tons of ore treated, yielding 4840 ounces fine gold. Costs for the month: Stoping, 10s 10d. per ton; ore reduction, ("Diehl" treatment), 16s. 10d. per ton; general expenses, 3s. 3d.; total working expenses, 30s. 11d; total for month, £11,657. Expenditure on machinery and plant, £596; expenditure on mine development, £3685.

BRITISH COLUMBIA.

(Special Correspondence) — In Slocan mining division the American Boy mine at Sandon is shipping three cars of ore per week. More men have been taken on at the mine, but the tunnels are still too wet to allow the force to be increased as intended by Manager McGuigan. The Slocan Star has resumed shipments after a short cessation due to the bad condition of the wagon road. Machine drills have been put in. A new ore house is being built at Red Fox mine, near McGuigan. A ledge has been uncovered on the Erin, near Slocan City, 8 feet wide and extending into the Republic ground. The ore carries copper, with 100 ounces of silver per ton.

In Lardeau mining division a strike on the Guinea Gold mine shows the ore body which has been developed in the upper workings at a vertical depth of 200 feet. The ore will net $103 per ton in all values. The Horse Shoe mine at Trout Lake has been sold to Philadelphia, Pa., parties, says G. W. Stead, manager of the Ethel and Lucky Boy mines, for $16,000. A strike of 4 feet of shipping ore was made on the Lucky Boy last week, showing gray copper and carbonates, with silver values. The Oyster-Criterion dam is finished and the flume is being built. Grading for the compressor plant and stamp mill is under way. At the Eva a contract has been let for clearing the tram line and work on the dam was started last week. Grading of stamp mill site is completed.

Nelson, July 5.

When the coal miners at Ladysmith and Cumberland requested Dunsmuir to allow them to return to work last week they were asked to sign a contract, which they refused to do Dunsmuir says that unless the Ladysmith strikers accept his proposal and go back to work the Extension collieries will he reopened and worked by Asiatics and non-union men. The latest reports say that the Cumberland miners are still out and intend staying out. The mines, however, since the inception of the trouble have been worked by Asiatics exclusively, 1000 men being used. The Government intends to enforce the law passed at the last session of Parliament, which excludes the Chinese from the collieries, and accordingly the inspector of mines will leave for Cumberland next week to investigate and put them out.

Two hundred and twenty-four Nanaimo miners working on the Long Wall mine, operated by the Western Fuel Co. of San Francisco, Cal, laid down their tools and walked out on the 6th inst, because the company withdrew the extra wage allowance.

It is expected that the Lenora mine at Mount Sicker will resume work this month under control of Bellinger & Breen of the Northwest Smelting Co. The firm

takes over not only the mine, but the entire business connected with it, including machinery, the railway to Crofton, the rolling stock and the hotel. W. T. Tregear is manager.

The Crow's Nest Pass Coal Co., operating at Fernie, Morissey and Michel, report their June output at 75,000 tons. The Coal Creek mines are increasing their output.

At Erie, near Ymir, besides Finch & Campbell's Second Relief, where thirty-five men are working in the mine and mill, the Canadian King mine is being operated under lease by W. Connelly and B. Porter.

At the Arlington mine forty men are at work.

W. S. Keith has a lease and bond on the Ruby claim at Boundary Falls.

The zinc plant being built at the Payne mine at Sandon, in the Slocan, is expected to be ready for operation next week.

Superintendent W. Myers has resumed work at the Watson mine near Fort Steele. This is a silver-lead group on Victoria gulch, a tributary of Wild Horse creek.

It is reported operations are to be resumed on the Tiger-Poorman group of mines, on the divide between the North Fork of Wild Horse and Sheep creek near Fort Steele.

Shipments from Rossland camp for the week ending July 4 and for the year to date are as follows, says the Rossland Miner:

	Week. Tons.	Year. Tons.
Le Roi	1,920	92,345
Center Star	1,290	42,208
War Eagle	1,290	29,775
Kootenay	465	2,870
Le Roi No. 2	450	14,142
Velvet	50	3,076
Giant	120	575
I. X. L.	....	40
White Bear	....	297
O. K.	....	25
Homestake	....	90
Totals	5,585	185,422

CONCENTRATES SHIPPED.

War Eagle-Center Star	90	90

Total year's shipments to date.185,512

This makes a total of 36,360 tons for the month of June. It is expected the Le Roi will increase its output this month. The obtaining of an adequate coke supply at the Le Roi smelter in Northport, Wash., will bring a further increase in output. In addition, several new mines will be on the shipping list before the end of the year. The past week shipments were begun from the Jumbo mine, operations resumed at the Gold Hill group and the mechanical plant at the Spitzee mine finished and underground operations begun; also, the first shipment of concentrates from the War Eagle-Center Star concentrator was made.

Shipments from the Boundary district for the same period were:

	Week. Tons.	Year. Tons.
Granby	4,927	162,535
Mother Lode	2,697	49,735
Snowshoe	1,920	25,830
B. C.	1,020	16,435
Emma	210	9,416
Sunset	512	5,949
Providence	....	591
Athelstan	60	60
Totals	11,346	270,680

The Granby smelter treated 4205 tons for the week, making a total of 154,661 tons for the year.

COLOMBIA.

The Darien Gold M. Co. reports for May show: Crushed, 2272 tons and obtained 4295 ounces gold, value $84,500. Sinking continues in the Maisounabe shaft and in the Lodin shaft.

KLONDIKE.

J. J. Rutledge, operating placers near Dawson, will put in a dredger on Forty-Mile river to cost $140,000. Rutledge says if this dredger proves successful it will be followed by twenty more dredgers, which he will have in operation on Forty-Mile river within 5 years. It will handle 3000 cubic feet of gravel daily.

MEXICO.

COAHUILA.

A number of the coal mines around San Felipe and Hondo were flooded by the heavy rains last week, says the Enterprise. Most of the flooded mines are owned by the International Railroad.

CHIHUAHUA.

The San Francisco, Cal., men owning the McDermott - O'Callahan group at Santa Eulalia have started work. Diamond drilling machinery will be put in. G. B. Jacobs is general manager.

DURANGO.

The San Acacio M. Co., owning the San Acacio mines at San Juan de Guadalupe, is building a railroad to connect with the Mexican Central.

A. T. Grove, secretary of the American-Mexico M. & D. Co., operating at Velardena, says they are putting in additional machinery.

The Pittsburg Gold Co., operating tin mines at Jaltomates, report opening another vein of tin ore.

M. & R. de la Parra have obtained a concession to exploit a large sulphur deposit known as La Tenebrosa, in Sierrita section, near Mapimi, says the Chihuahua Enterprise.

HIDALGO.

The Santa Irene y Anexas M. Co. has denounced fourteen mining claims on veins carrying gold and silver at Arenal, district of Actopan.

J. Perez and M. Garcia will work the Sacavon de la Purisima mine at the Cerro Huexotitla, municipality of Mineral del Monte.

JALISCO.

Carral & Kratz are putting up a 20-ton plant at their mine, near Etzatlan, and it is expected to be running by September 15.

Ashestos has been found in the Real mountains. It is said to be of good commercial quality.

MEXICO.

It is reported that the Esperanza mine, in El Oro camp, has been bought jointly by the Guggenheim Exploration Co. of New York and the Venture Corporation of London, England, through J. H. Hammond, manager for the former, and E. A. Wiltse, manager for the Venture. The property is well equipped and operates a 120-stamp mill.

J. Henderson, president and manager of El Porvenir de Sonora M. Co., operating a gold mine near Poza, says he expects to have the mill, which was recently damaged by fire, repaired and running next week.

OAXACA.

La Compania Petrolifera del Pacifico, S. A., has been organized to bore for oil on the Pacific coast of Mexico. E. C. Creel, F. Pimentel y Fagoaga, J. Pimentel, P. Macedo, M. S. Macedo, R. Alcazar, P. Escandon y Barron, A. Escandon y Arango, J. D. Cassasus own an area of 12,000 hectares near Puerto Angel, jurisdiction of Pochutla. A drilling outfit will be taken in.

SAN LUIS POTOSI.

A coal field is reported found near Huesteca Polosina. Several beds of asphalt are also reported in the same section.

SONORA.

At La Bufa the pump and pipe line of the Bufa M. Co. are in operation. They convey water a distance of 4½ miles and raise it 900 feet. Work on the mill buildings, matte furnace and other machinery is progressing, says the Oasis. The air compressors and machine drills will be in operation next week.

It is reported the Gutierrez M. Co., which is developing the Gutierrez mine at La Barranca, has bonded the Nahulia group of mines, at San Javier, for $65,000 gold, and the Belene mine, at La Barranca, for $75,000.

Work is under way by the Vega M. Co. on the Gabilan mine at Gabilan, says C. H. Buffett, superintendent.

W. B. Jenkins, D. N. Clemens and J. A. Cummings of Colorado Springs, Colo., have a bond and lease on a group of claims, including the Tucabe mine, 65 miles from Magdalena.

ZACATECAS.

A 100-ton milling plant has been built at the Proano mines at Fresnillo, owned by F. Ortega.

Obituary.

T. BEYNON, a pioneer mining man of Tuolumne county, died in Jeffersonville, near Columbia, Cal., June 26, after a long illness. Deceased was a native of Wales.

H. M. DRISCOLL, a pioneer mining man of Lander county, Nev., died at Galena, Nev., June 20. Deceased was a native of Ireland, aged 73 years, and is survived by two sons and two daughters.

M. MACNAMARA, a pioneer miner of Esmeralda and Nye counties, Nev., died at Silver Peak, Nev., June 27th, of miners' consumption. Deceased owned several mines in these districts, and recently sold the MacNamara group at Tonopah. He was a native of Ireland, aged 65 years.

A. H. FOWLER, a pioneer mining and smelting man of Colorado, died on the 2nd inst. at Hyannisport, Mass., after a lingering illness. Deceased was born in Connecticut and was 52 years of age. He went to Colorado in 1877, settling first at Leadville, where he was manager of the Berdell & Wetherill smelter. Later on, he was connected with the Smuggler-Union mines at Telluride, Colo., and with the Viola mine at Camas, Idaho. He is survived by a widow and three children.

PERSONAL.

L. B. RAPP of Cincinnati, O., is at Chihuahua, Mex.

A. S WISE is manager of the Black Swan M. Co., near Sunshine, Colo.

W. M. STRONG is superintendent of the Banker mine, near Leadville, Colo.

P. L. FLANIGAN, interested in mines near Reno, Nev., is in San Francisco, Cal.

W. H. WILEY, mining engineer of Idaho Springs, Colo., is in Los Angeles, Cal.

J. NEVILL is superintendent of the Treadwell group of mines near Kingman, Ariz.

A. B. DEALTRY of London, England, a director of the Le Roi Two Co., is at Rossland, B. C.

G. R. HANCOCK is vice-president and manager of the Comstock M. Co., at Park City, Utah.

J. A. SHINN of Denver, Colo., is examining mining property in Montana for Wisconsin parties.

G. L. KEENER has resigned as manager of the Mary McKinney mine at Anaconda, Teller county, Colo.

W. W. WHITE is superintendent of the Bonnie mine, near Prescott, Ariz., vice J. J. Brooks, resigned.

MANAGER G. H. DERN of the Con. Mercur M. Co. at Mercur, Utah, is in Jersey City, N. J., on business.

R. C. VIDLER of Georgetown, Colo., is visiting New York and other Eastern cities on mining business.

J. PRICE has resigned as superintendent of the Mary McKinney mine at Anaconda, near Cripple Creek, Colo.

C. SCHIERMEISTER, a mining engineer of Berlin, Germany, is traveling through the mining camps of Mexico.

W. E LLOYD is manager of the Sioux Falls & Cripple Creek M. & D. Co., operating near Cripple Creek, Colo.

G. E. MCCLELLAND, manager of the Monarch tunnel, Idaho Springs, Colo., is in the East on mining business.

A. H. ELFTMAN of Minneapolis, Minn., manager of the Miller mine, Brownsville, Cal., is inspecting the property.

L. S. WOOD has returned to Denver, Colo., from Empire, Colo., where he has been examining mining properties.

G. LAND is superintendent of the Keystone Hydraulic M. Co., operating near Telluride, San Miguel county, Colo.

F. A. KEITH is superintendent Bamberger's De Lamar mines and mill at De Lamar, Nev., vice F. Janney, resigned.

G. KARTSCHOKE has resigned as superintendent of the Delhi mine of the St. Gothard M. Co., near Nevada City, Cal.

W. T. TREGEAR, former manager Le Roi mine at Rossland, B. C., is manager of the Lenora mine at Mount Sicker, B. C.

W. H. BATES, manager of the Oro Concentrating Co., is in San Francisco, Cal., from Prescott, Ariz., on mining business.

S. K. THORNTON, superintendent of the Shenandoah mine, near Plymouth, Cal., is in San Francisco, Cal., on mining business.

F. ESCHER has resigned as manager of the Americana mine at Terrazas, Chihuahua, Mex., and will take a trip to Europe.

A. K. COOMARASWAMY, F. G. S., has been appointed director and J. Parsons as assistant of the Mineral Survey of Ceylon.

N. WILLIAMS is superintendent of the Olsen mine, at Don Pedros Bar, 5 miles south of Chinese Camp, Tuolumne county, Cal.

WILLIAM VARDI of Nady-Halmagy, Hungary, a mining engineer for the Hungarian Government, is at Cripple Creek, Colo.

W. W. BYRNE, treasurer of the Polar Star M. Co., is at their mines, near Nevada City, Cal., from Salt Lake City, Utah.

W. SWANSON is superintendent of the Abe Lincoln mine, near Cripple Creek, Colo., being operated by the Tunnel M. & L. Co.

P. M. MCKINNEY is superintendent of the Santa Emilia and Dona Louisa mines, Michoacan, Mex., vice J. C. Collinson, resigned.

W. C. GREENE of New York, president of the Greene Con. C. Co., is visiting their mines and smelters at Cananea, Sonora, Mexico.

A. T. GROVE, secretary and treasurer of the American-Mexico M. & Dev. Co., is at the company's mines at Velardena, Mexico.

M. HIRSCH of New York, with S. Bamberger and J. D. Wood of Salt Lake City, Utah, are in Los Angeles, Cal., on mining business.

J. W. TAYLOR, manager of the Tuna Co.'s mines in Lemhi county, Idaho, returned to Salt Lake City, Utah, from a trip East.

C. L. DIGNOWITTY of Salt Lake City, Utah, is at Boulder, Colo., on mining business, from which place he will go to Deadwood, S. D.

M. E. PINNEY, superintendent of the Nigger Hill mines, near Jamestown, Cal., is in San Francisco, Cal., on business for his company.

E. J. BONSTELL, who recently returned to San Francisco, Cal., from Groveland, Cal., has gone to Sutter Creek, Cal., on mining business.

LINDSAY CLARK is manager of the Brisels Tin M. Co. mines, near Hobart, Tasmania, whose branch office is at Melbourne, Victoria.

T. F. MCGOVERN has resigned as superintendent of the Republican mine, near Jacksonville, Cal., to devote his time to his other interests.

DR. A. E. SAYOUS of Paris, France, is in California on a French Government mission relative to a study of mining conditions in that State.

W. J. DOOLY, manager of the Johnny mine of Stateline, Utah, returned to Salt Lake City, Utah, last week from a trip to Nevada and California.

MANAGER C. W. WHITLEY of the American S. & R. Co. returned to Salt Lake City, Utah, last week after an extended visit in the East.

HAVEN SAWYER, superintendent of the Dewey mine, Siskiyou county, Cal., is in San Francisco, Cal., returning from a business trip to Boston, Mass.

A. P. GRIFFITHS, A. R. S. M., late general manager of the Palmarejo & Mexican Goldfields, Ltd., has returned to London, England, from Mexico.

M. L. REQUA, president of the Pacific Steel & Wire Co. of San Francisco, Cal., has gone to Eureka, Nev., near which place he has large mining interests.

JUNSUKE JIGIMA of Tokio, Japan, manager of the Ahoe copper mines, is examining copper smelting methods in the principal Utah and Montana camps.

S. BAMBERGER AND J. D. WOOD of Salt Lake City, Utah, and M. Hirsch of New York, are in Los Angeles, Cal., from Salt Lake City on mining business.

J. P. EMPSON, formerly with the Dakota M. Co., is to be cyanide superintendent of the Reliance G. M. Co.'s plant, which will be built near Deadwood, S. D.

J. A. GROESBECK of Salt Lake City, Utah, has gone to Cerro de Pasco, Peru, as superintendent of a group of placer properties owned by the Cerro de Pasco M. Co.

W. C. THOMAS, former superintendent of the Highland Boy smelter at Bingham, Utah, is superintendent of the smelter of the Newhouse M. & S. Co., near Salt Lake City, Utah.

F. JANNEY has resigned as superintendent of Bamberger's De Lamar mines and mill at De Lamar, Nev., and accepted a similar position with the Utah C. Co. of Bingham, Utah.

C. F. V. JACKSON, an assistant geologist on the Queensland Geological Survey staff, has resigned, having been appointed first assistant geologist on the West Australian staff.

J. EDDIE, formerly superintendent of the Gold Tunnel mine, is superintendent of the Delhi mine of the St. Gothard M. Co., near Nevada City, Cal., vice G. Kartschoke, resigned.

T. HOOPER of Rockland, Lake Superior, Mich., has returned there from a trip through Sonora, Mexico. He also stopped at Idaho Springs, Colo., to examine mining property.

L. A. WOMBLE, M. E., of Berkeley, Cal., who has been connected with the Bunker Hill & Sullivan mines at Wardner, Idaho, leaves shortly to accept a position in South Africa.

Books Received.

"Earth Work and Its Cost" is the title of a neat volume of 244 pages, hy Halbert P. Gillette. It deals with tbe art of cost estimating; tbe handling of earth hy means of various devices; transporting the loosened earth hy means of wheelbarrows, carts, dump carts, scrapers, wagons, steam shovels, etc. It also goes into excavating by dredging, bydraulicking and by other means. The book Is illustrated and will prove of use to tbose engaged in tbe work of excavating on a small or large scale. $1.50; The Engineering News Publishing Co., New York City.

"Electrical Engineering," by E. Rosenberg, translated hy W. W. H. Dee and C. Kinzbrunner, is a new treatise on electricity designed as an elementary text book suitable for those employed in electrical and engineering pursuits. Besides tbe fundamental phenomena of the electric current, dynamos and motors for continuous, alternating and three-phase current, accumulators, measuring instruments and electric lighting are treated. Those desiring a knowledge of electricity, but who have no immediate connection with the profession, will he instructed in mucb useful and necessary knowledge by reading this volume. It is profusely illustrated; 8vo. XIII+267 pages. Cloth, net, $1 50; Jobn Wiley & Sons, 43 East Nineteenth street, New York City.

Catalogues Received.

"Colors and Specifications" is tbe title of a folder from tbe Joseph Dixon Crucible Co. of Jersey City, N. J., graphically illustrating paint specifications for steel and iron construction and maintenance work. James G. Allen, 304 Market street, San Francisco, Cal., is their Pacific coast agent.

Commercial Paragraphs.

A. LESCHEN & SONS' ROPE CO., St. Louis, Mo., manufacturers of wire rope and aerial wire rope tramways, have moved tbeir San Francisco, Cal., office to the Rialto building, corner New Montgomery and Mission streets. Tbeir other offices remain as heretofore, namely: 920–922 North First street, St. Louis, Mo.; 137 East Lake street, Chicago, Ill.; 92 Center street, New York, N. Y.; 1717–1723 Arapahoe street, Denver, Colo.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific ccast inventors:

FOR THE WEEK ENDING JUNE 30, 1903.

732,508.—TUBE SHEET PROTECTOR—C. H. Boone, San Leandro, Cal.
732,263.—METALLURGICAL FURNACE—M. P. Boss, S. F.
732,264.—METALLURGICAL FURNACE—M. P. Boss, S. F.
732,265.—METALLURGICAL FURNACE—M. P. Boss, S. F.
732,266.—METALLURGICAL FURNACE—M. P. Boss, S. F.
732,267.—METALLURGICAL FURNACE—M. P. Boss, S. F.
732,268.—METALLURGICAL FURNACE—M. P. Boss, S. F.
732,269.—METALLURGICAL FURNACE—M. P. Boss, S. F.
732,510.—VEHICLE FRAME—G. R. Boulding, Wells, Nev.
732,172.—EXCAVATOR—W. Cole, Olympia, Wash.
732,173.—EXCAVATOR—W. Cole, Olympia, Wash.
732,278.—TIRE PROTECTOR—L. C. Cummings, Pasadena, Cal.
732,537.—PAPER CUTTER—C. J. I. Devlin, S. F.
732,626.—PLOW AND CULTIVATOR—W. H. Fox, Gilroy, Cal.
732,538.—DREDGER—W. H Fulcher, Oakland, Cal.
732,298.—WINDOW SASH—E. Hipolito, Los Angeles, Cal.
732,563.—DESSICATING FRUIT—W. S. Keyes, S. F.
732,304.—PIANO—F. W. Kringel, Los Angeles, Cal.
732,567.—GOVERNOR—G. F Lasher, Portland, Or.
732,305.—CUFF HOLDER—C. H. Leach, Orchards, Wash.
732,580.—INDICATOR—T. J. McGrath, Portland, Or.
732,581.—INDICATOR—T J. McGrath, Portland, Or.
732,649.—SAWMILL—H. S. Mitchell, Seattle, Wash.
732,653.—RAIL BRACE—D. D. Quenell, Riparia, Wash.
732,319.—CONCENTRATOR—Rogers & Hanson, S. F.
732,655.—JAR CLOSURE—J. H. Saunders, Olympia, Wash.
732,452.—BASIN PLUG—W. F. Schultheiss, San Diego, Cal.
732,592.—BOTTLE—H. V. Scott, S. F.
732,605.—LEACHING ORES—G. E Thede, Havilah, Cal.
732,650.—RACING HURDLE—R. P Traxler, S. F.
732,667.—BEEHIVE—H Vogeler, Newcastle, Cal.
732,477.—ELECTRIC SWITCH—I. G. Waterman, Santa Barbara, Cal.
732,608.—ELECTRIC FLOAT—I. G. Waterman, Santa Barbara, Cal.
732,148.—SAWMILL—A. J. West, Aberdeen, Wash.

Our Eastern Business Manager.

On the 1st inst. Mr. Wm. Starr Bullock assumed charge of the business interests of this journal as special Eastern representative, with offices at 720 Park Row Building, New York City. Mr. Bullock's business acquaintance and personality commend him favorahly to present and prospective patrons.

Notice of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

EXTRACTING GOLD OR SILVER FROM SLIMES.—No. 731,631. June 23, 1903. J. T. Perry, Jr., Altar, Mexico. One-half assigned to J. O. Treanor of same place. This invention is designed to extract precious metals from the slimes or other unleached material hy the aid of cyanide solutions. It consists in spraying the slimes or slime mixed with water and called "sludge" into tanks which are partly filled with the cyanide solution containing oxidizing agents, such as calcium hypochlorite, or other active chemical agents, such as hromo-cyanide, and without agitation allowing the same to settle, drawing off the clear solution, then discharging the sludge into similar tanks filled with solution or water, allowing the mass to settle, then drawing off the clear liquid as before.

PRINTING PRESS.—No. 12,124 (reissue). June 23, 1903. J. F. Ames, Portland, Or. This invention is especially designed for the purpose of securing printing types or characters upon a revolving cylinder so that they may he employed for printing hags, the wooden sides or parts of which boxes are constructed, and for like purposes. It consists in a novel construction of the cylinder and means for securing the type or characters thereon from which the impression is to he made, means in connection therewith hy which the type or printing surface is protected from undue pressure from the surface on which the printing takes place, means hy which the ink is prevented from being transferred to the protecting strips, and means wh rehy all the devices are securely locked to the cylinder hy a single operation.

Latest Market Reports.

SAN FRANCISCO, July 10, 1903.

METALS.

SILVER.—Per oz., Troy: London, 24⅜d (standard ounce, 925 fine); New York, bar silver, 52½c, refined (1000 fine); San Francisco, 52½c; Mexican dollars, 41c San Francisco, 41c New York.

COPPER.—New York: Standard, $14.25; Lake, 1 to 3 casks, $14.00@14 25; Electrolytic, 1 to 3 casks. $14.00@14 25; Casting, 1 to 3 casks, $13 50; San Francisco: $14.00. Mill copper plates, $17.00; bars, 18@24c. London: £57 5s spot per ton.

There has been a noticeable drop in copper the past ten days and tbe market is not all that sellers could wish. It is reported that copper has been sold for less than the quoted price. The large consumers are holding back, evidently waiting for a still lower price before making contracts for the ensuing year. It is not likely that Lake will go helow 14 cents for tbe present. Tbe price of tbe past few months—15 cents and thereabouts—has stimulated the output in no small degree, and tbe influence of tbis increased output is now being felt. In tbe latter part of June, Calumet & Hecla offered copper in New York at 14½ cents and tbus broke the price that had prevailed. A reduction of one-half cent per pound seems small, hut it means a large sum to heavy producers. The following tahle shows tbe montbly exports of copper for the first five months of tbe year, in pounds:

	1903.	1902.
May	23 254,334	35,498,848
April	26,321,400	34 372,011
March	31,515,468	38,679 965
February	21,813,242	32 814,949
January	24,552,687	32,085,041
Total pounds.	127,451,131	173,450,814

It is thougbt hy some tbat the enforced shut-down of tbe Anaconda Company for several months pending the completion of improvements in tbeir reduction works may have a direct effect on the market.

LEAD.—New York, $4.12½; Salt Lake City, $3.50; St. Louis, $4.00; San Francisco $4.50, carload lots; 4¾c 1000 to 4000 lbs.; plpe 5½, sheet 6, bar 5½c; plg, $4.75. London: £11 6s 3d per long ton=2.75c per lb.

SPELTER.—New York, $5.87½; St. Louis, $4.85; London, £20 17s 6d per ton; San Francisco, ton lots, 6½c; 100-lb lots, 7c.

ANTIMONY.—New York, Cookson's, 9¾c; Hallett's, 8½c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

TIN.—New York, plg, $27.15@27.40; San Francisco, ton lots, 29½c; 500 lbs., 30c; 200 lbs., 30½c; less, 31c; bar tln, ℔ lb, 32½c @35c. London, £123 17s 6d spot.

PLATINUM.—San Francisco, crude $18.00 ℔ oz.; New York, ingot, $19.00 per Troy oz. Platinum ware, 75@80c per gram.

QUICKSILVER.—New York, $44.50@46.00; large lots; London, £8 15s; San Francisco, local, $44.50 ℔ flask of 76½ lbs.; Denver, $49.50. Export, $43.50.

BABBITT METAL.—San Francisco No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

ALUMINUM.—New York, No. 1, 99% pure lngots, 35c; No. 2, 90%, 30c to 34c.

SOLDER.—Half-and-half, 100-lb. lots, 19½c; San Francisco, Plumbers', 100-lb. lots, 16c.

NICKEL.—New York, 50@60c ℔ lb.; ton lots, 45@48c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer plg, $19.50 @19.85; gray forge, $18 60; San Francisco, har, 3c ℔ lb., 3½c in small quantities.

STEEL.—Bessemer hillets, Pittsburg, $29 50@30.50; open hearth billets, $31.50; San Francisco, bar, 7c to 12c per lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer	$20.50@21.00
Foundry Northern 1	20.00@21.00
Northern 2	19.50@20.50
Northern 3	19.00@20.00
Southern 1	18.85@ ——
Southern 2	18 35@ ——
Southern 3	17 85@ ——
Forge	17.35@ ——
Charcoal	23 00@24.00
Billets, Bessemer	31.50@32.00
Bars, Iron	1.70@ ——
Bars, steel	1.75@ 1.80
Rails, standard	28.00@30.00
Rails, light	34.00@40.00
Plates, holler	1.90@ 2.00
Tank	1.75@ 1.80
Sheets, 26 store	2.90@ 3.00
No. 27	3 00@ 3.10
No. 28	3.00@ 3.10
Angles	1.75@ ——
Beams	1.75@ ——
Tees	1.80@ ——
Zees	1.75@ ——
Channels	1.75@ ——
Steel melting scrap	16.00@16.50
Relaying rails	30.00@31 00
Dealers forge	13.50@14.50
No. 1 railroad wrought	15.50@16.50
No. 1 cast, net ton	15.00@16.00
Iron rails	20.50@21.00
Car wheels	20.00@21.00
Cast borlngs	5 50@ 6 50
Turnings	12.00@13.00

LUMBER.—(Retail): Pine, ordlnary slzes, $20.00@22.00; extra sizes hlgher; redwood, $22.00@23.00; lath, 4 feet, $4.25 @4.50; pickets, $19.50; shingles, $2.35 for No. 1 and $2.00 for No. 2; shakes, $13.50 for split and $14.50 for sawed; rustic, $26.00 @32.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, $3.25; Cut, $3.35; 10d to 16d, Wlre, $3.35; Cut, $3.35; 8d, Wire, $3.40; Cut, $3.40; 6d and 7d, Wire, $3.50; Cut, $3.50; 4d and 5d, Wire, $3.60; Cut, $3.60; 3d, Wire, $3.75; Cut, $3.75; 2d, Wire, $4.00; Cut, $4.00. Special rates for carload lots.

LIME.—Santa Cruz, $2.25; Roche Harbor. $2.25 per bbl.

CEMENT.—Germania, $2.50 @ 2.75; Hewmoor, $2.90; Trowell, $2.90; Portland, $2.50@2.75 per bbl.

GENERAL SUPPLIES.

POWDER.—F. o. b. San Francisco: No 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one, ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10½c ℔ set; 14 oz., 40s., 9½c.

CHEMICALS.—Cyanide of potassium, 98%–99%, johbing, 24@25c ℔ lb.; carloads, 23@24½c; in tins, 35c; soda ash, $2.00 ℔ 100 lbs.; hyposulphite of soda, 2½@2¾c ℔ lb.; caustic soda, in drums, 3@3½c ℔ lb; Cal. s. soda, hbls., $1.25@1.50 ℔ 100 lbs.; sks., $1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash. 10c ln 40-lb tins; horax concentrated, 7@8c ℔ lb.; roll sulphur, 4@6c; powdered sulphur, 2@ 3c; flour sulphur, French, 2@3c; alum, $2.00@2.25; Californla refined, 2@2½c; sulphide of iron, 9c ℔ lb; copper sulphate, 5@7c; chloride of lime, spot, $2 50@2.75; sulphuric acid, in carboys, 66% B, 2½c ℔ lb.; nitric acid, in carboys, 8c ℔ lh.

OILS.—Linseed, hoiled, bbl., 51c; cs., 56c; raw, bbl., 49c; cs., 54c; Lucol oil, boiled, bhl., 48c; cs, 53c; raw, bbl., 46c; cs, 51c. Kerosene—Pearl, per gal., 20½c; Astral, 20½c; Star, 20½c; Extra Star, 24½c; Eocene, 23½c; Elalne, 26½c; Water White, in hulk, 14½c; Mineral Seal, iron bbls., 18½c; wooden bbls., 21c; cs, 24c; Mineral Sperm, cs, 26½c; Deodorized Stove Gasoline, bulk, 17c; do., cs., 23½c; 86° Gasoline, bulk, 21c; do., cs., 27½c; 63° Naphtha or Benzine, deodorized, ln bulk, per gal., 16c; do., ln cs., 22½ c; Lard Oil, E. W. S., hbl., $1.00; cs., $1.05; Neats-foot Oil, pure, bbl., 75c; cs., 80c; Sperm, crude, 70@60c; Natural Whlte, 65c; Bleached do, 50c; Whale Oil, cs, 50@55c.

WHITE LEAD.—Per lb., ln kegs: 500 lbs. and over at one purchase, per lb., 6c; less than 500 lbs., per lb., 6½c; ln 25-lb. tln pails, ½c per lb. above keg price; ln 1 and 5 lb. tin cans, 100 lbs. per case, ½c per lb. ahove keg price. Dry Lead—In bbls., 1 ton and over, 6c; do. in kegs, 6½c.

RED LEAD.—500 lbs. and over at one purchase, per lb., 6c; less than 500 lbs., 6½c.

LITHARGE.—Pure, in 25-lb. bags, 8 @9c per lb.

BONE ASH.—Extra No. 1, 5@6c per lb. No. 1, 4@5c.

BORAX.—Concentrated, 7@9c per lb powdered, 9@12c; fused, 25@30c.

BORAX.—Crystal, 7c; calcined, 25c.

MANGANESE.—Pure, ℔ lb., 60c.

MOLYBDENUM.—$2 per lb.

CHROMIUM.—(90% and over) per lb., $1.00.

BISMUTH.—Subnitrate, per lb., $1.60.

SODIUM.—Metal, ℔ lb., $1.00.

MERCURY.—Bichloride, ℔ lb., 90c.

PHOSPHORUS.—(American) ℔ lb., 75c.

SILVER.—Chlorlde, ℔ oz., 90c@$1.00; nitrate, 55c.

ALUMINUM.—No. 1, 99%, small lots, 37c ℔ lb.; 100 lbs., 35c; 1000 lbs., 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

URANIUM.—Oxide, ℔ lb., $3.50.

ZINC.—Metallic, chemlcally pure, ℔ lb., 50c; dust, ℔ lb., 10c; sulphate, ℔ lb., .04c.

COAL.—San Francisco, coast, yard prices: Wellington, $8.00; Seattle, $6.50; Coos Bay, $5.50; Southfield, $8.00. Cargo lots, Eastern and forelgn: Walisend, $6.50 Brymbo, $7.50; Pennsylvania, hd., $14. 00 Scotch, $8; Cumberland, $12; Cannel, $9.00; Welsh Anthracite, $11.50; Rock Springs, $9.50, long ton; Colorado Anthracite, $14.00. Coke, $10.50 per ton in bulk, $13 in sacks; Sunnyslde, $8.50, long ton.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

SITUATIONS WANTED.

A YOUNG MAN WITH 12 YEARS' PRACTICAL mining experience wants position where the ahility to do things and doing them will lead to advancement. Can assay, survey, run engine or pumps, sharpen tools, or do anything about a mine. Have some mill experience. Referenoes given. Address R. J. S., care of this office.

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EXPERIENCED ANALYTICAL CHEMIST. Assayer and Millman desires position. Address H. T. S., this office.

FIRST-CLASS METALLURGICAL CHEMIST and Assayer desires position. Can furnish best of reference, etc. Address C. W. L., this office.

FIRST-CLASS MINING AND LAND SURveyor, Draughtsman, etc., desires position. Address H. W K., Box 74, Long Beach, Wash.

MECHANICAL ENGINEER—HAVE A UNIversity education and am an all around practical mechanic. Four years experience in steam and hydraulic engineering; have designed an up-to-date blast furnace; have been connected with large copper mine for two years; good references. Prefer large gold or copper mine; foreign country preferred. Address A. B. C., care Min. & Sci. Press.

MINE SUPERINTENDENT WANTS POSITION with a substantial company that has a mill on property. A qualified mining engineer who can run a mine or mill, cyanide plant, assaying and surveying. Address "Mining," this office.

HELP WANTED.

Required for Copper Mines in Arizona

employing about 250 men, young mining engineer of good technical education and some experience in mining and mechanics, to act as assistant to superintendent. Address SHANNON COPPER CO., Clifton, Ariz.

MINING AND SCIENTIFIC PRESS.

Whole No. 2243.—VOLUME LXXXVII. Number 3. SAN FRANCISCO, CAL., SATURDAY, JULY 18, 1903. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Art of Diamond Cutting.

The cutting and polishing of diamonds is an art requiring great skill and sound judgment. It is accomplished by means of steel horizontal wheels or plates upon which there are small lines or grooves radiating from the center. On this is placed a paste of diamond dust and olive oil. The grinding is done by setting the diamond in cement, and fixing it in the proper position in contact with the wheel, which is run at about 4000 revolutions per minute. Polishing is effected in much the same manner, but with impalpable dust. It requires weeks and months to cut diamonds, and in some instances has required years to complete the task. All diamonds are not perfect as they come from the mines. Some are covered with a hard, dull coating which must be removed. Often the stones are unsymmetrical in form; discolorations, flaws and spots are frequently included, and it is the business of the lapidary to judge how any particular stone will cut to the best advantage. All diamonds have cleavage, and it is usually possible to split diamonds of distorted shape in such manner that one or more good sized stones and possibly several small ones may be obtained. When it is desired to split or cleave a stone the lapidary examines it closely, and experience tells him the proper plane upon which the delicate feat may be accomplished.

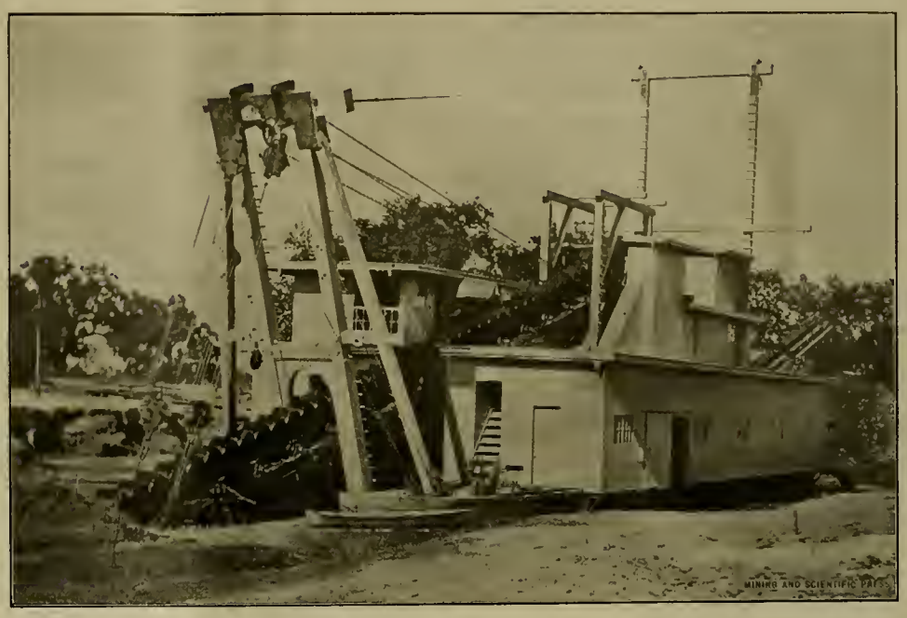
The cleaving of a valuable gem requires not only good judgment and skill, but also good nerve, for in some cases the reputation of the workman may be made or ruined by the result. The splitting is performed by embedding the diamond in cement up to a line about even with the plane upon which it is desired to remove a portion, the workman having previously scratched a line about the stone with another diamond, just where he desires to produce the fracture. He then places a steel knife blade against the diamond, holding it firmly at the proper angle, and strikes the blade a sharp blow with a light iron rod, and the work is done. The result, it is needless to say, is not always perfectly satisfactory. The art of diamond cutting has developed into a science, in which the workman must possess not only superior mechanical skill, but he must also thoroughly understand the theory of light, for the dispersion and refraction of light are of vital importance in cutting a diamond.

The aim is not to secure from the rough diamond the largest stone possible, but to get a gem which will reflect the rays of light entering it in the most intense and brilliant manner. The diamond is highly cleavable in a plane parallel with the pyramidal face. Taking advantage of this fact, lapidaries split a large diamond into thin plates at the time of the coronation of Queen Victoria, and beautiful miniatures of distinguished guests were presented to them, framed in gold and the picture covered with a sheet of diamond, instead of glass.

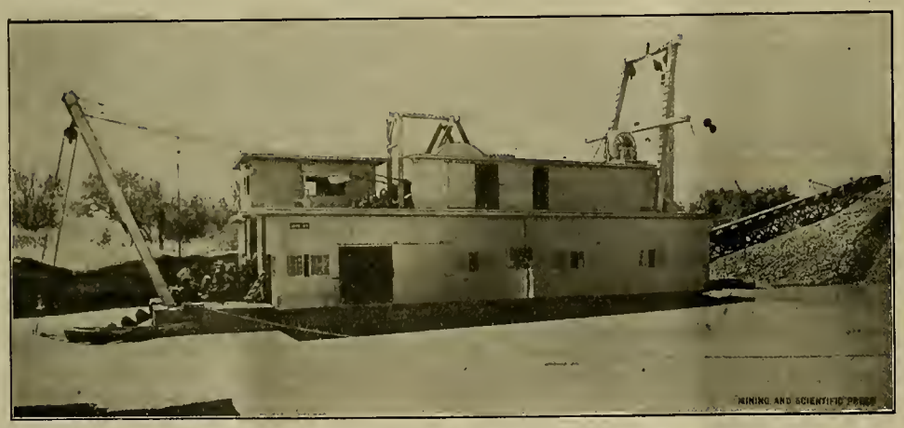
The diamond cutters of the fourteenth century contented themselves with merely polishing the natural faces of the stone, which in perfect crystals are octahedrons, usually with convex surfaces. Stones cut in this manner rarely show the true beauty which lies within. Several noted stones of great size have been cut repeatedly, losing largely in weight with each cutting, but always gaining in value by reason of increased brilliancy. The famous Koh-i-nur (mountain of light) is an example of this.

There is in diamond cutting, as in almost every other art, deceptions great and small. One of these is the filling out of a flat diamond with other inferior material, such as rock crystal or glass. A flat diamond is cut having a flat lower surface with the dome-like upper side cut in the usual triangular facets. A pyramidal section is then cut of quartz crystal or glass, to exactly fit the diamond cap, and the two bases are joined together with gum mastic, and the stone sold for genuine diamond.

In cutting diamonds the loss from the original weight of the crystal varies greatly—from one-third to three-fourths. It may be said to average about three-fifths. Diamonds occur in the mines in a great variety of size, color and form. The principal lapidaries are in Holland, London, Eng., and Boston, Mass. The United States is at present the largest buyer of diamonds.



Dredger Cherokee No. 1 Taking Off Top Soil, Near Oroville, Cal. (See Page 39)



The Dredger Indiana Digging Deep, Tailings Being Carried by Conveyor in Rear, Oroville, Cal (See Page 39)



A Large Dredger in Course of Construction, Near Oroville, Cal. (See Page 39.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION.

United States, Mexico and Canada.....$3 00
All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

BRANCH OFFICES:

NEW YORK CITY, 720 Park Row Bldg. BOSTON, 42 Worcester Square.
CHICAGO. 1115 Monadnock Block. DENVER, 606 Mack Block.

J. F. HALLORAN.....Publisher

San Francisco, July 18, 1903.

TABLE OF CONTENTS.

ILLUSTRATIONS: Page.

Dredger Cherokee No. 1 Taking Off Top Soil, Near Oroville, Cal 33
The Dredger Indiana Dredging Deep Tailings, Being Carried by Conveyor in Rear, Oroville, Cal.....33
A Large Dredger in Course of Construction, Near Oroville, Cal..33
Approximate Data of Open Streams, Weirs, Pipes, Etc..... 36
Beaudry Champion Power Hammer.....38
Jeffrey Grab Bucket.....39
Mining in Broken Hill, New South Wales.....40
Mining and Metallurgical Patents.....41

EDITORIAL:

The Art of Diamond Cutting.....33
The Value of Mineral Land.....34
Cost of Mine Investment.....34
Labor Conditions in the West.....34
Canadian Lead Bounty.....34
Regeneration of Cyanide Solutions by Various Means.....34

MINING SUMMARY.....42-43-44-45

LATEST MARKET REPORTS.....46

MISCELLANEOUS:

Concentrates.....35
Approximate Data of Open Streams, Weirs. Pipes, Etc.....36
Mining With Machine Drills.....37
Beaudry Champion Power Hammer.....38
Graphite in Canada.....38
Dredging and Valuing Dredging Ground in Oroville, Cal.....39
Jeffrey Grab Buckets.....39
Cost of Electric Drilling.....39
Mining in Broken Hill, New South Wales.....40
Mining and Metallurgical Patents.....41
Canadian Bounty on Steel.....41
Commercial Paragraphs.....45
Personal.....45
Obituary.....46
New Patents.....46
Notices of Recent Patents.....46

The Value of Mineral Land.

When the mineral in a tract of land on the public domain is sufficiently valuable to entitle the tract to be classified as mineral land it is often a perplexing question in the mind of a would-be locator. The Federal statutes of July 26, 1866, provided for the acquisition of titles to "veins of quartz or other rock in place bearing gold, silver, cinnabar or copper." The placer law, passed July 9, 1870, extended this right to include placer deposits, under the laws governing the location of placers, which includes all forms of mineral deposit, except veins of quartz or other mineral-bearing rock in place. Later in 1872 the law was further amended, and provided for the appropriation of lands containing veins or lodes of quartz or other rock in place bearing gold, silver, cinnabar, lead, tin, copper or other valuable deposits. In the matters of determining the character of lands claimed by locators the Land Department is the sole judge of the character of the land, and its decision is final. That department, in a circular of instructions issued some time since, said substantially that what constitutes a valuable mineral deposit is, whatever is recognized as a mineral by standard authorities on the subject, where the same is found in quantities and quality to render the land sought to be patented more valuable on this account than for agriculture, shall be treated as mineral.

No court would sustain a claim based on the mere occurrence of mineral in small quantities. For instance, in many places, copper, lead and quicksilver ores occur in small quantities, and are considered more as a curiosity than as a valuable mineral deposit. Such as these would not be considered "valuable" in the sense of the law. On the other hand, a deposit so low grade in mineral contents that it could not be worked at a profit at the present time by reason of location, price of the product of the mine, or for other good and sufficient reason, in a year or two may become very valuable by a change in the conditions which to-day render it practically valueless. It is unlikely, however, that the courts and the Land Department would condemn a large mineral deposit because it was at the time being too low grade to pay, for the reasons above given. But indications or traces of mineral, such as copper stains, small bunches or flakes of cinnabar, or occasional colors of gold, would not be sufficient to render the land subject to classification as mineral. Nor will the recording of a certificate of location render it mineral land, for the claim must be susceptible to proof. A tract cannot be assumed to be more valuable for mineral for the reason that it is situated in a mineral region or belt, for in such regions there is usually much land wholly without mineral values. On the whole it may be said that land may be deemed sufficiently valuable to be classed as mineral when the deposit is actually mineral regardless of its present worth, and on the other hand, the occurrence of small bunches and streaks of mineral, in fact mere indications, would not stand the test of courts.

Cost of Mine Investment.

When a mine investment is contemplated there is much that must be given consideration. In the case of a mine so situated that a small or relatively inexpensive plant will be required, and where the property will not cost a very large amount, the risk may be said to be reduced to a minimum. Take, for instance, some of the telluride gold ore deposits which lie upon or near the surface of some of the ridges in Terry's peak region of the Black Hills of South Dakota, or one of the shallower zinc deposits of the Joplin district of Missouri. In one case practically no surface mining plant is required, and the ores may be shipped to custom works, or a plant may be built for the beneficiation of the ores. In the other instance the ore may be hoisted by means of a small inexpensive hoist, and sold to reduction works near at hand or be shipped outside of the district for treatment. In either case the investment is small, the returns prompt, and the entire operation should prove eminently satisfactory.

In comparison with these instances, consider the investment which requires the outlay of several hundred thousand dollars in the first cost of property, where from four to five years or more are required to sink a shaft from the surface to the vein, as is the case in all of the deepest levels of the Rand. No company operating on the Rand deep levels considers the outlay of $2,000,000, before the mine shall have been opened sufficiently to justify a mill, an excessive investment. Then the cost of a large mill, such as an extensive mine should have, must be provided, and, unless connection with other mine workings can be made, two shafts are necessary for proper ventilation of the property.

The large capital required for the purchase, equipment and development of mines of this class, however, seem to be no obstacle in the way of securing sufficient money to float enterprises of this character. The reason for this is that there is confidence in the producing capacity of the mines. The extensive development of the several reefs of the Rand has shown that these several reefs may be depended upon to average a given tonnage and value per stated surface area—taking into consideration, also, the change in dip from those workings near the surface as related to those opened at great depth. It has been found that while some mines are decidedly superior to others, by reason of a higher grade of ore, or because of material difference in character of the ground, yet, on the whole, these mines may be depended upon to average about $10 per ton of basket when a large area is considered. The capital outlay and interest on the investment represent in most cases nearly, or quite, one-half of the ore available in a given area—say, about 200 acres. This at once reduces an enterprise of this size to a $5 proposition. That is, before any actual profit can be realized, from $2,000,000 to $3,000,000, representing the original outlay in purchase, equipment and development of the property, together with many incidental expenses, must be recovered from the operation of the mine. Thereafter any profit resulting from mining operations is net, and it is to make this distant profit that such investments are made. In mining operations it is the net result, and not altogether the size of output, that makes a mining proposition attractive to the investor. Notwithstanding all of these drawbacks, mining is popular, for the reason that no other form of investment can offer such promise or assurance of "net result" on a stated investment as can be found in a proven mine—one in which the ore is in sight, and the values exposed show a stated profit above cost of extraction, reduction and certain fixed charges for investment, sinking fund, interest and other necessary charges.

Labor Conditions in the West.

The eight-hour law passed by the last Nevada Legislature has been declared unconstitutional by the court of that State, for the reason that the text of the law does not contain the words "wherein the life, health or limb is jeopardized," which would have rendered it a sanitary measure. It was the provisions of this bill that precipitated the strike at Searchlight, where the miners are still out. Recently the owners of the mines in southern Nevada and southern California formed a combination known as the Desert Mine Operators' Association, the object of which is stated to be to "protect, foster and develop the mining industry in all its branches in the district covered by the association," and that they will not discriminate between union and non-union miners. The association numbers in its membership all of the principal operators in California south of the Tehachapi mountains, and many of those of southern Nevada.

In British Columbia, after a strike of four months, the miners, by a majority vote, have agreed to return to work under practically the same conditions as those obtaining at the time the strike was declared.

In Colorado the smeltermen are out at Denver and Colorado City, and have practically tied up several plants. The courts have issued an injunction restraining the strikers from picketing or in any manner interfering with the business of the smelters of the American Smelting & Refining Co. The strike threatens to involve the entire smelting industry of the State, and if prolonged must also seriously affect the mines as well, whether the strike extends to them directly or not, for a large portion of the mining industry of Colorado is directly dependent upon the smelters.

In Tuolumne county, Cal., a number of important mines are closed, the miners, who are members of the Western Federation, having gone on strike because of a refusal of the operators to increase wages. In Yavapai county, Ariz., numerous mines are idle, due to strikes resulting from the trouble over the eight-hour legislative day which was enacted by the last Territorial Legislature.

Canadian Lead Bounty.

The Canadian Government has authorized a bounty on lead produced and smelted in the Province of British Columbia. The miners of that section have long bitterly complained that they were working under a disadvantage of location, and made a determined effort to secure governmental assistance in the development of the large resources of the Province. The bounty as announced is 75 cents per hundredweight, or three-quarters of a cent per pound, a substantial increase over the prevailing price. The maximum amount provided for, however, is $500,000. The subsidy will be operative during a period of five years, during which time it is thought the industry may be placed on a footing which will render it self-sustaining. Should the price of lead in London go above £12 10s per ton of 2240 pounds—about $2.80 per hundred pounds—the duty shall be reduced proportionately. The English colonies in no case receive as much for their lead as do the miners of the United States. There are large silver-lead mines in the Province of British Columbia, particularly in the Slocan and Kootenay sections.

THE regeneration of cyanide solutions by various means is a subject now attracting much attention among workers in that important branch of metallurgy. This has been successfully accomplished by means of sodium sulphide, and experiments are now being made to do this electrolytically. Heretofore there has been much loss of cyanide, particularly in weak solutions and wash waters, but recent discoveries indicate that the time is not far distant when a stock of cyanide will remain in circulation for a long time, like quicksilver in an amalgamating mill, without serious loss.

CONCENTRATES.

MURIATIC ACID—hydrochloric acid (HCl)—is obtained largely as a by-product in the manufacture of soda-ash (crude sodium carbonate) by the Le Blanc process.

♣

IT is not possible to even approximately "give the annual consumption of dynamite in the mines of the United States." The Alaska-Treadwell mines, Douglas Island, Alaska, are credited with an annual consumption of 1,000,000 pounds.

♣

PHOTOGRAPHS of veins, above and below ground, of streams of water or springs, and improvements in the way of flumes, ditches, etc., and of buildings attached to a mine, are valuable accessories to a mine report, and should accompany the same whenever convenient.

♣

IN the United States sapphires have been obtained with placer gold, in gravel deposits along the Missouri river, near Canyon Ferry, Mont., but the principal mines for which are in Yogo gulch, Fergus county, Mont. North Carolina and Georgia also produce sapphires.

♣

MICA SCHIST is sometimes gold-bearing, though such deposits are very irregular in shape and values scattered. When a mica schist or a mica slate becomes gold-bearing to any considerable extent, the rock is usually more siliceous than the normal rock. The mica then often disappears.

♣

IT IS erroneous to presume that the dipping needle, often employed in the search for hidden iron ore, will show its greatest deflection when directly over the greatest mass of the ore deposit. The magnetic attraction is always found to be greatest at a point to the northward of the south pole of the deposit. Another fact not to be neglected in the use of the dipping needle is that a small mass of iron near the surface may exercise as great an influence on the needle as a larger mass at a greater distance below the surface.

♣

"DIP" in mining parlance, in mining law and geology, means the departure of a vein in its downward course, from the vertical or the horizontal. It is usually measured in degrees of arc from the horizontal. Thus a vein said to dip 80° stands nearly vertical and not almost flat. The dip of a vein or of strata is at right angles to its strike. In a vein having a sinuous course both strike and dip will be variable in direction, but the angle of dip may be uniform. It is the privilege of a claim owner to follow this "dip" of the vein beyond the side lines of the claim that is known as the extralateral right.

♣

BLANKET CONCENTRATION in one form or another has long been practiced. Bullock and other hides were employed for this purpose before blankets. Mats, carpets and other fabrics were used for the same purpose. The employment of canvas in concentration of slimes is of comparatively recent origin. It has been in use in California for twenty years or more. Old canvas is said to concentrate slimes more satisfactorily than new, for the reason that the roughness of new canvas catches a larger amount of sand. With the operators of canvas plants it is always a question of loss by fine material passing over, or loss by catching too much sand.

♣

THE carat is the unit of weight in valuing gems, and is equal to 3.2 grains in New York and 3.7 in London, varying according to different authorities. The international carat is 3.168 grains. The term originated in the division of a gold mark (coin) into twenty-four equal parts. It is also used to denote the proportion of gold in an alloy. Thus eighteen carats fine means that the alloy contains eighteen parts gold and six parts other metal, usually silver or copper, or both. There is no difference between grains avoirdupois or grains troy, but there is a difference in the avoirdupois ounce and the troy ounce. The avoirdupois ounce contains 437½ grains and the troy ounce equals 480 grains. An avoirdupois pound contains 14 58 troy ounces.

♣

A WINDLASS for prospecting work should have the winding cylinder long enough or of sufficient diameter to accommodate all the rope required to sink to the desired depth, without overlapping on the drum. A shaft may be sunk with windlass to 100 feet deep and more by putting four men on the cranks, but it is doubtful if windlassing is profitable below 70 feet. For long lifts a geared windlass is sometimes employed. It is customary to substitute a whip or whim run by horse power for a windlass when the shaft becomes too deep for windlassing, and it is not desirable or expedient to put in a power hoist. The so-called "pig tail" hook is not a safe device for men to work under, nor is a loop in the rope passed through the ring in the bale of the bucket and secured by a stick more so. A safety hook is the best device where it is necessary to detach the rope from the bucket below or above ground.

♣

THE United States Statute, Section 2320, provides mining claims upon veins or lodes of quartz or other rock in place, bearing gold, silver, cinnabar, lead, tin, copper, or other valuable deposits, heretofore located, shall be governed as to length along the vein or lode by the customs, regulations and laws in force at the date of their location. A mining claim located after May 10, 1872, whether located by one or more persons, may equal, but shall not exceed, 1500 feet in length along the vein or lode, but no location of a mining claim shall be made until the discovery of the vein or lode within the limits of the claim located. No claim shall extend more than 300 feet on each side of the middle of the vein at the surface, nor shall any claim be limited to less than 25 feet on each side of the middle of the vein at the surface, except where adverse rights existing on May 10, 1872, render such limitation necessary. The end lines of each claim shall be parallel to each other.

♣

THE spitzkasten is a device of German origin employed to effect a separation of fine from coarse ore and gangue by hydraulic method. It consists usually of a rectangular, sometimes square box, having a pointed bottom. The material to be sized enters through a launder at the top and the coarse passes out at the bottom, the fine flowing out near the top. The spitzlutte, also a hydraulic classifying device, generally consists of two inverted cones, one within the other. The pulp to be sized enters the inner cone, the coarse passing out at the bottom, as in the spitzkasten; but an upward current of water causes the slimes to remain longer in suspension, and thus effects a more complete separation of fine from coarse material. The fine slimes pass upward in the space between the two cones and flow away through a launder. Both the spitzkasten and spitzlutte have a variety of forms, but the principles employed are similar throughout.

♣

BORNITE—eruhescite, "horseflesh ore," peacock copper—is a sulpide of copper and iron (Cu_3 FeS_3), brittle, hardness = 3, specific gravity = 5, metallic luster, color between copper-red and "pinchbeck brown" on fresh fracture, but quickly iridescent from tarnish. Analyses of massive varieties show 50% to 70% copper and 15% iron. It is distinguished by its peculiar reddish color on fresh break and by its brilliant tarnish. Chalcopyrite (Cu FeS_2) also often shows an iridescent tarnish, but on fresh fracture is brass-yellow. Bornite before the blowpipe becomes magnetic. Bournonite is a sulph-antimonate (Ph Cu SbS_3), carrying 25% antimony, 42% lead and 13% copper. It is brittle, with brilliant metallic luster, and steel-gray, inclining to blackish lead-gray color. It is also called "wheel ore," from the twining action, forming cruciform and wheel-shaped crystals. On charcoal, with blowpipe, the residue treated in reducing flame with soda gives a globule of copper.

♣

THE Great Basin is a large area of territory lying east of the crest of the Sierra Nevada mountains of California and high mountains in eastern Utah. It includes nearly all of the State of Nevada, three-fourths of northern and western Utah, a portion of southeast Oregon and southwest Idaho, a narrow strip along eastern California and a large portion of southern California, known as the Mojave and Colorado deserts, and extending into Lower California. This vast territory covers an area of about 210,000 square miles and does not drain into any ocean, the entire drainage being absorbed or evaporated. The average rainfall is stated to be about 7 inches per annum. It is estimated that the annual evaporation of the Great Salt lake in Utah is about 80 inches. If it were not for the rain and snow fall tributary to that body of water it would in the course of a few years cease to be a living lake and would appear as a dry lake. The Great Salt lake is merely a remnant of a once greater lake known to geologists as Lake Bonneville. It was at least five times as large as the present Great Salt lake.

♣

TURQUOISE is a hydrous phosphate of aluminum, colored by copper. It occurs in veinlets and bunches of irregular size and form, usually in lava rocks, particularly the trachytes, sometimes in altered clay slates. It is sky blue, greenish blue, or apple green in color, often greenish gray. The pure sky blue is the most highly prized. The fracture of this mineral is small conchoidal, hardness about 6, and is brittle. It has a somewhat waxy luster. Turquoise occurs in the Los Cerrillos mountains, near Santa Fe, and in the Burro mountains, Grant county, New Mexico, several localities in Arizona, California and Nevada. Chrysocolla, a silicate of copper, is sometimes mistaken for turquoise, which it resembles in color. It has a conchoidal fracture, but is much softer than turquoise, being 2 to 4, and is readily scratched with a knife. The streak is white when pure. Chrysocolla contains silica 34.3, copper oxide 45.2 and water 20.5, there being no aluminum. It is in some localities an important ore of copper. It often accompanies other ores of copper and is undoubtedly a product of the alteration of copper sulphides.

♣

CUPELS are made from bone ash generally, though other substances, notably magnesite, have been successfully employed in cupel making. Experience has proven that the bones of horses or sheep make the best bone ash for this purpose. This ash consists principally of calcium phosphate, with some carbonate and a little fluoride of calcium. It is prepared by burning the bones until they become white, though care should be taken not to overheat the bones. The bone ash must then be pulverized, sifted and washed several times with boiling distilled water, until all soluble salts are removed. The finest particles of the ash will remain longest in suspension in the wash waters. These must be allowed to settle separately, and may be used in giving a final coating to the cupel. The cupel mold is filled with the moistened ash and the pestle hammered down to compress the ash into a solid cake. The pestle is then turned around to smooth the surface of the cupel. The pestle is then removed and a small quantity of the fine ash sifted over it, and the pestle again hammered into the mold. Care must be taken, however, not to compress the cupel too tightly or it will to a great extent lose its absorbent power and become useless. Cupels should be thoroughly dried before using—at first under a low heat, which may later be increased, finishing, if need be, in the muffle of the furnace.

♣

THE great danger involved in a "missed hole" is in the men who put in the shot being tempted to go to it, if it does not go off after a certain time, and tinker with it, and the shot may not have actually missed, but be smoldering, and go off while they are near. It is always claimed by electrical men that an electrically fired shot is safe to approach, immediately after the attempt has been made and has failed, but from the reports of the mines inspectors this does not appear to be correct. Ore nor coal are not like a cannon, though the action of a shot, which properly performs its work, is exactly like the action of a charge of powder fired in a cannon, the only difference being that the force of the explosion is expended in shattering the coal or ore instead of in expelling the shot. When the shot fires, but does not shatter the coal, or the rock it is intended to bring down, the action is similar to the firing of a blank charge from a cannon, the shot hole forming the barrel of the gun. It sometimes occurs that the explosive has not the full power it is supposed to have, owing to proper materials not being used, or to its having deteriorated, and it also sometimes happens that there are cracks in the coal or rock, especially when the shot is not fired immediately, and the squeeze from the overlying strata has time to operate, and in those cases the shot may be blown out, or it may be expended uselessly, but with danger to the attendants, in the cracks, etc., and may be smoldering.

♣

WHERE land is located on the public domain as placer, known lodes or veins are excepted and cannot be included by the placer claimant. What constitutes a known vein or lode has been made clear by the Supreme Court of the United States, says "Lindley on Mines." Where a vein or lode location has been made under the law, and its boundaries have been specifically marked on the surface so as to be readily traced, and notice of the location is recorded in the usual books of record within the district, it may be safely said that the vein or lode is known to exist, although personal knowledge of the fact may not be possessed by the applicant for placer claim. The information which the law requires the locator to give the public must be deemed sufficient to acquaint the applicant with the existence of the vein or lode (Noyes vs. Mantle, 127 U. S., 348), but a valid lode location can only be predicated on a discovery of a vein of quartz or other rock in place carrying valuable deposits sufficient to justify the expenditure of time and money for its development, and such discovery must be shown before the location notice or its record will possess any force as against a placer claimant. * * * The knowledge of the existence of a lode is not presumed from the mere production of a recorded notice ante-dating the location of the placer." It is plainly the intent of the law not to include any lode or vein, the existence of which was previously known, but not considered worth locating. The mining law also gives claim holders the right to cut timber on their claims for their own domestic use, mining purposes, etc.

♣

MICA is usually not difficult of determination if the scales are large enough to be distinctly seen and handled by the point of a knife. There are several varieties of mica, some of which have commercial value when in merchantable condition. The most common is muscovite, or potash, mica. This is the ordinary mica of commerce. By transmitted light it is various shades of yellow, green and brown, wine color, etc. It is an essential constituent of gneiss and granite and is sometimes found in quartz-porphyry, but never in other eruptive rocks. Phlogophite is a magnesian mica having a pearly luster and is often sub-metallic on the cleavage faces; color yellowish brown and brownish red, with copper-like reflections. When a small candle flame is viewed through thin plates of this variety of mica it shows commonly a six-rayed star. Phlogophite occurs mostly in the older crystalline rocks, such as Archæan granular limestone. Margarite, or pearl mica, is tabular, scaly or massive, and, unlike other micas, is brittle. In color it is white, grayish, reddish, yellowish, sub-translucent. It is commonly found with corundum. It is a lime-alumina mica. Biotite is the black, brown or green, dark-colored iron-magnesia mica. It occurs commonly in many rocks—in diorite, some volcanic rocks, and more rarely in granite, not uncommon in grano-diorite. It is completely decomposed by sulphuric acid. It is more abundant in acid than in basic rocks. Margarodite, a talc-like mica, though not a magnesian mica, is scaly to granular, and has a bright, pearly, sub-metallic luster. It is a variety of muscovite. Sericite is a fine, scaly muscovite, united in fibrous aggregates, and is characterized by its silky luster. Lepidolite is lithia mica. It occurs in plates and granular masses, coarse or fine; luster pearly, color rose red, violet gray, lilac, yellowish white. It occurs in granite, gneiss, and particularly in granitic veins of coarse crystallization.

Approximate Data of Open Streams, Weirs, Pipes, Etc.

Written for the MINING AND SCIENTIFIC PRESS by F. S. BECKETT.

The conventional formula or table, while indispensable, is at best fragmentary, often requiring much labor and calculation to complete the story. This may not be a serious matter to the student with time and a reference library at his command but to the practical man in the field facts and conclusions receive an added value from the ease and promptness with which they can be secured. The accompanying graphic table is an attempt to give in a form suitable for ready reference the results and conclusions of the formulæ most often required in the line of work indicated by the title.

A good way to use the table, for one sufficiently interested, is to form a strong mental picture of the various curves and scales. It is then surprising with what ease problems can be solved off-hand and with fairly accurate results.

As it is only intended to give approximate results, small losses have not been taken into account. No allowance has been made for strong head winds, evaporation or leakage. Hydraulic riveted pipe, being used to such great extent, is alone considered and is supposed to be clean, free from short ourves and valves, and with a perfectly shaped taper and nozzle.

The following problems are given to show the scope and application of the table:

Example 1 (indicated by heavy dotted lines).—An open stream is found by measurement to have an area of 3 square feet. Chips dropped on the surface float at an average velocity of 96 feet per minute. It is proposed to conduct the water across a deep ravine through 900 feet of 14-inch riveted pipe; thence through a ditch 3 feet wide by 1 foot depth of stream, through good, solid earth to a penstock; thence down 160 feet through 700 feet of similar pipe to a wheel rated at 85% efficiency, which wheel is to be belted to a compressor rated at 40% efficiency.

1. What is a rough estimate of the quantity of water by means of the chips?

Start from 96 feet, "Velocity at Surface," thence down obliquely left to 80 feet, "Velocity Feet per Minute;" thence vertically up to 3 feet, "Area Stream;" thence horizontally left to 240 feet, "Quantity Cubic Feet per Minute," or 160 "Miner's Inches." Ans. 1.

2. If this quantity is correct, what should be the depth of stream of a quadrantal weir?

Start from 240 feet, "Quantity Cubic Feet per Minute," thence down obliquely right to 14 inches, "Depth Quadrantal Weir." Ans. 2.

3. What should be the depth of stream of a 26-inch rectangular weir with contraction suppressed?

Start from 240 feet, "Quantity Cubic Feet per Minute," thence horizontally right to a point vertically down from 26 inches, "Width Rectangular Weir, no Contraction," which point is on 8 inches "Depth Rectangular Weir." Ans. 3.

4. What should be the difference between the levels of the two streams?

Start from 240 feet, "Quantity Cubic Feet per Minute," thence horizontally right to 14-inch "Riveted Pipe;" thence vertically down to 900 feet, "Length Pipe;" thence horizontally left to 4½ feet, "Actual Head Open Pipe." Ans. 4.

5. Give the limits of the velocity in the ditch that would prevent a growth of vegetation and at the same time not erode the banks.

"Earth in Good Order — Limiting Velocities = 1 foot to 2½ feet." Ans. 5.

6. Give the proper grade for the proposed ditch.

Start from 160 "Miner's Inches," thence horizontally right to 3 feet "Area Stream;" thence vertically down to "Earth in Good Order;" thence horizontally left to "Area ÷ Wet Perimeter = .6" $\left(\text{or } \frac{3}{3+1+1} = .6\right)$; thence vertically down to 1⅛ inch, "Grade Inches per 100 Feet;" or ⅛+ inch, "Grade Inch per Rod." Ans. 6.

7. Give the corresponding average velocity.

Start from 1⅛ inch, "Grade Inches per 100 Feet;" thence vertically up to "Area ÷ Wet Perimeter = .6;" thence horizontally right to "Earth in Good Order;" thence vertically down to 80 feet, "Velocity Feet per Minute," or 1⅓ foot, "Velocity Feet per Second." Ans. 7.

8. What will be the friction head of the pipe leading to the wheel?

Start from 160 "Miner's Inches," thence horizontally right to 14-inch "Riveted Pipe;" thence vertically down to 700 feet, "Length Pipe;" thence horizontally right to junction; thence down obliquely left to 3½ feet, "Friction Head Closed Pipe." Ans. 8.

9. Give the effective head of the same pipe.

Start from 3½ feet, "Friction Head Closed Pipe," thence up obliquely right to junction; thence horizontally right to a point vertically up from 160 feet, "Theoretical Head;" thence up obliquely right to end of oblique section lines; thence down obliquely right to 156½ feet, "Effective Head." Ans. 9.

10. Give the H. P. developed by the water.

Start from 156½ feet, "Effective Head," thence up obliquely left to end of oblique section lines; thence vertically up to a point horizontally right from 160 "Miner's Inches;" thence up obliquely right parallel to curved section lines to 60 "H. P. Wheel." Ans. 10.

11. What should be the effective H. P. of the compressor?

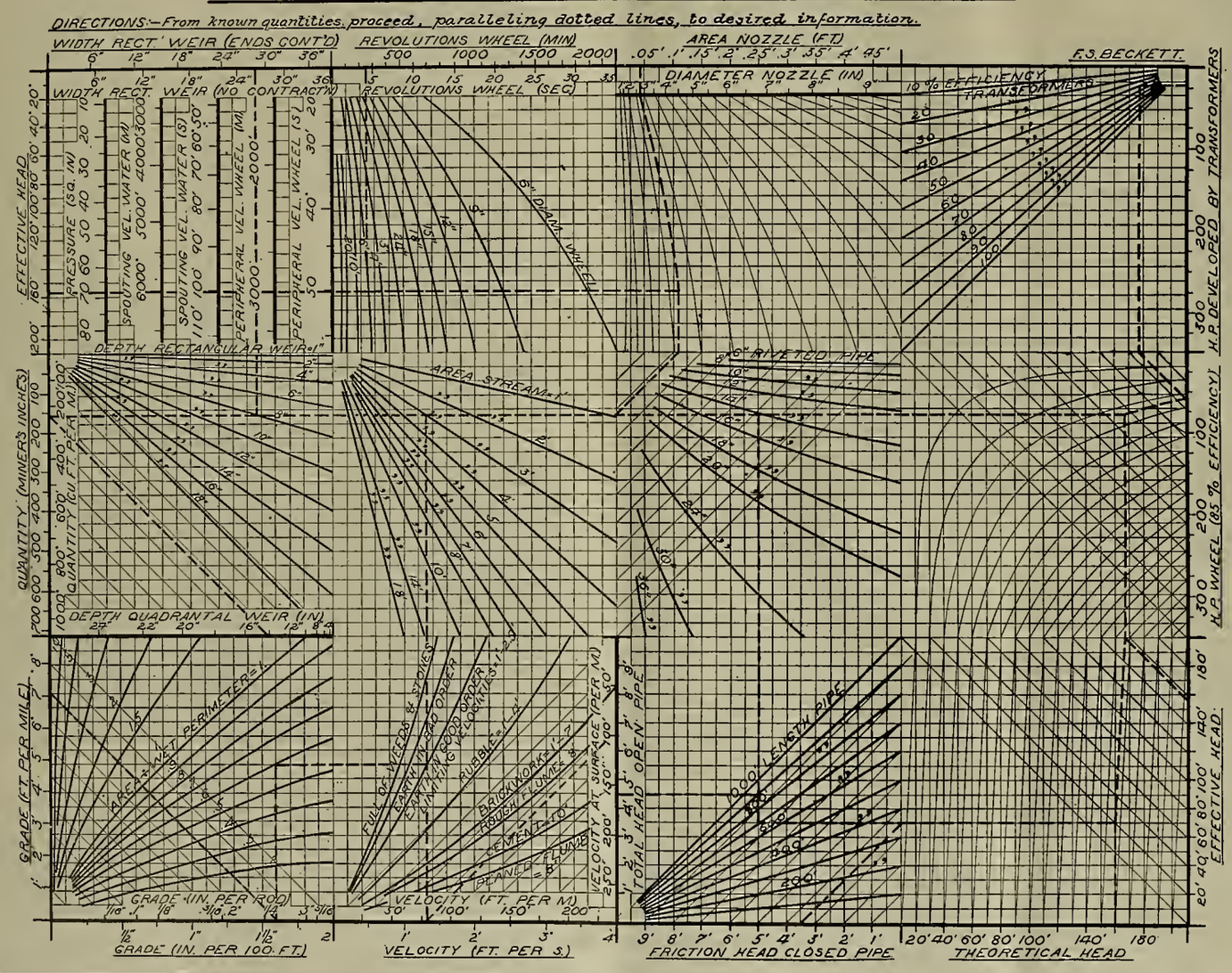
Start from 60 "H. P. Wheel," thence up obliquely left to end of oblique section lines; thence vertically up to 40%, "Efficiency Power Transformers;" thence horizontally right to 24 "H. P. Developed by Transformers." Ans. 11.

12. What will be the pressure of water when the wheel is running?

Start from upper left corner at 156½ feet, "Effective Head," thence horizontally right to 68 pounds, "Pressure per Square Inch." Ans. 12.

13. What spouting velocity corresponds to that head?

Start from 156½ feet, "Effective Head," thence hori-



zontally right to 6000 feet, "Spouting Velocity Feet per Minute," or 100 feet, "Spouting Velocity Feet per Second." Ans. 13.

14. What should be the peripheral velocity of the wheel?

Start from 156½ feet "Effective Head," thence horizontally right to 3000 feet, "Peripheral Velocity Wheel Feet per Minute," or 50 feet, "Peripheral Velocity Wheel Feet per Second." Ans. 14.

15. What diameter wheel should be used to give 250 revolutions per minute?

Start at 156½ feet "Effective Head," thence horizontally right to a point vertically down from 250 "Revolutions Wheel per Minute," which point is on 4 feet "Diameter Wheel." Ans. 15.

16. What diameter nozzle ring should he used?

Start from 156½ feet, "Effective Head," thence horizontally right to a point horizontally right, then up obliquely right, then vertically up from 160 "Miner's Inches;" thence up obliquely left, parallel to curved section lines to 2⅝ inches, "Diameter Nozzle." Ans. 16.

Answers may be found to problems relating to open streams varying in sectional shape, size and character of bed.

Problem 2.—A rough plank flume 4 feet wide by 2 feet depth of stream is given a grade of 4.75 feet per mile. What will he the velocity?

Solution.—Start from 4¾ feet, "Grade Feet per Mile," thence down obliquely right to 1.1 inch, "Grade Inches per 100 Feet;" thence vertically up to "Area ÷ Wet Perimeter" = 1; thence horizontally right to "Unplaned Plank;" thence vertically down to 3.8 feet, "Velocity Feet per Second," or 228 feet, "Velocity Feet per Minute." Ans.

By extending curves and scales the range of the table may be increased by a rough guess.

Problem 3.—If, in problem 1, a 12-inch pipe is used, what will he the friction head?

Extend curve "12-inch Riveted Pipe" to a point horizontally right from 160 "Miner's Inches." Extend line "700 feet Length Pipe" to a point vertically down from point 1; thence horizontally left to beginning of oblique section lines; thence down obliquely left to 7½-feet, "Friction Head Closed Pipe." Ans.

The following formulæ and rules of proportion, taken for the most part from Kent's "Mechanical Engineering" and Randall's "Practical Hydraulics," include those used in the preparation of the table, with the addition of others which may he used to increase its range or seoure greater accuracy for extreme quantities:

Rectangular weir, no contraction:

$$q = 3.33\, l\, h^{\frac{3}{2}};$$

$$q : q_{,} = l : l_{,}.$$

Rsctangular weir, full contraction:

$$q = 3.33\,(l - .2h)\, h^{\frac{3}{2}};$$

$$q : q_{,} = l : l_{,}.$$

Quadrantal weir:

$$q = 2.6365\, h^{\frac{5}{2}}.$$

Friction water in pipe:

$$f = \frac{l\,(4\,v^2 + 5\,v - 2)}{1000\,D}; \qquad \text{(Cox.)}$$

$$f.\ f_{,} = l : l_{,} = v^2 : v_{,}^2 = q^2 : q_{,}^2;$$

$$q : q_{,} = a : a_{,} = d^2 : d_{,}^2;$$

$$h' = h - f;$$

$$q = v\,a.$$

Pressure water:

$$p = .434\,h;$$

$$h = 2.3\,p;$$

$$p : p_{,} = h : h_{,}.$$

Spouting velocity water:

$$v = \sqrt{2\,g\,h'} = 8.02\sqrt{h'};$$

$$v : v_{,} = \sqrt{h'} : \sqrt{h'_{,}}.$$

Perlpheral velocity wheel:

$$v = .5\,\sqrt{2\,g\,h'} = 4.01\,\sqrt{h'};$$

$$v : v_{,} = \sqrt{h'} : \sqrt{h'_{,}}.$$

Revolutions wheel:

$$r\,c = .5\sqrt{2\,g\,h'} = 4.01\sqrt{h'};$$

$$r : r_{,} = d_{,} : d.$$

Nozzle ring:

$$d = \sqrt{\frac{a}{.7854}};$$

$$a = d^2 \times .7854 = \frac{q}{\sqrt{2\,g\,h'}};$$

$$q = a\sqrt{2\,g\,h'} = 8\,02\,a\sqrt{h'};$$

$$q : q_{,} = a : a_{,} = d^2 : d_{,}^2 = D^2 : D_{,}^2.$$

Open streams:

$$v = \left\{ \frac{\frac{1.811}{n} + 41.6 + \frac{.00281}{s}}{1 + \left(41.6 + \frac{.00281}{s}\right)\frac{n}{R^{\frac{1}{2}}}} \right\} (R\,s)^{\frac{1}{2}}; \quad \text{(Kutter.)}$$

$$v = .83\,v'.$$

Horse power water:

$$\text{H. P.} = .284\,h'\,i\,e = .00189\,h'\,Q\,e = .000031\,H\,q\,e = \frac{62.5\,Q\,h'\,e}{33{,}000} = \frac{62.5\,q\,h'}{550};$$

$$\text{H. P.} : \text{H. P.}_{,} = h' : h'_{,} = q : q_{,} = Q : Q_{,}.$$

Horse power developed by power users:

H. P. = H. P. water × e power users.

Safe thickness iron riveted pipe:

$$t = \frac{p\,D}{5000 \text{ to } 8000}.$$

1 cubic foot water = 62 5 pounds = 7.48 gallons = ⅔ miner's inch.

1 miner's inch = 93.75 pounds = 11.22 gallons = 1½ cubic foot per minute.

Notation:

a = area—feet.
c = circumference—feet.
d = diameter—feet.
D = diameter—inches.
e = efficiency.
f = friction head—feet.
g = 32.16.
h = head—feet.
h′ = effective head—feet.
H. P. = horse power.
i = miner's inches.
l = length—feet.
n = coefficient of roughness of stream bed.
.009 = planed lumber, perfect order.
.010 = cement.
.012 = unplaned wooden flumes.
.013 = brickwork.
.015 = canvas lining.
.017 = rubble, also earth in highly regular cases.
.020 = coarse rubble, set dry in bad condition, very firm, regular gravel.
.0325 = dry, coarse rubble in bad order; earth canals and channels above average.
.025 = earth, canals and channels in good order.
.030 = earth, canals and channels in bad order.
.035 = rivers and canals in bad order, overgrown with vegetation and strewn with stones.
.070 = rivers in earth, with stones and weeds in great quantities.
p = pressure per square inch.
q = quantity—cubic feet per second.
Q = quantity—cubic feet per minute.
r = revolutions per second.
R = hydraulic mean depth = area / wet perimeter.
s = sine of slope.
t = thickness—inches.
v = average velocity—feet per second.
v′ = velocity at surface—feet per second.

Problem 4.—If, in problem 1, 50 revolutions were required, what should he the new diameter of the wheel?

Solution by proportion:

$$d : d_{,} = r_{,} : r \text{ or } d_{,} = \frac{dr}{r_{,}} = \frac{4 \times 250}{50} = 20 \text{ feet}$$

diameter. Ans.

Solution to problem 2 by formula:

$$v = \left\{ \frac{\frac{1.811}{n} + 41.6 + \frac{.00281}{s}}{1 + \left\{41.6 + \frac{.00281}{s}\right\}\frac{n}{R^{\frac{1}{2}}}} \right\} (R\,s)^{\frac{1}{2}}$$

$$= \left\{ \frac{\frac{1.811}{.012} + 41.6 + \frac{.00281}{.0009}}{1 + \left\{41.6 + \frac{.00281}{.0009}\right\}\frac{.012}{1^{\frac{1}{2}}}} \right\} (1 \times .0009)^{\frac{1}{2}} = 3.8$$

velocity feet per second. Ans.

Hand vs. Machine Drilling.

In the mines of the Rand the subject of machine vs. hand drilling has received much attention. The conclusion reached there is that where circumstances are favorable, machine drilling in the stopes is carried on with considerable success. In narrow stopes, however, time is wasted in the frequent shifting of the drill, and unless the hanging and footwalls are extremely hard, there is the drawback of the greater amount of waste country rock brought down by the heavier blasting charges used; and this, combined with the larger amount of fines produced, which cannot be sorted, has a detrimental effect on the milling returns. Where the stopes are fairly wide and the dip flat, however, a great saving can he effected by the use of machine drills.

Mining With Machine Drills.

NUMBER II—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by E. L. LE FEVRE.

Where a number of machines are running it is advisable to have an assortment of bars. One man may require one 3½ feet long for a horizontal set up; another may find a 9-foot support none too long for a vertical position.

The simple bar with a jackscrew in one end is preferable to the column of fixed dimensions set upon a jack block with double screws for all stoping work.

In filled stopes the tripod is an unmitigated nuisance. In square-setted stopes too wide for bars they can he tolerated. The use of an arm to the bar is seldom required for big machines in stopes, as they are powerful enough to drive a heavy bodied drill across hard rock diagonally after the hole is properly started, and the runner knows his business.

In setting up the machine the judgment of the runner is shown more than in any other work on a machine. Peculiarities of vein structure, direction of slips and contour of intrusions, must he carefully noted and advantage taken of all favorable conditions. All blocking should be of sound, tough timber, reasonably free from knots. Sawed wedges are preferable. They should he 1 foot long and of varying widths and thickness at butt end. Blocking faced on one side and rounded on other answers very well, the rounded side being placed next the bar shoe. Blocking should he confined to one end of the bar if possible, preferably to the jacking end, a wide wedge or 2-inch piece properly wedged answers nicely for the opposite end. The blocking and plank should fit squarely on the shoes; if necessary the bar should he deflected to meet this requirement. Wet, slimy surfaces should he scored with a moyle or pick to roughen the face so as to give holding power and prevent wedges slipping.

In filled stopes the vertical set-up is to he preferred for many reasons. The bar may be slanted to meet inequalities in the roof: cleavage planes in fissures are apt to parallel the walls; handling machine is facilitated by it. Great care should he taken to avoid extremely hard or soft masses at angles impossible to drill. A vertical set-up allows small latitude laterally to correct deflections of the drill, yet a careful inspection of the vein mass will usually admit of locating the machine so that small inconvenience therehy results and a six-round hole in an 8-foot breast may he readily drilled in a shift. In setting up on the edge of slanting declivities in the stope the hottom timbers used for blocking should be laid parallel with the walls of the vein. Where rock sustaining walls are built they must he carefully laid and each course filled in with fine stuff to prevent uneven settling. By using precautions in preparation a great many mishaps can he avoided and the annoyance of having a machine fall down rendered impossible. In "jacking up" the bar it is better to do it a little at a time, thus giving the ruhble end a chance to settle and avoid splitting the foot block by applying too much pressure at one time.

Having secured the machine in the proper position, about two ounces of oil may he poured into the hose, gaskets (those made of fuse are good) inserted and the hose tightly connected with the machine. The runner should then go carefully over the machine, inspecting every nut and holt. Nine out of ten breakages of crossheads, feed screws and shell rods are due to neglect in not tightening rods properly. In drilling a round of holes the ground to he broken should he carefully inspected, and the physical characteristics noted in minute detail. An observance of this rule will benefit any machine runner, no matter how long he has been at the business, as it gives one a good idea of the salient features of vein structure and affords a hasis for reasoning when locating the set-up.

By breasting is hy far the most desirable method of carrying a stope, and to keep it properly faced requires not a little judgment of angles and distance. Here again is where a vertical set-up has superior advantages in allowing the proper pitch to be given the holes and permit a correct vertical spacing. Where water is difficult to obtain this is a very important point. Again, all machines necessarily have some play in the shell; this is at a minimum where the edge of the guides hears the strain. In starting holes at angles there is always a tendency for the drill to deflect in some direction, generally with the slant of the face; the upright bar makes it easy to correct this tendency.

The holes on opposite sides of the vein should he pitched at different angles from a common plane. This minimizes the chance of one hole shooting out another. Each and every hole should have a correlative value to all the others.

It is a difficult matter to start a hole in hard rock where the face plane is not at a right angle with the drill bit; this may usually be overcome by lowering the machine on the bar and changing the pitch, drilling a few inches, then raising the machine and catching the edge of the hole thus started. In soft rock, holding the shank of a drill against the face, shorten-

ing the stroke and using the least possible power at first, will accomplish the desired end.

Having started a hole free from rifling, great care should be taken to keep it straight, deflections in any direction should he met by promptly changing the adjustment. Too much stress cannot he placed upon this feature of machine work, for therein lies a cardinal secret of successful machine operating. Many a "failure" may know all about a machine, and be posted on the tricks of drilling, yet never be able to put in a symmetrical round of holes because of negligence, laziness or ignorance of this vital point.

The first drill used should be sharp, with a hig full length harrel, and perfectly straight. By leaving the weld unswaged the joint of body and barrel steadies the drill after it once gets heyond the collar of the hole. Beware of using slender-hodied, nuhbitted drills in starting holes in hard rock where difficulties are to he expected. A tendency to rifle should he met at once hy changing the stroke length and increasing the power. If the drill is even slightly dulled put in a sharp one.

In case a hole runs off, the machine should he moved in the direction the drill deflects until the harrel rests on the side of the hole; this gives a long hearing and makes it possible to cut into a harder stratum of rock at an ohtuse angle. When a drill sticks in a hole and fails to clear itself when struck hy the chuck wrench, it should he taken out at once and the cause investigated. More machines are broken hy reckless pounding in trying to force a drill than hy any other thing. If a drill is used too long and the next length won't go to the hottom of the hole hy a few inches, it may he made to work hy inserting the shank into the chuck, cranking up close, turning on power without tightening the chuck nuts and driving it to the hottom of the hole, then taking back and driving the hit down on a different place; the third change will clear the hole. This running with a loose chuck makes it possihle when the drill is held fast; hy driving it up and turning it with the hands on the back stroke the slight depth is gained which is needed hy the reciprocating mechanism and piston to permit their working properly. The character of the rock and the percentage of moisture present has a marked influence on the proper angle at which a hole should he pitched; the stroke length is also a factor not to be ignored, as a machine having a long stroke will pull a drill out of a hole where a short-stroked drill won't hudge. A long barrel hehind the hit likewise plays a part in keeping the drill dirt stirred up and moving toward the mouth of the hole. A dry rock of even texture may he drilled practically flat whether it cuts coarse or fine. On the other hand, a close-grained rock cutting fine cannot he drilled horizontally if a small amount of moisture is present, an amount not noticeahle in coarse cutting, granular formations. Hard sulphide ores are treacherous. Stick a drill in a hole in a fine-cutting hlack sulphide of iron or galena and it stays there until shot out. The small iron rod mentioned in the outfit for the machine is an efficient tool for loosening a choked drill unless it is packed too tight.

Where the hole varies but little from horizontal and passes from a soft rock into a very hard one at an ohtuse angle, a few pieces of hard quartz the size of hickory huts placed in the hottom of the hole will generally cause the drill to "take" in the harder rock; in water holes a track spike or two will effect the same purpose. In drilling water holes in argillaceous rocks, the mudding of a hole is frequently very annoying. This can be ohviated by cranking the machine hack, pouring in a small can of water, then turning on about a quarter of a head of air and churning the stiff mud while running the machine up.

A shrewd ohserver soon learns his stope and can greatly simplify his work by being alert to notice changes in vein structure or variations from normal in hardness, moisture, etc. The judicious use of power greatly simplifies the handling of the machine in the various contingencies arising in putting in a difficult hole. This is a feature of machine running that requires much experience and sound judgment to thoroughly master.

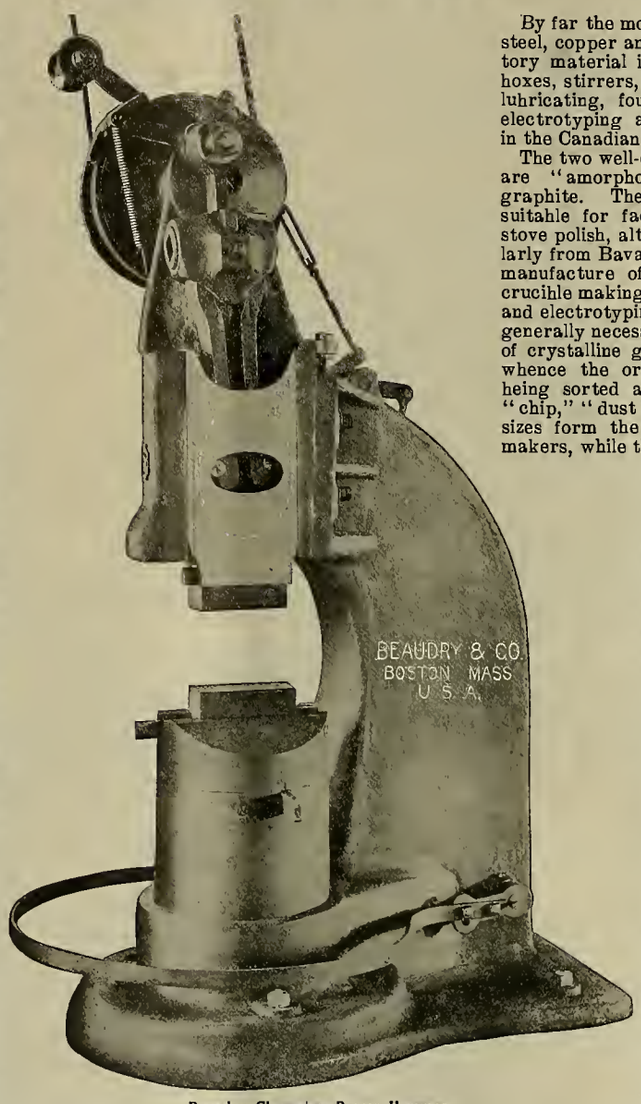
When the round is successfully put in the holes must he thoroughly cleaned and loaded. Here is where knowledge is valuable. An ignorant or careless man can easily waste his salary hy a profligate use of powder. For machine holes a gelatine powder should always he used, as the explosive does away with the expensive annoyance of a burned out hole. The fuse used should he the hest obtainable. The great majority of miners know how to load holes, and failures result principally from defective or badly made fuse.

In hlasting ore, when very hard, an ahundance of explosive should be used, as the rock is shattered into small lumps and a lot of lahor saved, which costs more than powder. In stopes filled with waste it is best to shoot the ore first, letting the foot wall holes go first where the waste is taken from the hanging wall. This method puts the ore in one place and greatly facilitates cleaning up.

While hreast holes are recommended for hreaking ore, uppers or half uppers drilled very deep where the rock is friahle or brittle meet the requirements for filling. It is not necessary to load waste holes heavily, the least quantity of powder that will break the hole heing sufficient.

Beaudry Champion Power Hammer.

The Beaudry power hammer, illustrated herewith, claims favor for several things, among which are elasticity and control of the blow struck by it, these heing because of a new device, simple, direct acting and effective, allowing the ram freedom of throw, and causing it to rebound the instant the hlow is struck. The operator has constant control of the force of the hlow, which may be of any degree from very light to very heavy (according to the pressure on the foot treadle), and on widely varying thicknesses of stock without change of adjustment. The ram has no reaction or jump. The hammer requires but light power. The manufacturers say that its



Beaudry Champion Power Hammer.

simple design, the unusual strength of its parts and thorough workmanship insure permanent durability.

This hammer has no beam, no saddle, no ruhher cushions or leather straps, no coil springs, nor any form of spring and link connections of numerous wearing parts. The ram or head is of steel, and has an internal curved track of ( ) shape, shown hy dotted lines in the illustration. The two spring arms, with rolls at their lower extremities, operate within the ram upon this curved track, and serve to lift and throw the ram, which, with increased speed of the hammer, acquires increased travel and force of hlow. The simple, positive action of the spring arms controls the ram, and causes it to rebound the instant the hlow is struck, without reaction or jump or sudden undue strain on any of the hammer parts. The box pillar frame is rigid, occupying small floor space, and requiring a foundation of moderate size. The anvil is an independent casting having no connection to the frame, thus preventing crystallization of the hammer parts. The crankshaft, of large diameter, runs in hard hronze hushing chambered for oil. The crank pin is adjustable for varying lengths of stroke. The connecting rod runs on a bronze sleeve. The connecting rod, spring hox, and ram are steel castings. The spring arms are forged from Swedish steel, and have hardened tool steel rolls. The tension on the spring arms is adjusted hy two tension nuts in the spring box.

The heavy ram guides are cast solid with the frame and have an adjustahle wedge-shaped gib, by which the wear, if any, can he taken up to the one-hundredth part of an inch. The ram is adjustahle for varying heights ahove the dies. The full stroke can be had on a piece 4 inches square as readily as on a piece ½ inch in thickness, and no change in adjustment is required except for unusually heavy or special work. The anvil has an independent adjustable shoe die. Full length hars can he worked either way of the dies. The ram is counterhalanced by weight in the pulley. The positive hrake will stop the hammer almost instantly, and will hold the ram at any desired position of its stroke. The hammer is direct acting. It can he made to run at the will of the operator at a high speed, and deliver hlows from one pound to its full capacity. These hammers are huilt solely hy Beaudry & Co., 147 Milk street, Boston, Mass.

Graphite in Canada.

By far the most important use of graphite is in the steel, copper and copper-alloy industries as a refractory material in making crucihles, retorts, muffles, hoxes, stirrers, etc. Other important uses are for luhricating, foundry facings, stove polish, paints, electrotyping and pencils, writes H. P. H. Brumell in the Canadian Mining Review.

The two well-defined trade divisions of this mineral are "amorphous" graphite and "crystalline" graphite. The former is usually of lower grade and suitahle for facings, paint, pipe-joint grease and stove polish, although the hetter qualities, particularly from Bavaria and Mexico, are used also in the manufacture of pencils and electrotyping, while for crucihle making, luhrication, high-grade stove polish and electrotyping, the purer or crystalline variety is generally necessary. The principal source of supply of crystalline graphite is the Island of Ceylon, from whence the ore is shipped in its crude form, after heing sorted and sized, the grades heing "lump," "chip," "dust" and "sweepings." The first two sizes form the hulk of the output used by crucihle makers, while the "dust" and the "sweepings" are utilized for lubrication stock.

Amorphous graphite is found principally in Nova Scotia and New Brunswick, where it occurs as graphitic shale and clay. The most important deposits are those in the vicinity of St. John, N. B., others of lesser note occurring in Kings and Westmoreland counties, N. B., and at Lochaher, N. S. In Ontario several deposits of amorphous graphite have been found in Halihurton and Hastings counties, while in Brougham township, Renfrew Co., an extensive deposit occurs, having associated with it a considerahle proportion of flake or crystalline graphite. This property is heing operated hy the Ontario Graphite Co., which has lately installed a plant, and is now refining and shipping the product.

The largest known deposits of crystalline graphite are in the counties of Ottawa and Argenteuil, Quehec. Smaller deposits occur in Lanark, Leeds and Frontenac counties, Ontario. Of this quality there are two distinct classes of ore, "lump" and "disseminated," the former usually occurring in limestone, as nodules, or filling pockets and small veins. There are also many minor occurrences where the lump ore constitutes small veins in diorite or other igneous rocks. As yet no discovery of lump has warranted systematic mining. Disseminated graphite is practically a sillimanite or other gneiss carrying graphite in a flaky or crystalline form, and varying in graphite content from a trace to 35%. These bands of gneiss are found in the townships of Buckingham and Lochaher, Ottawa county, many heds having a thickness of over 20 feet, and assaying on an average ahout 20% graphite. A numher of heds have heen opened and ore extracted and treated at the different mills in the district.

The process of manufacture adopted hy the different producers has heen jealously guarded, the "secrets" being considered the individual property of the refiner. Irrespective of secret methods, the practice adopted may be divided into wet and dry processes. No mill confining its operations to the dry or air method has as yet heen commercially successful, hecause the similar gravity of the component minerals prevents a satisfactory separation. Several pneumatic separators lately put on the market have heen partially successful, although they have not been ahle to eliminate the mica.

The wet or water separation method has been successful and high-grade graphite is heing produced in this manner hy the North American Graphite Co. of Buckingham, which is, at present, the only company in operation in the Province of Quehec. It is expected that the plant of the Walker Mining Co. will soon he at work. In the process of concentration used by these companies the ore is crushed and stamped wet, and a coarse separation made by stationary huddles. The concentrates are then dried, ground hy buhrstones and screened. An improve-

ment, resulting in a saving in cost of about 25%, has lately been made by the use of the Brumell separator, which treats the ore after drying by flotation upon, rather than immersion beneath, the surface of the water. By the wet method a higher degree of concentration is obtained than by the dry process, and the ground and finished concentrates retain their size of particles. As a consequence, those companies which employ wet methods are enabled to put upon the market the largest sized and purest flake crucible and lubricating stock.

Analyses of picked samples of graphite made by the Geological Survey of Canada have shown the following results:

Locality.	Carbon, Per Cent.
Buckingham township, Quebec (foliated)	99.675
Buckingham township, Quebec (columnar)	97.626
Grenville township, Quebec (foliated)	99.815
Grenville township, Quebec (columnar)	99.757
Ticonderoga, N. Y. (foliated)	99.656
Ticonderoga, N. Y. (columnar)	97.422
Ceylon (foliated)	99.679
Ceylon (columnar)	99.792

Dredging and Valuing Dredging Ground in Oroville, Cal.*

NUMBER II.—CONCLUDED

Written by NEWTON BOOTH KNOX.

CALCULATING THE AVERAGE VALUE PER CUBIC YARD.—The value of each hole in cents per cubic yard is multiplied by its depth in feet, and the sum of the products divided by the sum of the depth. The quotient is the average value in cents per cubic yard. Thus we have a block of dredging ground drilled with one hole to every 10 acres.

The sum of the products obtained by multiplying each depth by its corresponding value = 14.046. The sum of the depths is 660 feet. Dividing the first by the second gives 21.28 cents per cubic yard = average value of this ground. The average depth is 33 feet, or 11 yards.

FINAL CALCULATIONS.—At an average of 11 yards deep this ground will contain 53,240 cubic yards to the acre, and allowing 3240 cubic yards for ridges and "corners" left in dredging, we have 50,000 cubic yards per acre, or 10,000,000 cubic yards in the 200-acre tract under consideration. This at 21.28 cents per cubic yard gives a total content of $2,218,000.

Assuming the price is $150,000, cost of a 5-foot bucket dredger $65,000, working capital $10,000, the total cost is $225,000.

A 5-foot bucket dredger is rated at treating 65,000 to 70,000 cubic yards per month, but up to the present time the best these dredgers have been able to do has been about 70% of the possible running time. It may be added that the new dredgers now building hope to better this, and will doubtless bring up the running time to 80%. In fact, a new dredger, the Butte, which has been running but three months, has during that time averaged 75%, and the last month of their run they have averaged 86% of the time. Assuming 70% running time, a 5-foot dredger will work out this ground at the rate of an acre per month, or, in all, about seventeen years for the tract. Assuming a working expense of the dredger as high as $3500 per month, or $42,000 per year, and that 1 cent per cubic yard is left in the tailings, we have:

Total value in ground	$2,218,000
Total value in tailings	100,000
To be recovered	$2,118,000
Total cost of treatment	714,000
Net gain in ground	$1,314,000
Net annual gain for seventeen years	77,300
Net annual gain, 34 3%, or, allowing a sinking fund—seventeen years' life, annual contribution to sinking fund—to be at 3%	10,300
To be applied to dividends	$ 67,000
Gain per cent per year on investment, with sinking fund	30

COST OF DRILLINGS.—The running expenses of a driller per day is:

Labor—One driller		$ 3 50
One fireman		2 50
One teamster and team		3 50
Chinese rockerman		1 50
Total for labor		$11 00
Wood, half cord, at $6		3 00
Repairs, say		5 00
Drill hire		5 00
Total expenses per day		$24 00

Drilling about 10 feet a day gives a cost of $2 40 a foot. Drilling contracts at Oroville are let for $2.50 per foot, and considering delays, breakdowns, repairs, road cutting and moving from hole to hole, this figure is reasonable enough. The number of feet drilled per day varies greatly, and depends on the character of ground and the season. In soft ground 20 feet to 30 feet a day can be drilled, with a corresponding reduction in cost per foot. In winter and spring, when the top soil is wet and soft, the problem of moving the machine from hole to hole, and of bringing wood and water, becomes a serious one. Just to show the extra difficulties, delays and stoppages a driller must contend with, I quote in full the log of Mr. Radford for December, 1902:

1st—Started hole No. 12, but did not do much owing to lack of good driving cap and scarcity of water. Made 14 feet.

2nd—Drilling on hole No. 12 all day. Made 7 feet.

3rd—Started about 7:30 A. M. Broke sand pump about 8:15. Had to take it to town and get it repaired. Finished hole No. 12 at noon. Commenced pulling casing 12:30. Finished and moved to hole No. 18—1320 feet. Set up and started drilling.

4th—Worked all day on hole No. 18. Made 20 feet.

5th—Wet; did not work.

6th—Started work on No. 18 after lunch. Made 7 feet.

7th—Wet; did not work.

8th—Worked on hole No. 18. Made 11 feet. Started pulling up casing.

9th—Finished pulling up casing from hole No. 18; moved to hole No. 20—about 900 feet. Ground very soft; had to raise drilling machine with jackscrews and to keep it up by means of wood placed under the wheels. Made 14 feet in hole No. 20.

10th—Wet; did not work.

11th—Wet; did not work.

12th—Worked on hole No. 20.

13th—Finished hole No. 20—34 feet deep. Pulled up casing and started moving to hole No. 14; ground very soft.

14th—Moved to hole No. 14 and set up machine. Ground very bad in places. Distances from No. 20 to No. 14, 1320 feet.

15th—Working on hole No. 14. Made 17½ feet.

16th—Working on hole No. 14. Reached depth of 28 feet. Broke bolt in driving blocks. Got new one from machine shop in town. Lost two hours.

17th—Finished hole No. 14—29½ feet deep. Pulled up casing and moved machine a short distance towards hole No. 16.

18th—Moved machine about 100 yards. Got into soft mud and stayed there all day.

19th—Raised machine out of the mud. Took off gear ring on account of broken teeth, and took it into town and got it repaired.

20th—Got gear ring about noon, put it back on machine and started; ran short distance towards hole No. 16.

21st—Moving machine to hole No. 16. Road very bad in places.

22nd—Moving to hole No. 16—1320 feet from hole No. 14. Set up machine and started drilling. Struck old drifted ground. Made 21 feet.

23rd—Finished hole No. 16—29 feet deep. Pulled up casing and moved toward hole No. 10.

24th—Finished moving to hole No. 10—1320 feet. Set up machine and drilled 4 feet.

25th—Worked on hole No. 10. Reached depth of 19½ feet.

26th—Wet; did not work.

27th—Ground too soft to haul wood and water.

28th—Working on hole No. 10; reached depth of 31 feet.

29th—Working on hole No. 10; reached depth of 41 feet. Stopped.

30th—Finished pulling casing from hole No. 10 soon after lunch. Started moving to hole No. 8.

31st—Finished moving to hole No. 8—1320 feet. Set up machine and started drilling. Broke walking-beam arm. Had to send to town for a new one. Lost three hours. Made 13 feet.

Although the crew worked a ten-hour shift during this month, only seven holes were finished, giving a total depth of 212.5 feet, or an average of 6.8 feet a day.

I quote this, not as an example of average work, but merely, as I have said, to show the difficulties, particularly in winter.

VALUE OF THESE TESTS.—Three years' drilling, followed by subsequent dredging of the drilled tract, has proven that these tests are but fairly indicative of the values in the tract. For instance, one company, in order to prove the efficiency of these tests, drilled an acre of ground with twenty-three drill holes, which afterwards dredged within 95% of the calculated value. On the other hand, I have heard that a company with a recently finished modern dredger has already dredged about 6 acres, which produced 35% of the drilled values—two holes to the acre. It is unfortunate that more exact data regarding the value of these tests are not at hand. Engineers will recognize the ever-present liability of error and consequent dissatisfaction arising from all work where the value of the large is calculated up from the value of the small. So the chief value of this method of testing ground lies not so much in proving the total possible yield of a piece of ground, or its values in sight, but in indicating the presence and occurrence of the pay channels, depth of bedrock, water level, etc. It is now the custom to keep a driller well in advance of the dredger, the results of the drilled holes serving as a guide for its future movements.

The accompanying engravings show modern type bucket dredgers, in construction and in operation.

Jeffrey Grab Buckets.

Few more interesting and important problems from an economical standpoint have attracted the attention and called forth the best efforts of our brightest engineers than those involved in the unloading and subsequent disposition of ore and coal from vessel to furnace or consumer, with the necessary stocking and reclaiming because of the difficulty in securing cars to handle the enormous cargoes as rapidly as they are taken from the holds. Among the devices more or less successful, the automatic grab bucket or clam shell has proven itself adapted to the work, its manufacturers say, and to such an extent is this recognized that older vessels are being altered and new ones are building, so that these buckets can take out from 95% to 98% of the entire cargo.

The Jeffrey Manufacturing Co. claims to have brought out a bucket which combines with simplicity



Jeffrey Grab Bucket.

and power, great capacity per unit of mass in motion, the weight of the moving mechanism being reduced to the minimum per unit of ore handled—a bucket whose life under the rough usage to which these devices are subjected while strenuous will prove a long and useful one.

These buckets have a remarkable spread, the one having a capacity of three tons of ore being 11 feet over all when open, while the five-ton bucket opens to 15 feet. The closing path is most efficient and in opening the load is cleanly and entirely discharged. An important feature is the small head room required. It permits reaching under the decks and keeps down height of tower. These buckets will handle ore, coal, including run of mine, bituminous sand, limestone, and may be used for dredging and excavating. These are also proving an economical means of handling coal and ashes in power plants, also for transporting coal long distances from and to the stock piles.

The Jeffrey Co., Columbus, Ohio, are prepared to furnish suggestions as to methods, also plans and estimates for installations for unloading and handling material in bulk in any quantity.

Cost of Electric Drilling.

John B. Hobson, M. E., general manager of the Consolidated Cariboo Hydraulic M. Co. at Bullion, B. C., in his annual report gives some interesting figures of costs of operating an installation of Gardner electric drills, says the Canadian Mining Review. The plant, which was an experimental one, included four Gardner No. 15 drills with 2 H. P. 110-volt direct current portable motors, one Gardner "B" drill, with 1½ H. P. 110 volt direct portable motor, all complete, with 7-foot flexible shafts, adjustable tripods, the necessary flexible cables, working tools and five sets of drills of suitable lengths to drill holes, varying from 2 to 8 feet deep. Mr. Hobson states that these drills proved a decided success, for they were run at low expense and proved more efficient than expected:

STEAM POWER.

One cord of cedar wood, delivered	$2 25	
One electric engineer	4 00	
Lubricants for engine and generator	35	
		$6 60

OPERATING THREE DRILLS.

Three power drill men at $4 each	$12 00	
Three helpers at $2 each	6 00	
One blacksmith	4 00	
One helper	2 00	
Three bushels of charcoal at 25 cents	75	
Lubricants	20	
		$24 95
Total cost of running three drills ten hours		$31 55

The duty attained by the Gardner drills used during the season, in advancing and lowering the bedrock cut, averaged 312 feet of holes per ten-hour shift.

The duty attained by two miners drilling by hand, with ⅞-inch steel and eight-pound hammers, averaged about $14\frac{5}{10}$ feet per ten-hour shift, and made

the cost of drilling 312 feet of holes in bedrock by hand as follows:

Forty-two miners at $2 per day	$84 00
One blacksmith at $4 per day	4 00
One helper at $2 per day	2 00
Four bushels of charcoal at 25 cents	1 00
Total cost of drilling 312 feet of holes by hand	$91 00
Saving made in favor of power drills per ten-hour shift	50 45

Mining in Broken Hill, New South Wales.*

Written by EDWIN K. BEAUMONT.

The impressions of a new arrival on coming to the Barrier are anything but pleasant or reassuring, for when, after spending a whole night in rattling over 300 miles of almost desert country, one seeing the line of lode, about 1½ mile in length, with its long chain of chimney stacks, poppet heads, engine houses, concentrating mills, and immense mullock and tailings

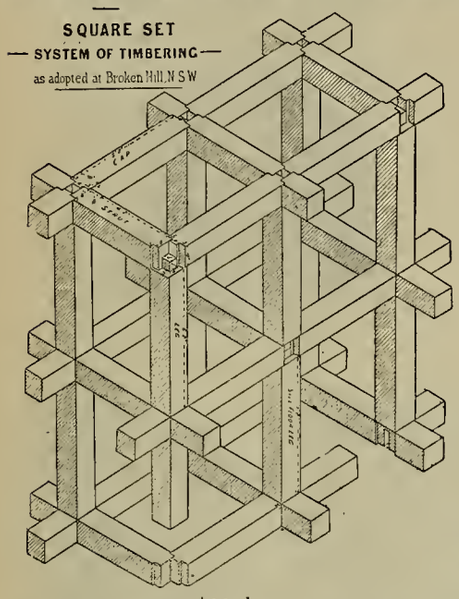


FIG. 1.

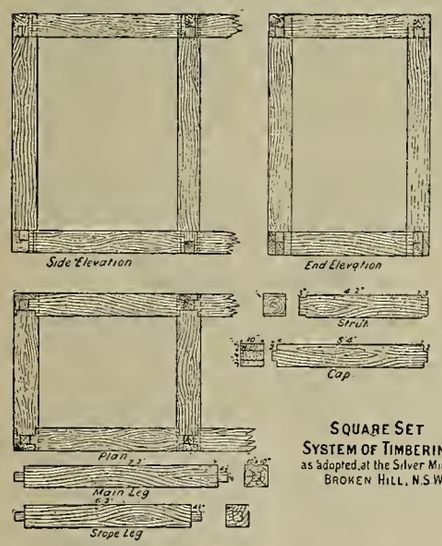


FIG. 2.

dumps, etc., finds it hard to imagine that this is the famed Barrier Range or Broken Hill, unless a mining man who has been on similar fields. The original Broken Hill is now a thing of the past, having been entirely removed by the large open cuts, from which the oxidized ore is being extracted down to about 200 to 250 feet.

EARLY MINING.—The story of the finding of silver by the stockman on Mount Gipps station and of Rasp's shaft (Rasp himself being a station hand at the time), and of the mining of earlier years, are familiar, when only the oxidized ores of the upper levels of the lode were worked down to 300 or 400 feet, and, as on new fields, the methods adopted were crude until, with great advance of output and rush of population, more modern and advanced systems were adopted; and the arrival of American mining managers and engineers with the "square set" system of timbering, as carried out in ore mines of America and elsewhere.

SQUARE SET SYSTEM.—Fig. 1 is an isometric drawing of the square set system showing sizes of timbers and all joints. Fig. 2 shows the construction in detail. All timbers are 10x10 inches, the vertical ones called legs and the horizontal ones caps and struts; they are all cut to the required size in the sawmills. Some of the mines have their own sawmills, and buy their timbers in long lengths from the Port, and cut all timbers to templates. They are sent underground ready for the miners and timbermen to frame up in the stopes. When the ore is hard and compact (and it is hard sometimes, especially in the class of ore containing rhodonite), I have frequently seen five drills blunted to bore a hole less than 1 inch; but when the ore is friable it is then timbered close up to the working face (as shown in Fig. 3) on the upper floors. You will notice that in this system the miners are always working close to the face or hack, which they can easily examine to make sure of its safety. One disadvantage of keeping the timbers so close to the face is that frequently a heavy shot will "throw," and thus knock down several sets and shake others, thereby causing delay and rendering the working face unsafe until the timbers are re-erected. You can readily imagine the difficulty in securing them all as firmly as they were originally. Lagging of 10x2-inch Oregon pine are laid on each floor as the stope rises upwards to the next level, and chutes for conveying the broken ore to the sills and thence to the trucks are provided at convenient intervals, and slides placed to run the ore to the chutes from the working face, as shown on the plan and section showing the stope (Fig. 3). It will also be noticed that the end sets of each floor are wedged firmly to the foot and hanging walls of the ore body, and frequently notches or hitches cut to secure a solid bed. In theory, as a system by itself, these seem admirable, but in practice (without being filled with waste as they now are) they fail, for after the ore has been extracted, any movement or pressure of the walls of the lode causes a collapse of the sets. They have gained the weird name of "creeps," and a more complete state of chaos can hardly be imagined than a creep, that is, broken and splintered timbers, and masses of ore and mullock in one almost unapproachable mass, often rendering the further working of that portion of the lode impossible, and thereby losing large quantities of ore in the debris; but it is a noticeable fact that in those mines where the managers did not rely on the timbers alone, but judiciously filled in the sets with mullock from wall to wall (leaving only the necessary openings for chutes, gangways, etc.), when any movement came in the walls of the lode the timbers and surrounding filling stood the burden, and the mines were singularly free from "creeps." Some idea of the pressure on these timbers may be imagined, when I state that I have seen a piece of 10x10-inch Oregon pine compressed to barely 3 inches; have also seen a 10x10-inch vertical leg driven 4½ inches into the horizontal cap and sill at its ends, without bending the leg, and have frequently noticed, when there has been any lateral pressure, the 10-inch piece of Oregon splintered like a piece of willow on the convex side, and on the concave side, though bent 1 foot, was still unbroken.





FIG. 3.

LIFE OF TIMBERS.—The life of timbers underground depends a great deal on location. In some mines I have noticed Oregon pine that had been in approximately ten years almost sound, while in others the same class of timbers, if put in a badly ventilated stope, in about three or four years had completely decayed by a kind of moldy dry rot. In the upper portions of one mine I noticed a lot of joggled logs of blue gum, from 6 inches to 9 inches diameter (brought from the river in early days), and they were worm-eaten and quite rotten, while the mulga and black oak, both hard native timbers, were quite sound; but as these latter are usually only about 4 inches to 8 inches in diameter they are almost useless for underground timbering, except as laths, or for latticing the sides of square sets and enclosing the mullock fillings, for which they are sometimes used. I omitted to mention when describing the mullock filling of the square sets that 10x2-inch planks are used by some mines, but other mines having their own sawmills, rip the 10x2-inch lath in halves and use the 5x2-inch lath, thus effecting a small saving in the amount of timber used; but I have noticed also that these lighter laths frequently give way when any great pressure from the mullock is thrown on them.

Other great detractions to the square set system are the great cost of timber and the liability to fires.

COST OF TIMBER.—When considering the amount of timber required to timber up a lode the total feet is enormous, and at, approximately, $38 per 1000 feet, the cost greatly reduces the profits. We have in the Central a width of over 270 feet from foot wall to hanging wall at the 600-foot level, the greatest width on the Barrier, taken out in blocks about 50 feet wide right across from one level to another, viz., 100 feet.

FIRES.—There is the liability to fires, of which the fire in Block 11, of about 7 years ago, and the fire in Block 12, of four years, both of which are still burning, are examples. These cause great expense in extinguishing and greatly hamper the working of the upper portions of the lode. So much timber of inflammable nature is a great menace, especially when the stopes are well ventilated by winzes from the upper workings. These winzes serve as vents or chimneys, and spread the gases throughout the mine, and the result is loss of life, as it was on both occasions referred to, when men went below to locate and attempt to overcome the fire.

It will be seen that the deduction to be drawn is that this system is an admirable one when combined with filling; but it is also an expensive one.

LATER SYSTEMS. — Owing to the sulphide ore requiring more costly and tedious treatment and preparation before smelting than oxidized ores, and the many and varied expenses incidental to the mining, due to the hardness and the work of extraction and handling, it was necessary that managers and others interested should devise some safer and cheaper methods, which would also be more suitable to the class of ore to be mined and treated, and thus, born of actual experiment and necessity, these later methods have gradually evolved into their present forms; and their almost universal adoption on several mines on the line of lode—with sundry modification to suit individual cases—proves their efficiency. The square-set system is far from annihilated, as it is still used where applicable, especially on the sill floors where gangways are required, also chutes, outlets, etc. Here the sets are on solid bottoms; being well wedged against the hanging and foot walls or the sides of the stopes, they are firm and permanent, and with the 10x3-inch planking to carry the mullock filling they form convenient passages about the workings. So it is still used in conjunction with these later systems, as a valuable and necessary adjunct.

(TO BE CONTINUED.)

RECENTLY a French patent was issued to A. Tar and, S. Mathiea and H. Lasne for a process of utilizing burnt pyrites, in order to recover from them the cobalt and other metals which they contain. A solution is formed in the usual way, and the copper is precipitated by means of metallic iron. The iron sul-

*Trans. Aus. Inst. Min. Eng. (condensed).

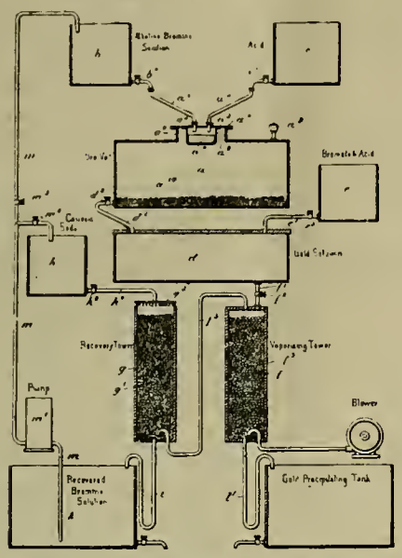
phate thus formed is then crystallized out and the liquor is evaporated to dryness. The residue thus obtained is calcined at a dull red heat. It is then digested with acidulated water, whereby cobalt, nickel, zinc and manganese pass into solution, together with some iron, while the residue enacted upon furnishes a salable paint. The iron is then precipitated by powdered chalk and a current of air. After that the cobalt and nickel are removed by chloride of lime, or any other oxidizing agent, and carbonate of lime, and the zinc by lime, while the manganese remains in solution.

Mining and Metallurgical Patents.

PATENTS ISSUED JULY 7, 1903.

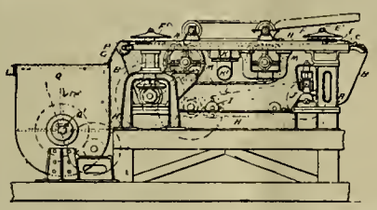
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

PROCESS OF EXTRACTING GOLD FROM ORES.—No. 732,708; H. R. Cassel, New York, N. Y.



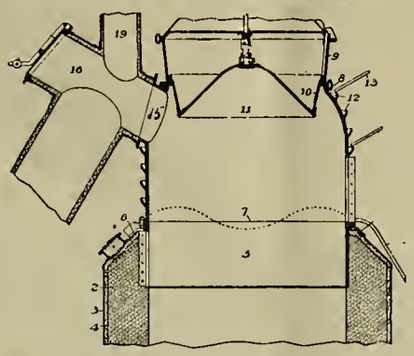
Process extracting gold from ore treating ore with bromine solution form dissolved gold and bromides, mixing bromate with acid, and causing mixture to act upon dissolved gold and bromides to set free bromine of bromides and bromate.

APPARATUS FOR SEPARATING LIQUIDS FROM SOLIDS.—No. 732,720; H. Duncan and R. R. Sherriff, Glasgow, Scotland.



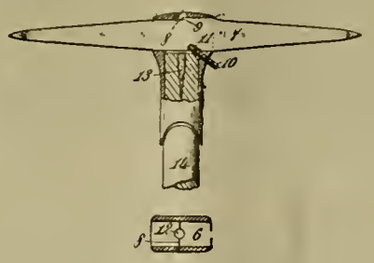
Machine for separating liquids from solids comprising framing and gear carrying and traversing endless band filter cloth, automatic clip devices securing band, vacuum box on under surface of band and interposed endless band wire cloth or gauze arranged support and travel with filter band.

BLAST FURNACE TOP.—No. 733,196; G. K. Hamfeldt, Munhall, and T. A. Tesch, Swissvale, Pa.



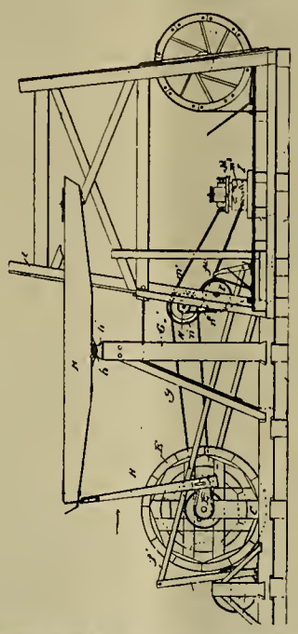
Blast furnace having annular metal shell projecting above masonry and having contracted upper portion, hopper supported on contracted portion, and outer annular cooling device for shell.

MINER'S PICK.—No. 733,449; A. Walker, Whatcheer, Iowa



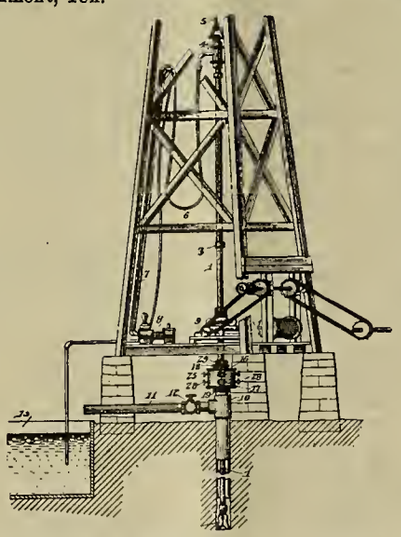
Socket having eye combined with blade removably extending through eye, provided with single shoulder centrally of its length, eye having interiorly coacting and single shoulder located centrally thereof, and means for holding shoulder of blade against that of eye.

COMBINED CABLE AND ROTARY RIG FOR DRILLING DEEP WELLS.—No. 732,785; L. C. Sands, Jr., Pittsburg, Pa.



In combined cable and rotary rig for sinking wells, combination with derrick of hoisting drum, rotary table movable to and from well opening of derrick, and driving mechanism adapted to actuate rotary table, or hoisting drum.

OIL WELL DRILL.—No. 732,925; H. R. Decker, Beaumont, Tex.

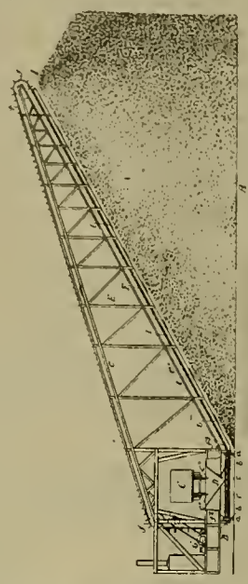


In apparatus of class described, combination with rotary drill pipe, and well casing receiving drill pipe and closed at top provided with lateral outlet, of locking device comprising stop connected with well casing, and means carried by drill pipe for engaging stop, whereby drill pipe be prevented from being blown out of well casing.

PROCESS OF LEACHING ORES.—No. 732,605; G. E. Thede, Havilah, Cal.

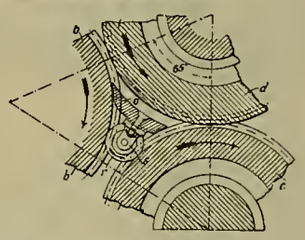
Process leaching ores which consists mixing with ore metallic oxide, treating mixture in cyanide solution containing oxide capable of reducing metallic oxide.

STORAGE APPARATUS.—No. 733,355; J. M. Dodge, Philadelphia, Pa.



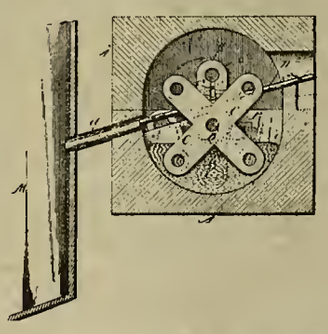
In apparatus for piling material, movable frame, hopper carried by frame, guides on frame for means of feeding hopper, and conveyor on apparatus arranged to receive material from hopper.

THREE ROLL CRUSHING MILL.—No. 733,125; J. J. E. Bekker, Amsterdam, Netherlands.



In crushing mill, frame, plurality pressing rollers mounted to revolve in frame, interengaging grooves in rollers, returner bar in proximity to one of rollers, returner bar being provided with teeth that register with grooves of roller, and wheels on returner bar that turn in grooves of roller and in grooves of next succeeding roller.

QUICKSILVER FEED FOR AMALGAMATORS.—No. 733,301; J. W. Swearingen, Gaston, Cal.



Automatic feed for quicksilver, comprising case forming reservoir, shaft bearing rotating arms having buckets in ends, and inclined trough having spout at one end, handle at other and blade or lip adapted to be juxtaposed to arms.

THE Canadian government has decided to give a bounty of $2.70 on steel from July, 1903, to June, 1904, $2.25 to June, 1905, $1.65 to June, 1906, and $1.05 to June, 1907. Also a bounty of $6 a ton on wire rods sold to manufacturers of wire. On large steel plates now admitted at a low duty there will be a bounty of $2.70 a ton on such made in Canada. The same bounty is proposed for structural steel. On steel ingots, puddled bars and pig iron it is proposed to give the same bounty as last year, the gradual reduction which began last year being suspended for this year. Under the gradual reduction the bounty will be off in 1907. Last year the Dominion Iron & Steel Co. earned $350,000 on the bounties in force, and it is estimated with the additional bounty the company will show earnings considerably in excess of $1,000,000 on its finished product, pig iron and steel.

Mining Summary.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

(Special Correspondence)—The influx of people, machinery, capital, etc., is beyond all expectations, and a prosperous season is assured. So far, nearly 5000 people arrived on the first fleet of boats, and all accommodations for passage were taken up. Also, about 60,000 tons of freight have reached the camp, including an outfit for a railroad from Solomon to Council, a distance of 50 miles.

On many creeks work has started, the snow having disappeared in this one hot wave we are experiencing at present. For the last ten days we have had 90° every day—weather as hot as in the year 1900.

From all indications, we should be able to produce at least $10,000,000 of gold this season, and then only a small portion of the section will be worked. The output last winter is estimated at $1,250,000, the Snowflake mine alone, on Dexter, producing $250,000.

Nome, June 24.

A strike is reported made 20 miles from Sunrise in the Cook Inlet country on Juneau creek, tributary of Six Mile creek, by L. Laurison, J. Renner and R. Michaelson, and the pay goes from 25 cents to $2 to the pan on bedrock.

ARIZONA.

COCHISE COUNTY.

The Swisshelms group of forty-four claims, in the Swisshelm mountains, has been sold to J. L. Wood and S. S. Wood of Pittsburg, Pa. A steam hoist will be put in. Assays show the ore to run well in copper.

The new pumps in the Lowell shaft of the Copper Queen mine at Bisbee are controlling the water. The shaft is being straightened preparatory to resuming sinking. It is proposed to put in two additional boilers, which will give them power for heavier hoisting work.

GILA COUNTY.

J. B. Newman has bought for $5000 a one-third interest in eight patented mining claims and a 10-stamp mill, north of Payson, in Green Valley mining district, says the Globe Silver Belt. The claims do not adjoin and they include the Oxhow, Golden Wreath, Delaware, Summit and American.

MOHAVE COUNTY.

(Special Correspondence).—The Enterprise mine in Wallapai mountains, 15 miles east of Kingman, operated by the Enterprise M. Co., W. A. Mensch superintendent, at Kingman, is sinking a shaft which is down over 300 feet on a vein of lead ore carrying thirty-seven ounces silver and values in gold. The ore is worth about $60 per ton. At the 300 level the crosscut has tapped a parallel ledge of milling ore.

J. P. Wallace, manager of the Monmouth M. & D. Co. on Burro creek, has completed 7 miles of wagon road to Peach Springs and the milling plant is being built. The gold is in a vein of soft, red oxides.

The Arnold mine at Cedar has been cleaned out and work resumed, keeping the 20-ton mill in operation.

The Penn Yan mine at Layne Springs, owned by G. W. Bowers of Kingman, is producing good gold rock. The vein and gangue matter are 2 feet wide, all being saved for shipment.

Ore shipments from Stockton hill are better than for some years past, the Earl and Treasure Hill mines shipping the largest quantities.

The Portales de Oro M. Co. are having their claims at Union Pass surveyed for patent. The ores are low grade and the company will build a concentrating mill.

Several new bodies of gold ore have recently been opened up in Cerbat district, near Stockton hill, one of them by J. Dixon, the vein averaging 10 inches of eight-ounce gold ore.

Chloride, July 13.

W. J. Tarr of Los Angeles, Cal., president of the Southwest Turquoise Co., says final payments have been made on the Mineral Park group and operations will begin this month. C. E. Sherman of Mineral Park is vice-president and superintendent. Their lapidary shop is at Los Angeles, Cal.

J. P. Wallace, general manager of the Monmouth D. Co., operating near the Burro mines, near Kingman, says arrangements will be made for the installation of a reduction plant on Burro creek. The ores are free milling.

The 40-stamp mill of the Mohawk G. M. Co., 7 miles northeast of Needles, Cal., on the other side of the Colorado river, is ready for operations. It will crush ores from the Leland-Mitchell group. The stamps will not begin dropping until the Mohave & Milltown Railway is completed, which is 17 miles in length and reaches from the company's mines to the bank of the Colorado river, opposite Needles, passing the mill midway, says the Eye. A cable ferry will be built across the river.

L. Hoffman, president and manager of the Chloride G. M. Co., operating the Samoa and 4th of March mines at Chloride, is preparing to make ore shipments by pack train, and will send out a carload per month.

SANTA CRUZ COUNTY.

The 50-ton concentrating plant of the Arizona G. & C. M. Co. is in operation. The company's mines are in Salero district of the Santa Rita mountains, but its office and smelter are at Patagonia. The ores to be treated carry copper, silver and lead values.

YAVAPAI COUNTY.

The Lucky Verde M. Co. have started work on their mine near Jerome.——Work on the Apex group, near Jerome, has been temporarily suspended pending settlement of the estate of the late J. G. McBride, who was interested in the company.

J. B. Tomlinson, superintendent of the Yeager Canyon C. Co., near Jerome, says he has machinery on the ground, including two 80 H. P. boilers and a ten-drill air compressor, which he expects to have in operation by August 1. The building for the mill is going up.

J. H. Wood of Prescott, manager of the Wood Mines Co., reports work going ahead at the Roosevelt group, owned by his company. The shaft has been enlarged and retimbered, a hoist put up and preparations made for extracting ore. At depth of 60 feet they have 20 inches of free-milling ore averaging $34 per ton. He is arranging to build a 5-stamp mill.

YUMA COUNTY.

Machinery is being put in at the Las Trigos placer fields, 10 miles northeast of Ehrenberg, by a company of New York and Chicago men, who intend to work the gold-bearing gravel by the dry process. J. E. Smith is manager.

Bullard's Cunningham Pass group in Cunningham Pass, near Yuma, has been bonded to W. H. Bates. The property consists of five claims, and two shafts have been sunk below water level at 200 feet down. Ore shipments of the first-class ore to the smelter gave 16% copper and one ounce of gold.

The G. H. Ward group, at Harrisburg, covering a peak and ridge adjoining the Socorro, has been bonded to G. W. Middleton of Prescott and work started this week.

CALIFORNIA.

AMADOR COUNTY.

W. E. Stewart says work has been started on the Butte basin gravel claim, near Jackson. It is intended to sink the shaft 40 feet deeper and prospect the gravel at that depth.

At the Sand Pile mine, near Forest Home, D. Fricot is putting up a cyanide plant to treat the accumulations of tailings from the Plymouth Con. mills. It is said assays show $2 per ton in gold.

Ore shipments are being made from the Grand Prize mine, in Pioneer district, adjoining the Horn mine, owned by G. S. Andrews.

The framework of the hoist at the Fremont Con. shaft, near Amador City, is in position and work on the mill progressing. It is expected the mill will be ready to run by September 1.

At the Kennedy mine at Jackson the cleanup for June is reported at $40,000, the product of seventy stamps.

CALAVERAS COUNTY.

At the Rooney mine, in Chili gulch, near Mokelumne Hill, they are timbering the main gangways, north and south, and finishing up the north and south stations. Grading for the 3-stamp mill is in progress. This mill will be run by electricity. The pump and mill machinery are on the ground.

Superintendent J. A. Sommers of the Woodhouse mine at West Point has closed the property down pending the putting in of heavier machinery to handle the water which is coming in.

EL DORADO COUNTY.

A tunnel is being run at the Vandalia mine, near Shingle Springs, under the old workings.

The water in the Mt. Pleasant mine at Grizzly Flat has been lowered below the 500-foot level, and they have started to run a drift south from this level.

The unwatering of the Havilah mine at Nashville is completed and operations resumed.

KERN COUNTY.

The Kern Trading & Oil Co. has been organized in New York, with J. Kruttschnitt of San Francisco, Cal., J. Wallace, W. A. Worthington, J. L. Willcutt and J. E. Foulds as directors. They have taken over the holdings of the San Joaquin Oil Co. and the Reed Crude Oil Co., both of which were controlled by the Associated Oil Co. The Associated is one of the most important independent oil companies in California. Besides the San Joaquin and Reed, the constituent companies of the Associated include the Canfield Oil Co., Green & Whittier, Wolverine Oil Co. and other smaller concerns. They own 60% of the Kern river district, near Bakersfield, and 90% of the McKittrick district—in all 200 wells. It controls 5490 acres and has a daily output of 12,500 barrels.

It is stated the stream of oil through the Standard Oil Co.'s Bakersfield-Richmond pipe line will reach Point Richmond next week and the officers of the company claim the capacity of the line will be 10,000 barrels a day. The reports of the line being a failure are denied, and it is thought it will hardly be necessary to construct more than four additional pumping stations.

MARIPOSA COUNTY.

The Exchequer M. Co. is opening up the O'Brien claims on the Merced river, near Mariposa, and has fifteen men on three shifts. A shaft is being sunk to connect with the tunnel, which is also being driven.

NEVADA COUNTY.

(Special Correspondence)—The Blue Tent G. M. Co., operating a group of gravel properties north of Nevada City, is making preparations to put up a 20-stamp gravel mill. Construction work will begin this month. C. L. Canfield is president.

On Shady creek, a 1200-foot bedrock flume has been started by the Shady Creek M. Co. They are putting in a hydraulic elevator and a mile of pipe. Full operations are expected to be under way August 1.

Nevada City, July 14.

The Centennial mine, 3½ miles from Grass Valley, will be reopened this week, says G. W. Root, manager of the Grass Valley Con. M. Co., which owns it.

The Zeihright M. Co., F. Zeitler of Nevada City, president and superintendent, has begun operations at the Zeibright mine, south of Grass Valley.

L. H. Mitchell has bonded the Wright & Bailey group, adjoining the Boss mine, 2 miles from North San Juan, and has men at work on development.

The Kentucky Ridge mine, near Grass Valley, has been sold to an Eastern company, of which A. Helsey is local manager. There are two tunnels driven, each showing a vein which contains milling ore. The lower tunnel is in 400 feet and the upper tunnel 200 feet.

PLACER COUNTY.

At the Nissen mine, being operated by A. Russell of San Francisco, men are at work making cuts and building flumes. A hydraulic plant will be put in. Russell proposes to buy the Rising Sun mine, a free milling proposition, near Colfax, says the Herald.

Near Ophir the Boulder mine is being unwatered, says Manager Ayers of San Francisco.

The International M. & S. Co. of New York has begun operations at the Southern Cross mine at Humbug canyon, near Towle. They will build a 20-stamp mill, says E. J. Trimble, superintendent.

SAN DIEGO COUNTY.

Work is progressing at the Stonewall mine, near Cuyamaca, says the Julian Miner. Their sawmill is turning out 1000 feet of lumber a day, which is being used at the mine and in improving and enlarging buildings. Manager Lucas has twenty men at work. The mine will be unwatered.

At the Owens mine, near Julian, the work of pumping out the water is progressing. It is the intention of the Phelps-Dodge Co. to sink 50 feet from the lowest level and drift 50 feet after unwatering.

SISKIYOU COUNTY.

At J. Quigley's quartz mine at French Gulch, on Indian creek, rock averaging $5 per ton is being opened up and he proposes to build a mill. The Tyrer & Co. mine at Klamath river, below Klamathon, reports work progressing and the 10-stamp mill running steadily.

TUOLUMNE COUNTY.

It is reported a partial reorganization of the Golden Gate M. & S. Co., near Sonora, will be made. It is planned to increase the capacity of the mill as to batteries, crushers and concentrators; sink the shaft 500 feet deeper, says the Banner.

J. Vincent of San Francisco has bought the Realization quartz mine, east of the Tuolumne river, near Groveland.——B. Jennings of San Jose has an option on 120 acres of gravel land on Table Mountain, near Sonora, for $5000.——J. E. Williams of Stockton has bought a half interest in the Fraction quartz mine, on Knight's creek, adjoining the Sunset mine, and B. M. Hohenshell of Stockton has bought a fourth interest in same.——P. Rowe has bought a third interest in the Bell quartz mine, near Tuttletown.

At the John Royal mine, near Columbia, stoping is going on in the east drifts at the 100-foot and 200-foot levels; five stamps are dropping in the mill and shipments of concentrates are being made, says Superintendent W. A. Holmes.

At Soulsbyville, at the Soulshy mine, operations have been resumed by W. Sharwood, part owner.

Work has been resumed at the Mack mine, near Groveland.

Superintendent Stayton of the Willieta mine, near Sonora, says a tunnel has been run in on the vein and the depth gives them about 150 feet of backs on both shoots. It is proposed to put in electric power and a concentrating plant

COLORADO.

BOULDER COUNTY.

A 2-foot vein of shipping ore has been opened up in the Copper Glance mine, near Ward, one of the mines of Sunset district, says Superintendent W. J. Barrett. Shipments are being made to the smelter.

The Blue Grass M. Co., operating at Phœnix, is taking out high-grade ore and have started building a mill to handle their own ores.

The Boulder & Denver Water Power Co. has been organized, having bought the Barker property near Nederland, and will build an electric power plant and mill for treating low-grade ores. The directors are W. S. Boynton, F. R. Jeffery, R. W. Norrington, A. Remley and A. C. Patton. W. S. Boynton of Colorado Springs is president. The company proposes not only to deliver power for a mill it intends to erect on Four-mile, but for sale of it for mining, smelting, manufacturing and other purposes.

W. Capp of Denver, manager of the Eagle Rock M. Co., operating on Boulder creek, 9 miles west of Boulder, says near the Cochrane mill he is driving a crosscut tunnel in Sugar Loaf mountain. The Milan mine is on the course of the tunnel. The first of the company veins to be cut is the Independence, then the Post Boy. The tunnel is in 800 feet and they have 50 feet to drive to cut the Independence, which has a shaft 214 feet deep, and showing $20 ore.

CLEAR CREEK COUNTY.

T. M. Fisher of Colorado Springs reports making final payment on the New Year mine, 1 mile from Idaho Springs, on the Virginia canyon road. It has been developed by a shaft 120 feet in depth and the drifts extended. Some lead ore has been opened up.

The Gold Medal group, near Idaho Springs, resumed operations last week with S. B. Swink as superintendent.

J. A. Wright of Denver, manager of the Lucania tunnel, near Idaho Springs, says their operating plant was started up this week. They have put in a 14x16 compressor to operate five drills. Their boiler capacity is 100 H. P.

Work on the Vidler tunnel of the Transcontinental Co., near Georgetown, is going ahead. The grading for the compressor plant was started last week and the road started to connect with the county road. The road to the sawmill site is finished and the machinery is being taken in.

W. S. Liehrick, manager of the Little Mattie M. & M. Co. of Colorado Springs, operating near Idaho Springs, says developments are progressing in the fourth and fifth levels. In the former workings Lessee Parker is developing a shoot yielding high-grade ore for a distance of 250 feet, and he has 100 feet in depth on it, being between the 300 and 400-foot levels. The company is driving the fifth level. It is proposed to put in a 50-ton cyaniding plant, which will be increased to 100 tons later. The mill is running full time. The jig concentrates are running $118 a ton and $55 a ton from the tables. It is reported the Little Mattie will construct an aerial tramway from the mine to their mill, which is on Chicago creek. This would save a haul of 1 mile.

CUSTER COUNTY.

It is reported that a company is being organized at Pueblo to develop the Clara claim at Rosita. This claim is near the Humboldt mine. The shaft of the Clara mine is down 40 feet and ore samples show silver, lead and gold values. Machinery is on the ground and the shaft will be continued down 100 feet more and stopes carried toward the Humboldt vein.

DENVER COUNTY.

(Special Correspondence).—It was the intention of the union to place pickets at each of the plants of the American S. &

R. Co. and to boycott the smelter should the company attempt to open up with non-union men. The trust has secured an injunction against the Federation from boycotting, picketing or interfering in any way with the smelters or its employes. The Globe plant is resuming under police protection. The Grant plant will remain closed indefinitely. No serious trouble is anticipated. At the Standard mill at Colorado City the men have gone out, but it is thought the trouble will not extend as far as at first supposed.

Denver, July 13.

DOLORES COUNTY.

The concentrating plant at the Group tunnel, near Rico, is expected to be in operation before Aug. 1, says Superintendent C. D. Hooper.

GILPIN COUNTY.

J. R. Anderson of Pittsburg, Pa., president of the Pittsburg Con. M., M. & T. Co., says they have bought the Gold Dirt mines at Perigo. He states there are 3000 feet of the west end of the property that is practically undeveloped. A new cage shaft will be sunk on the vein, and as the lode is nearly vertical it will be started 200 feet above Gamble gulch. A concentrating and stamp mill of 100 tons daily capacity will be built between the shaft and the gulch. A good wagon road connects the mines and mill with Rollinsville, 1½ mile. The Pittsburg Co. also owns the Dover and Brighton mines in Idaho Springs and Freeland districts, in Clear Creek county, says the Post. W. H. Knowles of Denver is manager.

GUNNISON COUNTY.

The Moro mill of twenty tons capacity is being remodeled hy J. M. Gardner of Pittsburg. Pa. The mill is near the mouth of Jones gulch, 4 miles above Ohio City. It is intended to increase the capacity, says the Times.

On Cinnamon and Baldy mountains on Crystal river, near Elko, H. C. Clark of Leadville, manager of the Gregor G. M., L. & M. Co., says they are doing development work. Another tunnel has been started 200 feet below the previous workings. Their ore carries gold, silver, copper, lead and zinc.

D. C. Tohin & Co. are operating the Erie & Eureka-Nest Egg group, near White Pine, under lease. These lie under the David H. and join the Akron holding. The Akron Co. have started work of remodeling the concentrating mill for treating concentrating ores from neighboring mines, as well as their own. Another property in operation is the Alwilda group of ten claims on Granite mountain, and owned by Fuller & Riley, who are working them. A tunnel has been driven 850 feet, with 200 feet of drifting, showing 1½ foot of concentrating ore between walls of granite that runs 12% lead, 12 ounces silver and $2 in gold per ton, says the Times.

The East Rock M. & M. Co. resumed operations last week on the Hercules and Ajax mines, near Elko, says Manager S. E. Day. The principal work to be done at present will be development. A vein has been opened, 3 feet wide, running $2 in gold, 20 ounces silver and 4% copper.

LAKE COUNTY.

The Republic S. & R. Co. will build a duplicate of the Salida plant in Leadville, work to begin this month, says Manager Goodwin. For the present two lead furnaces will be installed, with a capacity of 200 tons each, and a matting furnace later, but it is expected to add two more. The completed plant will have a capacity of 1000 tons a day.

LA PLATA COUNTY.

The Neglected mine, near La Plata, is shipping high-grade ore to the Durango smelter and will ship concentrates also from the mill. Seventy-five men are employed.

MINERAL COUNTY.

(Special Correspondence). — Mining around Creede is improving. On the list of shippers are the Big Kanawha, Delmonte, New York and Chance, Commodore and Bachelor mines. The Bachelor is being operated hy lessees. The camp is shipping 6000 tons per month. The Corsair and Alpha each ship 15 tons daily. The East Willow M. Co. is operating the Solomon, Ethel and Moses. They have a concentrating mill which handles 60 tons daily. They are putting in more tables and jigs.——The Humphrey mill is handling 5000 tons of ore per month from the United Mines and making 45 tons of concentrates per day. The mill has been operated by water power, but they are adding a steam plant to furnish power for winter operating. They have plenty of water this summer. L. H. Norton is superintendent and J. D. Hawkins manager.

Creede, July 13.

RIO GRANDE COUNTY.

(Special Correspondence)—The Kansas City Tunnel Site M. Co., 6 miles east of Jasper, have their tunnel in 800 feet. They intend building a reduction plant. L. K. Kramer, Monte Vista, is manager. The ore carries gold, silver, lead, copper and zinc.

Jasper, July 12.

SAN JUAN COUNTY.

A 14-inch pipe line is being built to supply water power for the Highland Mary mine and mill near Silverton. The line will be ½ mile in length with a 950-foot fall.

G. Howard is reopening the Creole Belle mine, near the Sunnyside mine, near Silverton.

M. Heiser of Eureka has resumed work on the Montezuma (Tucson) mine in South Eureka gulch, near Eureka.

The Dewoy claim in Horseshoe basin, on the edge of Burrows Park, near Silverton, has eleven men at work. Shipments will be started next week.

The tramway line extending from the American tunnel to the Gold King mill at Gladstone is being overhauled to the extent of placing a new stationary cable of 1½-inch size and the attachment of additional buckets to increase the transportation of ores to 200 tons daily capacity, says the Silverton Standard.

SUMMIT COUNTY.

The French Gulch Placer Co., near Breckenridge, is using five giants. In order to double the output of gold, a dredge will be built, which they expect to have floated before the present season is over, says the Journal.

At Argentine, the Rothschild Co. has driven its tunnel into Cooper mountain a distance of 2400 feet. Heavier machinery will be put in, including an air compressor capable of driving eight drills.

The Uthoff mine, at Kokomo, is being worked again, says Manager Uthoff, the owner.

TELLER COUNTY.

Operations are resumed on the Mayhelle group, on Lawrence town site, below Victor, and it is intended to continue sinking to 500 feet. An air compressor, electrically driven, will be used to furnish the power.

According to estimates made by the surveyors, the Cripple Creek drainage tunnel will be completed by August 15, says S. Aldrich, chairman of the Cripple Creek drainage committee. The tunnel was driven 665 feet in June, being at the rate of 22½ feet a day; only four headings were worked, as a good flow of water is being developed in the fifth, northeast of the shaft. There remained 1032 feet to he run July 1. It is now seen the tunnel will unwater the Cripple Creek basin, as the northeast breast is getting a flow of 300 gallons a minute; so that further work in that heading is unsafe until the tunnel is opened to that portal.

President K. Macdermid of the C. K. & N. Co. says that as soon as the Cripple Creek drainage tunnel is completed to the El Paso shaft and unwaters that area, Lessee Granfield & Co. will run a crosscut from the shaft at 550 feet to connect with the El Paso workings. This crosscut will constitute a lateral of the drainage tunnel and will serve as an outlet from the C. K. & N. mine, as Granfield proposes to put a pump in the bottom of his shaft and lift the water to the crosscut, whence it will flow out of the tunnel. This will be but a short lift for the water.

The Isabella directors at Colorado Springs have given a three years' lease to T. Murphy and C. C. Hamlin for the entire holdings of 100 acres near Cripple Creek.

The Ajax G. M. Co, operating on Battle mountain, near Cripple Creek, are preparing to set up a heavier pump on the 1100-foot level.

The Kimball Investment Co. of Denver has bought of the Legal M. & M. Co. the Saturday lode claim on Rosebud hill and the Colnage lode claim on Tenderfoot hill, Cripple Creek.

The payrolls of Cripple Creek district for month of June were distributed last week to a total of 6286 men, and aggregated $654,778. The leasing of the Stratton estate mines and the completion of the drainage tunnel will cause still further increases in the number of men needed in and about the mines.

The mines on Bull hill, Cripple Creek, owned by the Empire State Con. G. M. Co., have been taken over by W. H. Spurgeon, H. C. Cassidy, et al. Included in the claims held by the Empire State Co. were those formerly owned by the Arrow G. M. Co. and Orphan G. M. Co.

The Merrimac Leasing Co, operating the Merrimac mine, near Cripple Creek, are putting in a steam plant of machinery. They will sink the shaft another 100 feet.

The El Paso Co. at Cripple Creek has granted a lease on the dump of the old shaft to D. Bernard, who has put in a steam washer and has started work washing the rock. The washing machine will treat 100 tons of rock per day.

The executors of the Stratton estate have granted several additional leases on their ground at Cripple Creek including: J. A. Himebaugh of Colorado Springs on the Geneva; A. J. Francis of Cripple Creek on the Monitor; G. Johnson and J. Lund on the Geneva; C. Lund and A. Nelson on the Nada. The property on which Himebaugh has a lease has a shaft 600 feet in depth.

A three-drill compressor has been set up on the Climax No. 1 and a crosscut from the tunnel of the Climax No. 2 will be driven by H. P. Wilkins et al. of Boston, Mass., who have a lease on the ground from the Little Puck Co., which is on Squaw mountain, near Cripple Creek. The crosscut is expected to cut the Ocean Wave vein.

Manager T. Cornish of Stratton's Independence at Cripple Creek says a cyanide plant is being built.

The Independence Con. Co. at Cripple Creek resumed work last week on company account above the first level (300 feet in depth). The company will work in the two veins that were opened up in crosscutting. One vein contains smelting grade, while the other is of milling ore Pumps will be put in on the 1250-foot level and the shaft will be sunk an additional 100 feet. Additional boiler capacity is to be installed. This work will be independent of the work being done by the Cripple Creek M. Co., which has a lease from the first level down to depth of 1250 feet. W. P. Dunham is manager.

Oastler, Tomlinson & Pender Bros. have built a cyanide plant to work the Ingham dump, owned by the Doctor-Jack Pot Co. at Cripple Creek. It is estimated in the dump there are 5000 tons, assaying $4 in gold. A crusher, a pair of rolls and four tanks are in place. The cyanide plant at the Van Fleet sampler, near Goldfields, is reported doing satisfactory work. All the ore for this mill comes from the Ironclad claim that is under lease to Rice & Temple.

The Gold King claim, near Cripple Creek, of the Savage G. & C. M. Co. of Colorado Springs has been leased to H. S. Rankin for two years at graded royalties. He will develop through the Good Will tunnel, which cuts the property between 500 and 600 feet.

IDAHO.

BLAINE COUNTY.

The Rosetta District D. Co. has been incorporated at Hailey hy C. C. Ruthrauff, C. Hernsheim and J. H. Miller of New York to operate in Rosetta district on the Little Smoky river, 35 miles from Hailey.

The Rosetta M. Co. has been incorporated hy C. C. Ruthrauff and B. F. Jackson of New York City, G. D. B. Hasbrouck of Kingston, N. Y., and L. Thompson of Westfield, N. J., to operate in the same district.

The Little Smoky M. Co. has also been organized hy the same parties.

BOISE COUNTY.

R. L. Hordern, working a group of claims at the head of Little Bull Dog creek, 2 miles west of Pen Basin road and 16 miles from Alpha, reports opening up free gold ore assaying $20. The ledges are 3 feet wide between a granite and a porphyry contact.

CUSTER COUNTY.

Manager Czizek of the Lost Packer mine in Loon Creek district, near Custer, says it is proposed to build a mill this summer. Work will begin this month.

IDAHO COUNTY.

R. S. Law reports making second payment on the Kimberly and Jewell groups of claims in Marshall Lake district, which is under bond to Law, Hill & Co. of New York City for $65,000. A Chilian mill of 40-ton capacity will be put up this summer and will be run by water power. There is a 160-foot tunnel in on the Jewell and an exploration shaft and some tunneling on the Kimberly. They propose to build a wagon road from Goff, a station on the stage road, to Lewiston, 40 miles from the Meadows.

F. S. Myers, part owner of the Silver King mine at Warren, has sixteen miners at work at the Silver King and the Keystone mines, having resumed last week. An engine and hoist have been placed on the Keystone. The ore will be taken to the Silver King mill. It is the intention of the Silver King M. Co. to increase development work.

OWYHEE COUNTY.

Additional equipments are being put in hy the McKinnon G. M. Co., near Silver City, and Superintendent McKinnon has started the crosscut tunnel to open their group of claims.

A motor and blower were put in at the Addie mine tunnel, near Silver City, last week. Stoping has begun.

SHOSHONE COUNTY.

The St. Louis & Idaho M. & M. Co. has been incorporated to develop three claims on Canyon creek, between the Hercules and the Tiger-Poorman mines, near Burke. Galena, carrying 25% lead and some silver, is shown in the croppings. A 300-foot tunnel is being run. R. F. Collins of Wallace, D. D. Barbee of St. Louis, Mo, G. D. Collins of Jerico, Mo, and I. S. Collins of Lewiston are incorporators.

The Tiger-Poorman mine resumed operations last week after being closed down since May 19, when the hoist and crusher buildings were destroyed by fire. These have been rebuilt.

The Springfield M. Co., operating near Mullan, is shipping ore to the smelter, which assays 16% copper and $5 in gold.

KANSAS.

CHAUTAUQUA COUNTY.

R. R. Pitkin, A. E. Stilwell, J. C. Richardson and T. Morgan of Joplin, Mo., are prospecting a number of gas and oil leases near Niotaze on which they have two drill rigs in operation. They report having a large flow of gas in one drill hole, which is down 900 feet. The other drill hole is down 400 feet.

MONTGOMERY COUNTY.

J. M. Parker of Independence reports the Bank's well completed and flowing. The opening of this well shows the presence of oil under the Walker mound where the well is located. One-half mile east of this well is the Fellows' well, which produces twenty barrels daily.

MICHIGAN.

HOUGHTON COUNTY.

The Lake Superior concentrating works on the Franklin sands, near Hancock, resumed operations last week, after a long shutdown because of the explosion which wrecked the cylinder of the engine.

At the Rhode Island mine, near Calumet, they are sinking winzes below the eighth level at a depth of 1000 feet. On that level the crosscut is being driven west and has opened up a good lode. The winze is sinking from a point on this drift 25 feet south of the crosscut.

The St. Mary's Mineral Land Co., near Winona, is diamond drilling for the lode operated at the Winona mine.

KEWEENAW COUNTY.

Near Allouez the company has men at work on the Miswabik property test pitting east and west from a common starting point. Test pits 4x5 are being sunk 8 feet. The overburden is light. The Kearsarge lode has not yet been struck.

ONTONAGON COUNTY.

The mill of the Mass Con. C. Co. of Mass City in June stamped 8469 tons of rock, producing eighty-eight tons of mineral. The remainder of the month's product of 172 tons was eighty-four tons of mass copper. The management has adopted the filling system in use at the Baltic mine and hoisting of waste rock will in future be avoided. By September they expect to send 500 tons of rock daily to the mill.

MISSOURI.

JASPER COUNTY.

An increase of $391,432 is shown in the value of the output of the zinc and lead ores of Joplin district for the first six months of 1903 over the same period of 1902. This gain was made, too, with a decrease of 13,662 tons in the zinc shipment and 1576 tons of lead shipment. The average price of zinc was $34 per ton, against an average for the same period of 1902 of $28 48. The average price of lead was $54.30, against $43, says the Joplin News-Herald.

The Rex M & S. Co., near Joplin, are doing considerable prospecting. They have a lease on 400 acres of land east of the original 1000-acre tract, and have two drills prospecting. The pumps are at work on the mines that were recently flooded.

The Florence G. M. Co. has been incorporated at Joplin by J. D Bowersock, H. L. Moore, H. S. Clarke, I. Hill of Lawrence, Kan., A. G. Cummings, B. T. Love, N. H. Wright, J. H. Legg of Joplin.

The Barr None M. Co., operating on the Modoc lease south of Joplin, has put in a boiler and engine and a steam hoist. A drift has been started and they are taking out pay dirt.

At Carterville the Missouri Blanket Vein M. Co. has sold its mill and all its machinery and has quit mining, says the Carterville Record.

F. Nicholson of Joplin has bought a prospect on the Eleventh Hour lease for $30,000. The property consists of four lots on the Eleventh Hour ground with a shaft down showing a 20-foot face of ore, says the News-Herald.

LAWRENCE COUNTY.

At Stotts City the Keystone mine has its mill in full operation and the mine has been unwatered.

The Mt. Vernon M. Co., which has a lease on 200 acres of mining land in Stotts

Clty dlstrlct, is preparing to sub-lease on tracts of five acres.

NEWTON COUNTY.

The pumpling machinery at the Buckham mlne at Granby is in operation.

STONE COUNTY.

At Baxter sprlngs it is reported that a mlli will be built at the Sunny Slde mine and work will be started this month.

At the Tom Clark mine drifting has begun on the lead ore. The ore in the bin is lump ore only, as the fine dirt has not been cleaned.

MONTANA.

CHOTEAU COUNTY.

J. Torgenson, superintendent of the Mission Peak M. Co., operating near Landusky, says their 10-stamp mill is running steadlly. Tbe ore averages $7 per ton in gold. He proposes putting in a cyanide plant. They ship some high grade ore.

FERGUS COUNTY.

The pay rolls of the Gold Reef Co., at Glit Edge, show sixty men on the works, says tbe Argus. Of these, twenty men are prospectlng in the mlnes, and others are working on the construction of the roasters. It is expected the roasters will be put in operation August 1st.

FLATHEAD COUNTY.

The Snowshoe mine, near Libby, has begun shipments of ore and concentrates. The concentrator is running full time.

J. H. Geiger, manager of tbe Illinois & Montana M. Co., says work will be resumed on thelr group in West Fisher dlstrlct, near Libby, and that, in addition to development tbis summer, the company will build a mill.

It is reported that work at the Banner & Bangle mine, 6 miles south of Troy, operated by Larson & Greenougb, under a bond, is progressing and shipments of ore will be started this month, says the Western News. They have decided to bulid a concentrator at the mine.

JEFFERSON COUNTY.

Machlnery is being put in at the Evening Star mlne, in Cataract district, near Basln.

Muivahill & Ely, lessees of the Daly group at Wlckes, are making shipments to smelters of their first-class ores, and have enlarged their concentrator to 100 tons per day capacity. Tbey have started slnklng 200 feet from the 600 level.

LEWIS AND CLARKE COUNTY.

The Mlssouri & Montana Co., owning the Sure Thing mine in Ontario district, near Helena, is increasing development work. Canol & Martin of Helena, the principal holders, expect to place a smelter on the group this summer.

The Lee Mountaln M. Co., operating at Rlmini, has increased its shipments since the completion of tbe three-rail gravity tramway from tbe mine to tbe railroad. The mine hss been shipping 800 tons of ore a month to the smelters and concentrator, which will be increased to 2000 tons.——J. Kuykendall of Helena bas leased the Tathem group of claims ln Rimini district.

It is reported the Montana Co., Ltd., has taken a lease and bond on the property of the Cruse Mountain Con. M. Co. and also the South Drum Lummon M. Co., near Marysvllie, says the Mountaineer, and operations are to be begun this week.

MADISON COUNTY.

(Speclal Correspondence).—The three dredgers near Virginia Clty are operating with great success tbis summer. The one operated by the Chicago M. & D. Co., W. W. Parker superintendent, will cease operations next fall, upon expiration of time lease from Conroy Placer M. Co.

Virginia Clty, July 13.

The Kearsarge mine, near Virginia Clty, started last week to sink a three-compartment shaft for 500 feet; the only stop to be made is at the 130 foot level, where a station will be cut to connect the new shaft with the present workings, says the Inter-Mountain.

Manager Godfrey of the Montana & St. Paul M. Co., operating near Twin Bridges, says operations have begun on their claims on Wisconsin creek at Old Baldy mountain. They have uncovered three shoots of shipping ore.

POWELL COUNTY.

Manager G. J. Kirby of the Montana United M. Co. has bought the Elroy, the Poorman and the Hemlock mining claims, near Emery. These claims are north of the Emery mine, and the first two adjoin tbe Sunday.

NEVADA.

ELKO COUNTY.

G. E. Gavin of Boise, Idaho, developing the Riddie mine, near Elko, reports tbe tunnel being driven ahead. The mine has a 20-stamp mill which is run by electric power. The Bull Run is opened up, and has a 10-stamp mill.

LINCOLN COUNTY.

The Ione M. Co. is preparing to start development work on tbe Pompeii, American Girl and Independence - Golden Garter groups, near Searchlight, which it has under bond. These are north of the Blossom group, being operated by tbe Southern Nevada Co. F. J. Spare is manager, and he will put in an air compressor and two macbine drills. Two shafts will be sunk.

WHITE PINE COUNTY.

A group of fourteen claims north of and adjoining the New York & Nevada C. Co., near Ely, bave been taken under a three months' bond by W. C. Rose for Eastern men.

NEW MEXICO.

GRANT COUNTY.

Near Bromide, tbe Strawberry mine, which has been idle for several months, resumed work last week with eleven men, says Superintendent R. Cole. Work will consist for the present of sinking the sbaft and crosscutting at the 100-foot level. The Strawberry has steam machinery and air drills.——Work on the Continental has been delayed for the past six weeks because of water in the shaft. ——At the Sardine mine work will be resumed, says Superintendent Roberts.——Work will be begun on the property of the Cunningham Guich M. Co. this month. The company owns several claims near the War Eagle, Continental and Tampa mines, says the New Mexican.

LINCOLN COUNTY.

(Speclal Correspondence).—The plant of the American Placer Co. at Jlcarilla will soon be ready for operation again. The machinery is all on the ground. It is about a year now since the company first attempted to operate these placers, and when tbeir dredger equipment resulted unsatisfactorily, it looked as if they would have to abandon the project. But they have had their plant remodeled and expect to handle 400 yards of dirt a day, yielding an average of $125 gold per day. Fifteen men will be required to run the whole plant, or five men per sbift of eight hours. H. L. Payne of Cleveland, Ohio, is engineer in charge of the work.

Jacarilla, July 14.

OREGON.

BAKER COUNTY.

The Gold Hill quartz mine of the Burnt River G. M. Co., near Baker City, bas been sold to C. H. McNicholas of Portland for $200,000.

J. Michaels of Minneapolis, Minn., president of the Turnagain Arm M. Co., operating in Cracker Creek district, near Sumpter, says that at the Cracker Jack, one of their group, they are preparing to put up a sinking plant with capacity of 500 feet depth. A shaft will be sunk on the Snowflake claim and tunnelling done on the Uneeda. Work on the concentrating plant at the California is going ahead and it is expected the mill will be running by August 1.

Work has been started on the Martha Washington group of five claims, in Cable Cove district, near Sumpter, by C. Warren, F. W. Northup and T. C. Gray, owners.

Work was started last week on the mines of the Cracker-Highland G. M. Co., in Cracker Creek district, near Sumpter. The company has been reorganized and H. Cummings, W. G. Perkins, J. C. Davies and A. P. Goss elected as officers, with C. H. Fenner of Sumpter consulting engineer. Tbe group is on the Minneapolis ledge. They will continue the tunnel on tbe ledge to tap the ore shoot uncovered on the Minneapolis and also sink a 200-foot shaft.

GRANT COUNTY.

Near Alamo, F. A. Wheeler, G. A. and R. E. Hills of Chicago, Ill., F. H. Hills of Northeast, Pa., H. W. Maxwell and G. H. Bowers have bought the Democrat and Earl claims, adjoining the Red Boy mine, and the Helenora M. Co. organized for development of the group. The same parties bought the Bryan mine and the Colorado & Oregon group, adjoining the St. Anthony group, near Alamo. This was for the St. Anthony Co., in which tbey are interested, and gives a total of twenty-four claims between the Alamo mine and the Black Jack and Oregon Monarch.

The Don Juan and Quebec mines, in the Greenhorn and Alamo districts, respectively, are reported sold to T. W. Davidson and A. B. Browne of Sumpter. The Don Juan is equipped with a 10-stamp mill and concentrating tables. Development consists of a tunnel on the vein and a shaft sunk 200 feet below this tunnel. The Quebec mine is near Alamo, near the south end of Quebec mountain.

There are twenty men at work at the Dixie Meadows mine, says H. P. Belknap of Sumpter, part owner. Tbe lower level is in 750 feet, but most of the work is in the upper levels. Preparations are being made to build a mill. The Dixie Meadows mine is 12 miles north of Prairie City and is on a tributary of the Middle Fork of the John Day river.

J. W. Larkin and D. R. Evans of Spokane, Wash., principal owners of tbe Cougar mine, near Granite, report operations resuming. The Cougar is equipped with a 250-ton a day dry crushing and cyaniding plant.

JOSEPHINE COUNTY.

At the Greenback mine, on Grave creek, at Greenback, Superintendent C. W. Thompson says work is progressing. The machinery for the 100-ton cyanide plant is in place and ten more stamps are being added to the mill, making a total of forty stamps. The ledges of the Greenback mine lie in Browning mountain and three drifts have been cut through the hill. The old mill, with its ten stamps, sits on one side of the mountain and the new mill, with thirty stamps, is 450 feet lower and on the opposite side of the mountain. The cyanide plant is near the 30-stamp mill. The new equipment is below the ninth level of the mine. The mine is electric lighted throughout and there are 7500 feet of tunnels, drifts and upraises, says the Ashland Record.

Tbe Golconda quartz mine, near Provolt, under development by D. J. Lawton et al., has a double shift at work, drifting on a 6-foot vein at a depth of 200 feet. The ore carries free gold and sulphurets.

At the Lucky Cuss mine, near Murphy, owned by Schrimpf Bros., Superintendent W. T. Cope reports work going ahead.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The Columbus Con. G. M. Co. has an option on the Mueller-Hanley water right on False Bottom creek, near Lead, for $5000. It is intended to raise the water and convey it down Blacktail guich. Another find of ore has been made on the ground of the Columbus Con., north of the main shaft. It is free milling. The Columbus is continuing its westerly crosscut from the drift on the 200-foot level. Tbis crosscut has passed through 247 feet of ore. The vein passed through is the Pierce vein. The crosscut is being run for the purpose of cutting the Erin vein, which lies west of the Pierce.

The Echo G. M. Co., operating on False-bottom creek, ½ mile above Maitland, have done several hundred feet of tunnelling. The next work will be driving a working tunnel into the side of Echo hill. Values in gold and silver are obtained. It is intended to drive the tunnel to tap the slate porphyry contact at 400 feet below the surface.

PENNINGTON COUNTY.

Superintendent J. B. Safford of the Golden Slipper mine, near Hill Clty, says bis company will build a cyanide annex to the stamp mill, which is working on Slipper ore. Work will begin on the plant this month.

UTAH.

BEAVER COUNTY.

The Lincoln mine (the Rollins), near Minersville, was sold at sheriff's sale last week for $58,747 to F. Frour, of Lincoln, Logan county, Ill.

IRON COUNTY.

It is reported work will be resumed on the Venus mine, near the Johnny mine, at Stateline. The Venus carries gold ore.

JUAB COUNTY.

Of the seventy-five men employed at the Mammotb mine of the Mammoth M. Co., at Mammoth, sixty were discharged on the 12th inst., says the News, partly due to a disagreement between the company and the smelters. The fifteen men retained will keep the mine open.

PIUTE COUNTY.

The Mount Baldy M., M. & Water Power Co., of Marysvale, has been incorporated, with J. Patten, president; R. De Witt, vice-president, and C. P. Barnson, secretary and treasurer.

Superintendent A. D. McLean of the Madsen M. & M. Co., operating on Gold mountain, near Kimberley, says the Trapper's Pride is being reopened and development work started.

SALT LAKE COUNTY.

The Mono mill in Dry canyon, near Bingham, is in operation again, says President G. A. Land, the plant having had an overhauling.

SUMMIT COUNTY.

Manager W. I. Snyder of the California M. Co. mine and mill, near Park City, says the zinc tailings are to be concentrated for their zinc values. On the dump there are 2000 tons of these tailings, which will yield $10 per ton. The concentrator was started last week and will also treat some crude ore. The shaft being sunk to tbe 500-foot level is down 270 feet.

The Majestic M. Co. has incorporated to operate at Park City, a group of twelve claims in the eastern part of the camp and southwest of the Liberty group. C. S. Rolpb, J. and J. Nelson, F. Aubrey, E. Ryan, M. Ferguson, J. McDonald and J. Powell.

TOOELE COUNTY.

Manager Bothwell of the Sacramento mine, at Mercur, says tbey are retorting 3000 pounds of ore, deriving 450 pounds of quicksilver daily. The ore also carries gold. The ore body shows an average width of 7 feet. Tbeir gold ores also show the presence of quicksilver.

UTAH COUNTY.

The Murray M. Co. of Salt Lake Clty has been incorporated with N. Treweek, J. H. Moyle and W. H. Irvine as officers. The company owns eight lode claims in American Fork and Snake Creek mining districts.

WASATCH COUNTY.

The Ontario-Ingersol M. Co. of Salt Lake City has been incorporated to operate in Blue Ledge mining district, M. Cullen president. T. Jordan and J. Moritz are officers.

WASHINGTON.

FERRY COUNTY.

Tbe Commissioner of the General Land Office at Washington has affirmed a decision of Register Ludden of the Spokane Land Office to the effect that the Republic M. & I. Co. is entitled to tbe Wake Up Joe, Joe Dandy, Wasp, Josie, Trail and Big Bug claims at Republic. When the company applied for its patent on the claims, P. McPherson et al. filed a protest on the ground that the land was not mineral in character, says the Spokesman-Review.

Tbe Golden Eagle M. Co has started a shaft on the Peacemaker Fraction claim, near Republic, with two compartments. Manager M. R. Staight intends to sink this sbaft 500 feet, at which depth it is expected to strike the extension southward of tbe Quilp veln. The Golden Eagle Co. has two claims, the Peacemaker Fraction and Eureka Fraction, which adjoin the Quilp on the south.

The Belcher M. Co. is preparing to build a fifty-ton smelter on Lambert creek, near Republic, for the treatment of Belcher and Hawkeye ores, says the News-Miner. The first furnace put in will be designed as a unit of a 250-ton plant, to be completed later. Belcher ore carries a high percentage of sulphur and the Hawkeye ore contains sufficient silica to flux the ore of both mines mixed.

W. L. Curry says he has resumed work on the Crown Point and Summit group in Empire camp, near Republic.

OKANOGAN COUNTY.

S. E. Barron, president of the Q S. M. Co., near Conconully, says operations have begun on the Q. S. mine and they are driving an upper tunnel, which is in 840 feet.

STEVENS COUNTY.

W. S. Rogers of Spokane of the Lawrence M. Co., says they are developing a group of iron mines, near Valley, adjoining the group owned by the Hill interests. More men are to be put on.

WYOMING.

CARBON COUNTY.

Work is again under way at the Doane-Rambler copper mine, near Battle Lake, says Consulting Engineer R. G. Legg. Shipments of ore will be resumed. J. L. Powell is superintendent. The mine has fifty men at work.

FOREIGN.

AUSTRALIA.

QUEENSLAND.

Manager A. Gibb of the Mount Perry Copper Co., near Bundaberg, says the company's new furnace is in operation, with the result that 50% more ore than formerly is being treated. The total quantity of ore smelted per month is 1100 tons. The present bottom levels of the mines are showing up well. It is proposed to connect tbe George's workings at the 700-foot levels with the Kennedy mine, and thereafter all work will be carried on from tbe latter. On their outlying properties, the New Moonta and Great Freehold mines, work is progressing.

Dredging for tin in Santhorpe district during May and the first half of June was retarded both by drouth conditions and the difficulty of providing appliances for effectively saving the tin, says the Government Journal. There is at present an ample supply of water, and in one case at least the other drawback has been overcome. Tbe Border Post says the Wylie creek dredger is running steadily and there is every indication the dredger will be able to save a good percentage of the tin. So far it has been working in clay and is making its way into the main water course. One feature of the dredger is the revolving screen, which takes off all of

the large stones, nothing passing throu h but the fine sand, from which it is easy to extract the tin in the sluice box.

From January 1 to June 15 the Mungana M. Co. at Chillagoe has sent 3582 tons of ore to the smelters, which was treated for a return of 255.0 tons of copper and 18,749 ounces silver.

The Great Northern Freehold Tin Co. at Herberton reports having struck tin at the 700-foot level.

WEST AUSTRALIA.

The W. A. Journal says, at Kalgoorlie heavy additions are to be made to the surface plants of several of the Golden Mile properties. At the Golden Horseshoe a belt conveyor is being put in to carry the mill residues on to one of the Golden Treasure blocks, owned by the Horseshoe Co. The Ivanhoe management is sponding £40,000 in extra rock drill, electric light and hoisting machinery, while the Associated Co., in addition to electric light and sulphide mill alterations, propose to build a 20-head battery for the treatment of their deposits of low-grade ore.

The experimental plant at the Lake View Consols mine at Kalgoorlie to determine the capabilities of the Elmore oil process is in operation. The plant in its present form is capable of treating fifty tons daily, and is run by electricity. At the 1200-foot level the lode struck in the crosscut driven west of the main drive, 600 feet north of the shaft, has proved to be 30 feet in width. Only the western side of the body is payable. The main drive has been turned westward at point 800 feet north of the shaft. On the 1400-foot level they have cut a lode in the diagonal crosscut west from the main shaft, width 290 feet, assay value 15 dwts. per ton, which is thought to be the Perseverance lode.

TASMANIA.

A provisional agreement for the amalgamation of the Mount Lyell M. Co. and North Mount Lyell M. Co. at Mount Lyell has been signed and a new company will be organized in London.

BRITISH COLUMBIA.

The Cariboo Gold Fields Co., operating near Barkerville, has suspended operations. —— The Consolidated Cariboo is making extensive preparations to sink a shaft on Lightning creek, 2 miles below Stanley.

The Perry Creek M. & Hydraulic Co., near Fort Steele, are building a ditch and flume 3½ miles in length. A syphon 1200 feet in length has been built across a ravine 175 feet deep. The sawmill is cutting 10,000 feet of lumber daily. Thirty men are at work, and several teams are excavating the ditch. —— Development work has been resumed on the Roaring King group of claims at the head of Perry creek, with F. Williams as superintendent.

It is reported work will be resumed on the Badger and Red Mountain group of claims, near Fort Steele. It is a free-gold proposition under bond to an Eastern company. A 10-stamp mill will be put in, says the Fort Steele Prospector.

The Kootenay Perry Creek M. Co., near Fort Steele, are sinking a shaft to bedrock to test their ground. Manager A. Banks says he will put in a stacker and washer. Operations with the steam dredge have ceased temporarily pending their arrival.

The strike at the Extension coal mines has been settled, and work begun. The proposal made by owner, James Dunsmuir, in answer to the request of the miners, was finally accepted, says the Rossland Miner. The conditions are practically the same as those in force at the time the mine closed. Dunsmuir expects to have at least 500 men working by next week. Any further increase in the number of miners will depend on demand for coal. It is thought the settlement at Ladysmith will lead to an adjustment of the troubles at Cumberland also. A Nanaimo report says the decision was hastened by the fact that a number of Chinese had been put in No. 1 mine.

Development work has been started on the Crackshot group of four claims on Macdonald creek, near Ferguson, by the owners, J. B. Manross and G. Peterson, says the Eagle.——S. Shannon, local manager for the Black Warrior M. Syndicate, says work is again under way on their group near Ferguson. M. B. Webber of Winona, Minn., is managing director.

At Nanaimo preparations are being made to unwater the Harewood mine, which has been closed down since the New Vancouver Coal Co. ceased operations there last year. President Howard of the Western Fuel Co. says when the old company stopped work faults had been reached, which were near bore holes which indicated coal. They propose to drive through the faults to the coal.

The Crow's Nest Pass Coal Co. is increasing coke shipments to the smelters in the Boundary district, thus relieving the fuel situation. A. I. Goodell, manager of the Boundary Falls smelter, says he is running two stacks and will build a third. The Granby smelter is also increasing its furnaces near Greenwood. The Mother Lode mine is working 75 men at its mine and 100 in the smelter; the Sunset has 20 men in the mine and 80 in the smelter: in the Providence 40 men are at work, 15 in the Elkhorn, 40 in the B. C. mine and 12 in the Oro Denoro.

Hydraulic mining is in full operation in Cariboo district, of which Barkerville is the center, says the News-Advertisor. The Cariboo Gold Fields, Ltd., is running two shifts, the bucket machinery being in operation. Superintendent Bailey reports progress with the boring machine at the Eleven of England.

Customs returns, says the News-Advertiser, are stated to show that as a result of the Vancouver Island colliery troubles, 13,733 tons of coal, worth $62,657, have been imported from Japan.

W. Blakmore of Montreal, consulting engineer, has started development on coal lands of the British Columbia Coal Co. on the north fork of the Kettle river, 60 miles north of Grand Forks. As soon as he completes preliminary work, including the opening up of the 5-foot seam on the Wiseman claim, a diamond drill plant will be set up.

The No. 7 M. Co., Ltd., owning a group of claims near Greenwood, will further develop the No. 7 mine and build a concentrating plant. The group includes the No. 7 mine and five adjoining claims. On the No. 7 a shaft has been sunk 320 feet, from which drifts and crosscuts have been run. The ore is quartz, carrying gold, silver, lead and zinc. The mine is equipped with a 5-drill compressor and hoist. F. Keffer is manager.

Near Rossland the Gold Hill mine, adjoining the Jumbo on the north, and under bond to J. S. Bedier, is being reopened.

The Badger and Red Mountain groups of claims on Perry creek near Fort Steele have been given under option to F. Byron, of Frank, Alberta. The properties are the Badger, Red Mountain, Perry Creek and Custer mineral claims. There are 300 feet of tunnels and drifts. The ledge has average width of 6 feet; assay returns of $20 in gold.

CANADA.

ONTARIO.

Consul M. J. Burke, writing from St. Thomas, says the bureau of mines of the Ontario Government gives the output of metalliferous mines and works of Ontario for the first three months of 1903, as follows:

Product.	Quantity.	Value.
Gold ore treated, tons....	9,688	.....
Gold product, ounces.....	2,692	$ 45,218
Nickel copper ore raised, tons.....	52,866	.....
Ore smelted, tons.....	47,880	.....
Nickel in matte product, tons.....	1,059	567,211
Copper in matte product, tons.....	780	112,676
Copper ore raised, tons.	9,940	.....
Concentrates produced, tons.....	236	10,388
Iron ore raised, tons.....	78,789	116,620
Ontario ore smelted, tons.	7,392	.....
Foreign ore smelted, tons.	18,349	.....
Pig iron produced, tons..	14,357	165,656
Steel produced, tons.....	1,340	29,480
Arsenic produced, lbs....	216,000	6,264

As compared with the first three months of 1902, the total value of production shows a decrease from $1,256,685 to $1,043,513. This is chiefly accounted for by the falling off in the output of pig iron from $397,838 to $165,656, due to shutting down at the furnaces for repairs. Nickel rose in quantity from 1485 tons to 1659 tons, and in value from $546,356 to $567,211.——The Canadian Corundum Co., which has been treating twenty tons of rock daily at its plant at Craigmont, South Renfrew, is preparing to increase its capacity to 200 tons daily. They have seventy-five men at work. Extensions are also proposed at the Belmont gold mine in Hastings. The water-power plant of 1000 H. P. will be increased, the sorting plant—large enough for 120 stamps—will be set up and the hoisting capacity increased. At present they have thirty stamps and the power is conveyed 2½ miles by means of compressed air.——The importance of the fuel question has led the bureau of mines to take a special interest in peat, lignite and other kinds of fuel found in Ontario.

GERMANY.

Consul-General O. J. Hughes, writing from Coburg, says it appears from a report in the Berg und Huettenmaennische Zeitung, the northern boundary of the Rhenish-Westphalian coal fields is being pushed forward from year to year. One company proposes pushing its derricks eastward toward Oelde. During the past three years thirty bore holes have been sunk outside the worked area on both sides of the Lippe and have all struck the carboniferous layers, mostly at considerable depth. The deepest bore holes in the Lippe region are near Schermbeck (2999 feet), Spellen (3035 feet), Huemxe (3077 feet), and Beckum (3320 feet). Several concessions have been secured in this part and five of these have started sinking shafts. All the bore holes sunk near Metz have proved the presence of anthracite coal. The Banay boring was completed at depth of 1542 feet in the coal formation; the Ravilie boring, 2369 feet depth, went deep into the coal formation; and the boring at Lerquigny went to 2231 feet, the coal stratum having been struck at the same depth as in the others. The carboniferous stratum dips under the younger formations in the direction of France and confirms a hypothesis that the Sarbruck coal measures extend toward Pont-a-Mousson. On the frontier it occurs deeper than 2297 feet from the surface.

MEXICO.

MEXICO.

The Bossie M. Co. has been organized to operate mines at El Oro and Tlalpujahua by R. Hilman, H. Bloom, P. Requena, H. Scherer Jr., J. B. McManus and R. H. Drennan. The company owns the Bessie claim of 80 pertenencias in the Tlalpujahua and El Oro mineral belt, being near Tlalpujahua. Machinery for development work is being put up. They will sink a main shaft. The Bessie adjoins the Aldibaran and San Patricio minesa nd is near the Reforma.

SONORA.

There are at least eight mills and smelters in course of erection in the State of Sonora, says the Chihuahua Enterprise. The Sonora Development Co. of Kansas City, Mo., is building a 10-stamp mill in Moctezuma district; the Yaqui S. & R. Co., composed of Toledo, O., men, a smelter at Toledo, on the Yaqui river; the Zehuite, near Tonis, a 40-stamp mill; the Reina de Oro M. Co., at El Tivo, in Altar district, has started its 5-ton Huntington mill.

PERU.

The Caylloma silver mines report the May production at 18,250 ounces fine silver in export ores and 17,000 ounces fine silver in bullion.

RUSSIA.

At Riga the imports of coal, which were mainly from England and Westphalia and which two years ago aggregated 33,000,000 poods (532,500 tons), have decreased by 193,546 tons. By order of the Government, coal is now derived exclusively from Russian mines. The local works and factories require 483,871 tons of coal and 8065 tons of coke per annum. Petroleum residuals are expensive in Riga and are only used experimentally on some locomotives on local lines. Wood fuel is also unable to compete with coal, but is used on the small branch lines. Peat, although its deposits cover hundreds of square miles near Riga, finds no application whatever because of its being comparatively expensive and inconvenient to handle, says O. J. Hughes, Consul-General at Coburg, Germany.

SPAIN.

The Pena Copper Mines, Ltd., operating at Pena near Huelva, in Andalusia province, report output of ore during May at 15,844 tons; shipments of ore, 14,788 tons; precipitate containing 61 tons of fine copper was produced. Their annual report shows 92,057 tons of ore shipped during 1902, made up of cupriferous ore, 19,927 tons; washed ore, 62,982 tons; and crude sulphur ore, 9148 tons. The chief exports of ore in the future will consist of washed ore and also some crude sulphur ore.

Commercial Paragraphs.

THE Risdon Iron Works of San Francisco, Cal., report they are preparing for shipment to Nevada Co., Cal., a 20-stamp gravel mill and accessories for the Blue Tent G. M. Co.

THE Ohmen Engine Works of San Francisco, Cal., have issued an illustrated circular of their vertical, high-speed, self-contained, center-crank engine. The illustrations show the open frame type, direct connected to electric generators.

THE Mine & Smelter Supply Co. of Denver, Colo., have shipped a Dimmick classifier and Wilfley tables to the El Cubo M. & M. Co., Guanajuato, Mexico. They received an order for two 500 H. P. De Remer water wheels and pipe line for the Rock Creek Power Co., Baker City, Or., and a 10-stamp concentrating mill for the Alamo Con. M. Co. of Spokane, Wash., the mill to be erected at Alamo, Or.

PERSONAL.

F. S. HARRIS is examining mines in Sonora, Mexico.

EMERSON GEE of Los Angeles, Cal., is in Denver, Colo.

R. COLE is superintendent of the Strawberry mine, near Bromide, N. M.

W. A. BATEMAN, of Michigan, is examining mines near Bisbee, Arizona.

R. W. HOLLIS has returned to Silverton, Colo., from a business trip to Denver, Colo.

C. NEWMAN, of Durango, Colo., has returned from a business trip to Denver, Colo.

S. B. SWINK is superintendent of the Gold Medal mine, near Idaho Springs, Colo.

J. H. KINKEAD, of Virginia City, Nev., is in San Francisco, Cal., on mining business.

E. S. KELLEY, interested in mines near Tonopah, Nev., is in San Francisco, Cal., on business.

J. W. ADAMS of Chattanooga, Tenn., is at Durango, Colo., looking after his mining interests.

A. HELSEY, of South Carolina, is manager of the Kentucky Ridge mine, near Grass Valley, Cal.

G. E. GAVIN returned to Boise, Idaho, last week from examining mining interests in Elko county, Nev.

E. GODBE, metallurgist, returned to Salt Lake City, Utah, last week from Mojave, Kern county, Cal.

J. T. TERRY, superintendent Sunnyside mines, Eureka, Colo., has returned there from Denver, Colo.

R. F. TURNBULL is superintendent of the mines of the Gold Reef M. Co. at Gilt Edge, Fergus county, Mont.

L. H. CARVER, E. M., of San Francisco, Cal., has gone to Sierra and Plumas counties, Cal., on mining business.

A. D. MCDONALD is superintendent of the Madsen M. & M. Co., operating near Kimberly, Piute county, Utah.

W. J. NELSON, interested in mines near San Andreas, Calaveras county, Cal., is in San Francisco, Cal., on business.

J. H. WARD of Bristol, Conn., is in Durango, Colo., looking after his mining interests in the Oro Fino district.

W. A. WHEELAND of Kansas City, Mo., is spending some time in Colorado looking after his mining interests.

D. BUCKLES is acting superintendent of the Mary McKinney M. Co. at Cripple Creek, Colo., vice G. Keener, resigned.

JNO. W. NESMITH, president of the Colorado Iron Works Co., has returned to Denver, Colo., from San Francisco, Cal.

J. L. POWELL, of Salt Lake City, Utah, is superintendent of the Doane-Rambler mine, near Battle Lake, Wyo.

P. M. COLLINS has resigned as superintendent of the Portland mill of the Portland G. M. Co., near Crippie Creek, Colo.

H. Z. OSBORNE of Los Angeles, Cal., is at the Dorleska mine, in Trinity county, Cal., of which he is president and manager.

E. H. LUNKEN, president of the Lunkenheimer Co., Cincinnati, Ohio, has returned to Denver, Colo., from Cincinnati, Ohio.

F. E. WILSON, of the Friday mines and mill, near Baker City, Or., has returned from a business trip to Salt Lake City, Utah.

WM. SHARWOOD, part owner of the Soulshy mine at Soulsbyville, Tuolumne county, Cal., has returned from a business trip East.

F. ZEITLER of Nevada City, Cal., is president and superintendent of the Zeilbright M. Co., operating near Grass Valley, Cal.

E. H. LUNKEN of Denver, Colo., has returned there from La Plata City, Colo., where he was inspecting his mining interests.

V. B. SHERROD, who has been examining the Bolanitos mine at Guanajuato, Mex., returned to Salt Lake City, Utah, last week.

MANAGER A BANKS of the Kootenay-Perry Creek M. Co. has returned to Fort

Steele, B. C., from a business trip to Montreal, Quebec.

ROSS E. BROWNE, E. M., of San Francisco, Cal., has been appointed a trustee of the California State Mining Bureau.

S. W. TRAYLOR, New York representative of the Colorado Iron Works Co., has returned there from a visit to Nevada and California.

G. R. LEHMAN has resigned as smelter superintendent of the Fernando M. Co., at San Fernando, Durango, Mexico, and is in Berkeley, Cal.

R. G. LEGG, of Salt Lake City, Utab, has gone to Wyoming as consulting engineer for the Doane-Rambler mine, near Battle Lake, Wyo.

W. H. TAYLOR is manager of the Republic Con. G. M. & M. Co. of Boston, Mass., operating near Dumont, Colo., vice F. H. Collins, resigned.

F. H. COLLINS has resigned as treasurer and manager of the Republic Con. G. M. & M. Co. of Boston, Mass., operating near Dumont, Colo.

C. D. HOOPER, former mill superintendent of the Liberty Bell at Pandora, Colo., is superintendent of the Group mill near Rico, Dolores Co., Colo.

B. F. GRAHAM, of Bisbee, Ariz, president of the Lucky Tiger Co. and of the Bisbee Queen Dev. Co., is in Kansas City, Mo., on mining business.

W. G. SCOTT, formerly superintendent Queen Bess mine, near Sandon, B. C., is now superintendent of the Continental-Alta mines, Alta, Utah.

S. E. PHELPS, secretary and treasurer of the Gold Coin M. Co, returned to Grand Encampment, Wyo., last week, from Idaho City, Idaho.

W. WESTON, M. E., of Denver, Colo., is in Grand county, Colo., looking after the mining interests of the Denver, Northwestern & Pacific Railway.

S. E. BARRON, president of the Q S. G. M. & S. Co., returned to Conconully, Okanogan county, Wash., last week from a business trip to Chicago, Ill.

A. A. ROSS, superintendent of the Southern Nevada mine at Searchlight, Lincoln county, Nev., returned last week from a visit to Placeritas, Ariz.

L. G. EAKINS, superintendent of the Philadelphia plant of the American S. & R. Co., has been promoted to be assistant general manager, with headquarters in Denver, Colo.

T. A. MOSMAN, who has been superintendent of the Eilers plant of the American S. & R. Co., has been changed to their plant at Leadville, Colo., and G. A. Marsh is superintendent of the Eilers plant.

H. H. NICHOLSON of Denver, Colo., has gone to Breckenridge, Summit county, Colo., to inspect working of placer operations there. From there he goes to the gold districts of Oregon in the interest of Eastern investors.

W. F. POPE of East Machias, Me., was in Silverton, Colo., last week, accompanied by F. Gifford, F. J. Robinson, A. Smith, G. Pierce, G. Boynton, W. S. Brown, E. Bunker, J. W. Dorlan, F. Johnson, E. Bruster, C. C. Chalfant, J. F. Shafer, also of Maine, and J. J. Muenger of Pittsburg, Pa., who are interested in mining in the San Juan.

Obituary.

C. BOGAN, a pioneer miner of Colorado and California, died July 8 at San Rafael, Cal. Deceased was a native of County Tyrone, Ireland, and 74 years of age. He is survived by a wife and daughter.

A. F. STOCKMAN, a student from the Minnesota State University mining school, was killed in a cave-in on the 370-foot level below tunnel No. 3 of the Bully Hill C. M. & S. Co., Shasta Co., Cal., July 7th. Deceased was 22 years of age.

M. L. DAWSON of Lynchburg, Va., assistant superintendent of the Minas Prietas mines in Sonora, Mexico, was murdered by Mexicans while on a prospecting trip near Acampo, Chihuahua, Mexico, about July 1. Robbery was the motive. Two of the three Mexicans have been captured.

DANA HARMON, mining engineer and author, died at his home in Oakland, Cal., July 9, from heart failure, after an illness of but a few hours. Mr. Harmon was born in New Orleans, La., in 1849, and went to California in 1854. After completing his education in an Eastern college he returned to California and engaged in mining, and made a success of his chosen profession. He was a keen judge of a mine and an equally good judge of men. He was a close observer of all that passed before him, and in his practical work as a miner and mine manager he was always a student, and he turned to useful account the knowledge gained by his personal experience. He was an experimenter and an investigator, and while no department of mining was strange or unfamiliar to him, he gave particular attention to the milling of gold ores, and he has left behind him as an evidence of his genius and his thoroughly practical methods, his splendid contributions to metallurgical science, the "Stamp Milling and Amalgamation of Free Gold Ores." He had a wide circle of acquaintance within and without the mining world, and his loss will be severely felt by all who knew him. Mr. Harmon leaves a widow and four children.

Our Middle West Business Manager.

On the 15th inst. Mr. Lester A. Greene assumed charge of the business interests of this journal as special Middle West representative, with offices at 1115 Monadnock Building, Chicago, Ill. Mr. Greene's business acquaintance and personality commend him favorably to present and prospective patrons.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR WEEK ENDING JULY 7, 1903.

732,915.—TRANSMITTER GUARD—S. J. Ballard, Los Angeles, Cal.

732,818.—MOTOR—W. Ballerstedt, Los Angeles, Cal.

732,916.—WOOD CUTTING MACHINE—A. A. Bartlett, Eureka, Cal.

732,825.—TRUCK—E. J. Bryan, Riverside Cal.

733,001.—SHOE FASTENING—G. Bryant, S. F.

733,138.—PIPE WRENCH—F. D. Bullard, Los Angeles, Cal.

733,007.—LOG HAULING ATTACHMENT—S. H. Chase, San Jose, Cal.

733,009.—WINDMILL—J. Coates, Hemet, Cal.

732,831.—DISTILLING APPARATUS—J. M. Coffman, Montalvo, Cal.

732,736.—CHAIR—A. Gruenwald, Salem, Or.

733,193.—SPEED MECHANISM—R. B. Hain, Los Angeles, Cal.

733,198.—PNEUMATIC TIRE—R. A. Harris, Tucson, Ariz.

733,323.—SCREEN—E. Hipolito, Los Angeles, Cal.

733,041.—DOOR HANGER—G. W. Holly, Palo Alto, Cal.

733,208.—GATE LATCH—J. J. Hynding, Ferndale, Cal.

732,863.—BLACKBOARD—F. D. Jones, Los Angeles, Cal.

733,324.—MATTRESS STUFFER—A. R. Kezer, Los Angeles, Cal.

733,338.—ELEVATOR—D. R. Macpherson, S. F.

733,239.—TACKLE BLOCK—T. E. Maddux, Goldhar, Wash.

733,060.—WALNUT HULLER—G. F. Maiers, Goleta, Cal.

733,065.—PIPE JOINT—J. C. Martin, Jr., S. F.

733,074.—STAMP AFFIXER—W. E. Newton, Oakland, Cal.

733,361.—KEYBOARD—G. L. Noe, Wieland, Nev.

733,082.—ABRADING COMPOUND—K. Sakurai, S. F.

733,292.—CAMERA—W. R. Smith, Napa, Cal.

733,301.—AMALGAMATOR—J. W. Swearington, Gaston, Cal.

733,097.—ELECTROMAGNET—I. G. Waterman, Santa Barbara, Cal.

733,705.—ELECTROMAGNET—I. G. Waterman, Santa Barbara, Cal.

Notice of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

COMPOUND FOR ABRADING TOOLS.—No. 733,082. July 7, 1903. Keizo Sakurai, San Francisco, Cal. This invention relates to the production of an artificial compound for use as a substitute for emery, carborundum and the like in the manufacture of grinding wheels and other abrading or polishing tools. Its object is to provide an abrasive compound possessing the following qualities: One which will possess great hardness and durability and which will not suffer deterioration through the generation of heat by friction, which will be homogeneous throughout and will not become worn unevenly, which will have an enhanced cutting power and which will not be liable to glaze or to have the pores clogged by the dust from the article being operated upon.

LOG OR LUMBER HAULING ATTACHMENT.—No. 733,007. July 7, 1903. Stephen H. Chase, San Jose, Cal. The object of this invention is to provide a mechanism which is driven from a shaft moving continuously in one direction, and which mechanism is reversible in all its parts by the use of belts and binder pulleys with automatically acting weights and levers and connections by which either of them may be thrown into or out of action, and is designed to provide an apparatus by which the hauling cable is operated to transport the load, and a return cable, which is connected with the main hauling cable, can be actuated to draw the main cable back to the collecting point after the load has been discharged, both operations and reversely the whole apparatus being effected by means of weighted binder pulleys, levers and connections by which the power derived from a shaft running continuously in one direction may be properly reversed.

STAMP AFFIXING MACHINE.—No. 733,074. July 7, 1903. Willis Earl Newton, Oakland, Cal. This invention relates to improvements in devices for automatically affixing stamps upon envelopes and of pasting labels upon packages, boxes and the like. Its object is to provide a simple, light, durable and efficient machine in which the stamps are drawn successively into a chamber beneath a vertically reciprocating plunger adapted to sever the stamps and affix the latter upon the previously wetted surface of the envelope.

Latest Market Reports.

SAN FRANCISCO, July 17, 1903.

METALS.

SILVER.—Per oz., Troy: London, 24¾d (standard ounce, 925 fine); New York, bar silver, 53¾c, refined (1000 fine); San Francisco, 53¾c; Mexican dollars, 41c San Francisco, 42½c New York.

COPPER.—New York: Standard, $13.62½; Lake, 1 to 3 casks, $13.62½@13 75; Electrolytic, 1 to 3 casks, $13.62½@13 75; Casting, 1 to 3 casks, $13.25@13 37½; San Francisco: $14.00. Mill copper plates, $17.00; bars, 18@24c. London: £57 5s spot per ton.

LEAD.—New York, $4.12½; Salt Lake City, $3.50; St. Louis, $4.00; San Francisco $4.50, carload lots; 4¼c 1000 to 4000 lbs.; pipe 5½, sheet 6, bar 5½c; pig, $4.75. London: £11 8s 9d per long ton=2.75c per lb.

SPELTER.—New York, $6.12½; St. Louis, $4.85; London, £20 15s per ton; San Francisco, ton lots, 6½c; 100-lb lots, 7c.

ANTIMONY.—New York, Cookson's, 9¾c; Hallett's, 8½c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots. 13@15c.

TIN.—New York, pig, $26.90@27.15; San Francisco, ton lots, 29½c; 500 lbs., 30c; 200 lbs., 30½c; less, 31c; bar tin, ℔, 32½c @35c. London, £123 spot.

PLATINUM.—San Francisco, crude, $18.00 ℔ oz.; New York, ingot, $19.00 per Troy oz. Platinum ware, 75@80c per gram.

QUICKSILVER.—New York, $44.50@46.00; large lots; London, £8 15s; San Francisco, local, $44.50 ℔ flask of 76½ lbs.; Denver, $49.50. Export, $43.50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 34c.

SOLDER.—Half-and-half, 100-lb. lots, 19½c; San Francisco, Plumbers', 100-lb. lots, 16c.

NICKEL.—New York, 50@60c ℔ lb.; ton lots, 45@48c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, $19.50 @19.85; gray forge, $18.60; San Francisco, bar, 3c ℔ lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $29 50@30.50; open hearth billets, $31.50; San Francisco, bar, 7c to 12c per lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer	$20.50@21.00
Foundry Northern 1	20.00@21.00
Northern 2	19.50@20.50
Northern 3	19.00@20.00
Southern 1	18.85@ ——
Southern 2	18.35@ ——
Southern 3	17.85@ ——
Forge	17.35@ ——
Charcoal	23.00@24.00
Billets, Bessemer	31.50@32.00
Bars, iron	1.70@ ——
Bars, steel	1.75@ 1.80
Rails, standard	28.00@30.00
Ralls, light	34.00@40.00
Plates, boiler	1.90@ 2.00
Tank	1.75@ 1.80
Sheets, 26 store	2.90@ 3.00
No. 27	3.00@ 3.10
No. 28	3.00@ 3.10
Angles	1.75@ ——
Beams	1.75@ ——
Tees	1.80@ ——
Zees	1.75@ ——
Channels	1.75@ ——
Steel melting scrap	16.00@16.50
Relaying rails	30.00@31.00
Dealers forge	13.50@14.50
No. 1 railroad wrought	15.50@16.50
No. 1 cast, net ton	15.00@16.00
Iron rails	20.50@21.00
Car wheels	20.00@21.00
Cast borings	5.50@ 6 50
Turnings	12.00@13 00

LUMBER.—(Retail): Pine, ordinary sizes, $20.00@22.00; extra sizes higher; redwood, $22.00@23.00; lath, 4 feet, $4.25 @4.50; pickets, $19.50; shingles, $2.35 for No. 1 and $2.00 for No. 2; shakes, $13.50 for split and $14.50 for sawed; rustic, $26.00 @32.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, $3.25; Cut, $3.35; 10d to 16d, Wire, $3.35; Cut, $3.35; 8d, Wire, $3.40; Cut, $3.40; 6d and 7d, Wire, $3.50; Cut, $3.50; 4d and 5d, Wire, $3.60; Cut, $3.60; 3d, Wire, $3.75; Cut, $3.75; 2d, Wire, $4.00; Cut, $4.00. Special rates for carload lots.

LIME.—Santa Cruz, $2.25; Roche Harbor, $2.25 per hbl.

CEMENT.—Germania, $2.50 @ 2.75; Hewmoor, $2.90; Trowell, $2.90; Portland, $2.50@2.75 per bbl.

GENERAL SUPPLIES.

POWDER.—F. o. h. San Francisco: No 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10½c ℔ set; 14 oz., 40s., 9½c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 24@25c ℔ lb.; carloads, 23@24½c; in tins, 35c; soda ash, $2.00 ℔ 100 lbs.; hyposulphite of soda. 2½@2¾c ℔ lb.; caustic soda, in drums, 3@3¼c ℔ lb; Cal. s. soda, bbls., $1.25@1.50 ℔ 100 lbs.; sks., $1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb tins; borax concentrated, 7@8c ℔ lb.; roll sulphur, 4@6c; powdered sulphur, 2@3c; flour sulphur, French, 2@3c; alum, $2.00@2.25; California refined, 2@2½c; sulphide of iron, 9c ℔ lb; copper sulphate, 5@7c; chloride of lime, spot, $2 50@2.75; sulphuric acid, in carboys, 66% B, 2¼c ℔ lb.; nitric acid, in carboys, 8c ℔ lb.

OILS.—Linseed, boiled, bbl., 48c; cs., 53c; raw, hbl., 46c; cs., 51c; Lucol oil, boiled, bbl., 44c; cs, 49c; raw, hbl., 42c; cs, 47c. Kerosene—Pearl, per gal., 20½c; Astral, 20½c; Star, 20½c; Extra Star, 24½c; Eocene, 23½c; Elaine, 26½c; Water White, in bulk, 14½c; Mineral Seal, iron bbls., 18½c; wooden bbls., 21c; cs, 24c; Mineral Sperm, cs, 26½c; Deodorized Stove Gasoline, bulk, 17c; do., cs., 23½c; 86° Gasoline, bulk, 21c; do., cs., 27½c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 16c; do., in cs., 22½ c; Lard Oil, E. W. S., bbl., $1.00; cs., $1.05; Neats-foot Oil, pure, hhl., 75c; cs., 80c; Sperm, crude, 70@60c; Natural White, 65c; Bleached do, 50c; Whale Oil, cs, 50@55c.

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6c; less than 500 lbs., per lb., 6½c; in 25-lb. tin pails, ½c per lb. above keg price; in 1 and 5 lb. tin cans, 100 lbs. per case, ½c per lb. above keg price. Dry Lead—In bbls., 1 ton and over, 6c; do. in kegs, 6½c.

RED LEAD.—500 lbs. and over at one purchase, per lb., 6c; less than 500 lbs., 6½c.

LITHARGE.—Pure, in 25-lb. bags, 8 @9c per lb.

BONE ASH.—Extra No. 1, 5@6c per lb. No. 1, 4@5c.

BORAX.—Concentrated, 7@9c per lb powdered, 9@12c; fused, 25@30c.

BORAX.—Crystal, 7c; calcined, 25c.

MANGANESE.—Pure, ℔ lb., 60c.

MOLYBDENUM.—$2 per lb.

CHROMIUM.—(90% and over) per lb., $1.00.

BISMUTH.—Suhnitrate, per lb., $1.60.

MERCURY.—Bichloride, ℔ lb., 90c.

PHOSPHORUS.—(American) ℔ lb., 75c.

SILVER.—Chloride, ℔ oz., 90c@$1.00; nitrate. 55c.

ALUMINUM.—No. 1, 99%, small lots, 37c ℔ lb.; 100 lbs., 35c; 1000 lbs., 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

URANIUM.—Oxide, ℔ lb., $3.50.

ZINC.—Metallic, chemically pure, ℔ lb., 50c; dust, ℔ lb., 10c; sulphate, ℔ lb., .04c.

COAL.—San Francisco, coast, yard prices: Wellington, $8.00; Seattle, $6.50; Coos Bay, $5.50; Southfield, $8.00. Cargo lots, Eastern and foreign: Wallsend, $6.50 Brymbo, $7.50; Pennsylvania, hd., $14.00 Scotch, $8; Cumberland, $12; Cannel, $9.00; Welsh Anthracite, $11.50; Rock Springs, $9.50, long ton; Colorado Anthracite, $14.00. Coke, $10.50 per ton in bulk, $13 in sacks; Sunnyside, $8.50, long ton.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

WANTED.

CAPABLE ENGINEER OF GOOD STANDING and experience would like to purchase an interest in an established engineering business—mining or civil. Only a business capable of expansion and doing high grade work is desired. Address "Experience," care of Mining and Scientific Press.

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Gold, silver or lead, in New Mexico, Arizona or old Mexico. Will buy or lease. Give location, quantity and value. A. E. VAN VELSAN, Telluride, Colorado. Box 181.

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If you are a stockholder in any good going mining company and want to sell your shares
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Send for our price list of 500 stocks. It tells what we will buy and what we will sell.
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MINING AND SCIENTIFIC PRESS.

Whole No. 2244.—VOLUME LXXXVII. Number 4. SAN FRANCISCO, CAL., SATURDAY, JULY 25, 1903. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

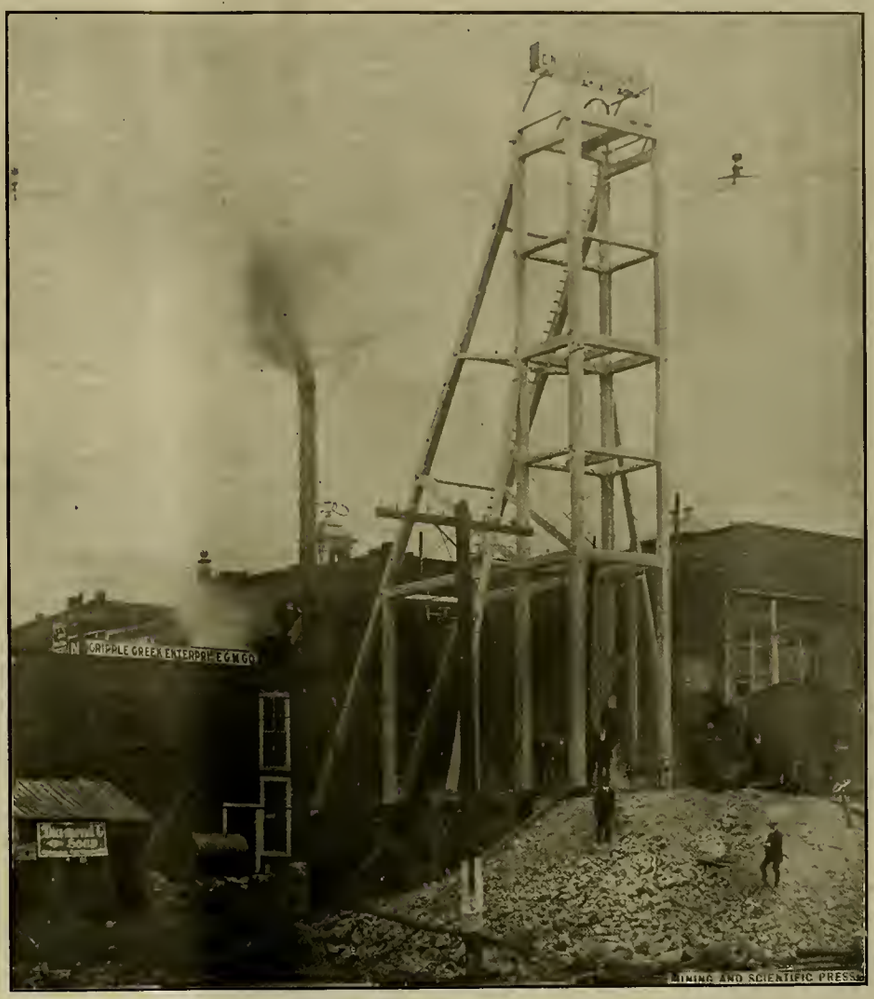
A Novel Head Frame.

There are always new departures in the construction of head frames, many types of which have been described and illustrated in the past in the MINING AND SCIENTIFIC PRESS. The accompanying illustration is that of a new frame constructed by the Cripple Creek Enterprise G. M. Co. of Cripple Creek, Colo. The frame is 60 feet high, the main timbers being 12x12 inches. It is very simple in construction, being of the four-post rectangular type, with the usual back braces. In this frame side braces have also been placed, owing probably to the rather narrow width of the frame, and to the further fact that the entire frame is constructed on a foundation of posts and sills and does not set on the solid rock, due to lack of dumping facilities. It will also be noticed that but one sheave has been provided, the evident intention being to hoist through a single compartment only. The frame is made more rigid by cross tie rods, which pass through the timbers, and are provided with washers and nuts on either end. The bucket is handled with a trip rope made fast to a heavy cross tie at the rear of the shaft.

This method of handling rock through vertical shafts is very commonly practiced in Colorado, as well as elsewhere. It is customary to arrange some sort of door or apron over the shaft to prevent rocks falling back into the shaft when dumping the bucket. Doors so arranged are easily handled by the topman, by means of rope and counterbalance, which assists in equalizing the weight of the door.

There are numerous bodies of ore known to exist under the streets of Cripple Creek, but no one has been permitted to mine under these thoroughfares without first making a satisfactory arrangement with the city authorities. This company has a lease from the city of Cripple Creek to mine under the city by paying the city certain royalties. They have their shaft down 210 feet and will sink 300 feet farther, and are now crosscutting at the 200 level. They have two veins that run from $138 to $765 per ton. One of the veins is 18 inches wide and the other 3 feet wide. They have recently installed an 8-drill compressor, and it is the intention to put in a 125 H. P. boiler.

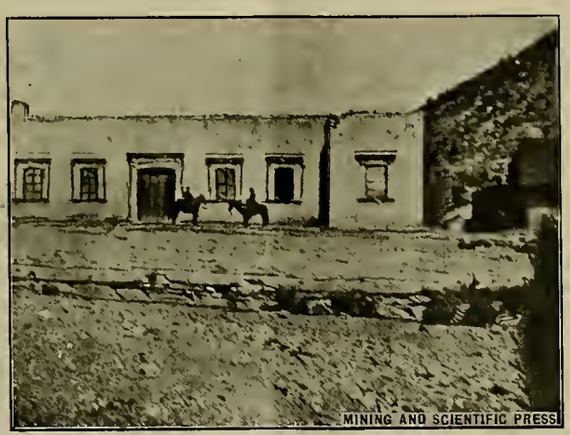
C. E. Miesse is treasurer, D. Hanley is president, and L. H. Allan of Cripple Creek, Colo, secretary.



New Head Frame Enterprise Mining Co., Cripple Creek, Colo.



Terminal of Railroad at Ojito, Mexico.



Ruins of the Old English Mint at Guadaloupe y Calvo, Mexico.



Street Scene at Guadaloupe y Calvo, Mexico.



Forest on Crest of Continental Divide, Chihuahua, Mexico.

(See Page 51.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.
TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION.

United States, Mexico and Canada.....$3 00
All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

BRANCH OFFICES:
NEW YORK CITY, 720 Park Row Bldg. BOSTON, 42 Worcester Square.
CHICAGO, 1115 Monadnock Block. DENVER, 606 Mack Block.

J. F. HALLORAN..... Publisher

San Francisco, July 25, 1903.

TABLE OF CONTENTS.

ILLUSTRATIONS: Page.
New Head Frame Enterprise Mining Co., Cripple Creek, Colo...47
Terminal of Railroad at Ojito, Mexico.....47
Ruins of the Old English Mint at Guadaloupe y Calvo, Mexico..47
Street Scene at Guadaloupe y Calvo, Mexico. 47
Forest on Crest of Continental Divide, Chihuahua, Mexico.....47
Mining Scenes in Mexico.....51
Heavy Mortar on Steel Wagon for Transportation in Peru, S A.52
Mining in Broken Hill, New South Wales.....53-54
Mining and Metallurgical Patents.....55

EDITORIAL:
A Novel Head Frame.....47
Wet vs. Dry Crushing.....48
The American Mining Congress.....48
Making Records in Mine Work.....48
Prospects in the Yukon Basin.....48
A Special Session of the Colorado Legislature.....48
Probable Extension of the Rand Banket.....48
"Mining and Scientific Press" Headquarters.....48

MINING SUMMARY.....56-57-58-59

LATEST MARKET REPORTS.....60

MISCELLANEOUS:
Concentrates.....49
Igneous Rocks: How to Identify Them.....50
Precipitation of Gold From Cyanide Solutions.....50
From Parral to Guadaloupe y Calvo, Chihuahua, Mexico.....51
California at the St. Louis Exposition.....52
Velocity of Objects Floating in Water.....52
Transportation in Peru.....52
Use of Alkalies in the Cyanide Process.....52
Mining in Broken Hill, New South Wales.....53
Values in Sluice Concentrates.....54
Leaching Siliceous Copper Ores With Acids as Solvents.....54
Cost of Mining and Reducing Ores, New York & Nevada Copper Co., Ely, Nev.....54
Mining and Metallurgical Patents.....55
Personal.....59
Commercial Paragraphs.....59
Obituary.....59
New Patents.....60
Notices of Recent Patents.....60

Wet vs. Dry Crushing.

Dry crushing is being tried in Rhodesia, South Africa, in the treatment of gold ores by cyaniding. This method of treating the average quartz ore, it would seem, had had a sufficient trial to demonstrate that the process is not all that could be desired, and in the case of New Zealand, after a trial lasting several years, it has been found that wet crushing produced better results, and that a higher saving was possible by wet than by the dry crushing method, with no materially increased cost for the former method. In the past dry crushing mills, which have been used in some localities in the United States where preliminary roasting was necessary, have been found very detrimental to the health of the workmen, but the recent introduction of exhaust fans, which take the dust from the batteries as fast as created, has largely reduced this objection to a minimum. Where a wet process is to be employed in the subsequent treatment of the ore, it has not been demonstrated that dry crushing is advisable. It is true that prior to the successful treatment of slimes after wet crushing, that dry crushing was superior to wet on ores containing a low percentage of sulphides and no coarse gold; but since slimes can now in most instances be successfully treated, dry crushing is practically a process of the past.

The American Mining Congress.

The sixth annual session of the American Mining Congress is to be held at the cities of Deadwood and Lead, South Dakota, Sept. 7th to 12th, inclusive. During the meeting addresses will be made, technical papers read and excursions taken to the various points of interest in the Black Hills. These trips can be taken without hardship or inconvenience, as railroads run to or near all of the larger mining, milling and smelting plants, as well as to the various points of scenic or geological interest; of which there are many. Visitors, it is stated, will be permitted to see the underground workings of the Homestake mines—a privilege that has been denied for many years.

Making Records in Mine Work.

Rapid work in excavating and securing mine openings by means of timbers or otherwise, where time is the basis of comparison, is only accomplished under favorable conditions. Work which is actually not quickly done when measured by the number of days required to accomplish it, may be considered so, however, when comparison is made with similar work elsewhere. Favorable conditions comprise rock not too hard, no trouble from water, or other extraneous causes, efficient and diligent workmen, good tools and competent supervision, and there is much in the last factor. Competent workmen are not always diligent, nor can good workmen do good work with poor or insufficient tools. The statement that a certain shaft was sunk a given number of feet in a certain number of days does not indicate that the work was accomplished more quickly than it should have been, nor does the statement that an average of but 6 inches per day was made in a certain drift, signify that the ground was unusually hard, or that there was some other feature about the work which seriously retarded the work. The fact that a given time, be it long or short, was required for the accomplishment of certain work, however, suggests that the conditions under which it was accomplished were either unusually favorable or particularly onerous. Under any circumstances, work is accomplished the most quickly under efficient superintendence, with the most capable workmen. The personal equation is a very large one, and when it is accentuated by reason of inferior and inexperienced workmen taking the places of those who are competent, the best work cannot be performed in the shortest given time. Some excellent work has been accomplished under the premium system, which is one of the best and fairest ever introduced in a mine. When the wage rate is fixed at a good and reasonable figure, and the task is set at a mark within the possibility of accomplishment by the exercise of reasonable industry, the offer of a premium for the accomplishment of additional work usually acts as a stimulant to all concerned in the task. Moreover, under such a system there can be no laggards. All must work faithfully for the good of all. If one man in the crew is incompetent or attempts to "soldier" on the others he is quickly called to task, and he must either "keep up his end" or quit the job to give place to another who is able and willing to do his honest share of the toil. In this manner the best results are obtainable as to speed, but this system of working also requires the most careful supervision, for the reason that the workmen in their desire to earn the premium are sometimes inclined to slight what may seem to them small details, and a shaft or drift under such circumstances is more than likely to get out of alignment, and the object of the premium system thereby defeated in the end.

Prospects in the Yukon Basin.

Recent advices from the Northwest country, Alaska and the Yukon Basin, are to the effect that some of the much-talked-of new placer districts are too poor to pay by ordinary mining methods, and it is doubtful in some cases whether they can be worked at a profit by any known method. The notoriety which some of these districts, both old and new, have gained appears to be due to the stories told by certain well known prospectors who have a reputation for finding rich diggings. A word from one of these men concerning a new district, particularly if it be favorable, is quickly magnified and the "rush" is on. Men tramp across those northern wilds without blankets, and often without food, taking a desperate chance of living on the bounty of another class that packs more provisions and outfit than it can care for. There is no promise of fighting over the staking of the Tanana country prior to the stampede to that section, as the diggings are not rich enough to warrant it.

A SPECIAL session of the Colorado Legislature is announced for the coming week, in anticipation of which Governor Peabody has been requested by labor organizations to recommend the passage of an eight-hour law. The last Legislature failed to pass this law, though urgently appealed to to do so. This new attempt is being strongly opposed by the mining and reduction companies generally. Thus far, in most cases where legislative bodies have interfered with the natural adjustment of the labor problem, their efforts have either been abortive or the laws have become a dead letter. In some instances the laws passed have failed to stand the test of the courts, having been declared unconstitutional. In Western Australia the government sought not only to fix the hours, but also the wage rate, and the result has been the closing down of many of the low-grade mines, they being unable to meet the short hours and high wages.

Probable Extension of the Rand Banket.

In a study of the gold-bearing conglomerates of the Rand in South Africa many theories have been advanced with a view to locating a possible extension of these beds. The anticlinal theory is the one now finding greatest favor. In itself, the theory is plausible enough, but at a distance one can form no positive opinion. The mining engineers and geologists who are in the field should be able to determine whether or not there is a reasonable probability of the anticlinal theory having any foundation in fact. It is properly assumed that the conglomerates, and sandstones in which they are intercalated, being of sedimentary origin, must have been deposited in a nearly horizontal position. It is also assumed by some for lack of better evidence that "these sediments were derived from highlands existing somewhere to the eastward, probably in the Indian ocean." This may have been the case, but it seems more reasonable to suppose that they were derived from some region much nearer than the nearest point on the shore of the Indian ocean, a distance of about 200 miles. Conglomerates are usually somewhat local in occurrence, and it seems unlikely that the conglomerates derived the materials of which they are composed from so great a distance.

The bankets with the sandstones are uptilted, dipping to the southward, usually at about 45°, at and near the surface, the dip flattening with depth and distance from the outcrop. That these beds extended farther to the northward, but that their northward extension has been removed by erosion, there can be no doubt, and whether the fold in the Witwatersrand district was a monocline or a synclinal fold is not material, but it is important to know whether these beds are repeated with a northerly dip, or whether the formation thinned out to the northward and never had an existence in the region where there might be a possibility of their being found. These conglomerates, unlike those of South Dakota, did not derive all their gold, if, in fact, any at all, from a pre-existing auriferous formation, but the gold was deposited in the cementing material in a manner similar to the deposit of gold in crushed zones of rock in situ elsewhere. This fact is of importance and has a direct bearing upon the value of any conglomerates which possibly may be discovered to the northward, for should such discoveries be made, it is a question whether or not they would prove sufficiently valuable, if found gold bearing at all, to constitute payable ore. The relative size of the pebbles in the conglomerate should convey some idea of the direction from which the detritus was derived, but as far as noticed no one of the numerous writers on the Rand mines has mentioned any appreciable difference in the size of the pebbles composing the conglomerate. However, a knowledge of the source of the conglomerate is not nearly so important as an idea of its probable northern extension on the opposite side of the fold.

VISITING mining men are invited to make their headquarters at the MINING AND SCIENTIFIC PRESS offices when in New York, Chicago, Denver or San Francisco. At the New York City office, 720 Park Row building, Mr. W. S. Bullock, the Eastern manager, will be pleased to welcome visitors and be of any possible service to them. Similarly, the Chicago manager, Mr. L. A. Greene, 1115 Monadnock block, Chicago, and Mr. E. J. Moore, the Colorado manager, 606 Mack block, Denver, will take pleasure in affording visitors such facilities as are at their command. The same cordial invitation is extended to visitors to the home office, 330 Market street, San Francisco, Cal.

CONCENTRATES.

A PROGRESSIVE MAN must needs often change his views. The man who "knows it all" is a hopeless case, and has outlived his usefulness.

THE specific gravity of sheet iron is 7.7 and that of sheet steel 7 854. A cubic foot of iron weighs 480 pounds, and of steel 489.6 pounds.

RESERVATIONS in mining patents are void unless the same are authorized by law, and after issuance the property rights are governed by State laws.

SOUTH AFRICAN mining claims are bounded by vertical lines. The extralateral and "apex" right is recognized in no mining country on earth, except Bolivia, S. A.—and the United States.

IODINE is extracted from the ashes of seaweed, especially those varieties occurring on the coasts of Japan, France, Scotland and Norway. Iodine is also obtained from Mexico and Chile in the mineral iodyrite (AgI).

THE locator of a mining claim may perform $500 worth of work on his claim as speedily as circumstances and conditions will permit—within a week after discovery, if desirable—and he may then apply for patent.

GOLD was first reported in Georgia, at Duke's Creek, near Nacoochee, about 1829. Another report places the first find near Dahlonega, earlier in the same year. Gold was discovered in Alabama about the same time.

THE mill man who steadfastly holds to the old-time methods of thirty years ago has much to learn, for there are many things about mills he does not know, and the amusing part of it is he does not know that he doesn't know.

THERE are numerous automatic ore samplers on the market and in use in sampling works, mills, etc. They all work mechanically, cutting out a portion of the sample or continuously taking a certain percentage of all the sample.

TO DETERMINE the actual capacity of an air compressor in free air per minute requires a painstaking test. It may be obtained very closely by taking indicator cards of the air cylinder, from which the effective stroke can be determined.

A MINING CLAIM cannot be held for debts contracted by a lessee or person working the same under bond in California, if the owner of the claim post a notice that he will not be responsible for any debts contracted by the person or persons operating the mine.

CONVEYING BELTS can be used to great advantage about quartz mills and other reduction works, carrying the ore in the various stages of the operation where gravity cannot be employed. They are also useful in disposing of waste coming to the mill with the ore.

THE loss of one-fifth ounce of quicksilver per ton of ore treated is excessive; probably too much "quick" is being fed, rendering the plates too soft, with a consequent loss of mercury. The loss of quicksilver will probably be proportionally more on a poor than on a rich ore.

THE dial of a watch may be employed as a compass on any day when the sun is visible. Point the hour hand directly at the sun, and in the northern hemisphere north of the 23rd parallel, south will be midway between the hour hand and the midday mark XII on the dial of the watch.

IT IS always advisable to have extra parts about a quartz mill, particularly those subjected to rapid wear or breakage. In some modern mills an extra cam shaft, with cams in place, is kept in readiness in the event of a shaft or cam breaking, that no unnecessary time need be lost in replacing the broken one.

IT is thought by some authorities that the diamonds found in Brazil alluvial deposits were derived from the degradation of the flexible sandstones found in the vicinity of the mines, but that they were deposited contemporaneously with the sand now forming these rocks. Diamonds are also known to exist in the conglomerates of that region.

BROMINE is extracted from sea water and saline springs—the important occurrences of the latter in the United States being in Michigan, Ohio, Pennsylvania and West Virginia. It is mainly marketed in the form of potassium bromide (KBr). Bromine is also obtained from the mineral embolite, a silver chloro-bromide, which is abundant in Chile.

THE steam turbine is considered to be a commercial success. The gas turbine is the newest device. Its success is yet problematical, and, ultimately, seems to depend upon ability to produce a continuous combustion of gas, under pressure and under complete control. This sounds small, but means much, doing away with the boiler, and relegating water from the business of supplying power as completely as the oar has been relegated from the business of propulsion.

GARNIERITE, or noumelte, is a hydrated silicate of nickel and magnesium, represented approximately by the formula, $H_2(Ni\ Mg)\ Si\ O_4 + aq$; amorphous; soft and dull; color, bright apple green to nearly white; specific gravity, 2.5. It is an important ore of nickel, principal occurrence being near Noumea, New Caledonia island, in serpentine associated with chromic iron and steatite.

THE power required to run a wet crushing gold mill of the usual design varies somewhat, owing to distribution of power, and the amount of friction to overcome. The power required in a small mill is proportionately more than in a large mill. Forty horse power should be sufficient to run an ordinary 20-stamp mill, comprising the battery of twenty 1000-pound stamps (100 drops per minute), one rock breaker and eight concentrators.

A SINGLE machine drill, 3½-inch piston, working at normal speed under ninety pounds pressure per square inch, will use about 160 cubic feet of free air per minute. A number of machines, however, may be kept constantly running with proportionally less air. For instance, ten drills of the same size operating under similar conditions will use but 1120 feet of free air, equivalent to an average of 112 feet per machine. This takes into consideration leakage, friction, etc.

ROADS AND DITCHES, as well as the construction of buildings and the installation of machinery, when for the benefit of an unpatented claim, may each and all be applied on assessment work on the same; but a ditch constructed and actually reaching a claim, which is not used in connection with the same and is not intended for use on the same, cannot be applied in this manner. The bringing of tools, etc., upon a claim is not permissible as a charge to assessment work.

SHAFTS may be sunk in quicksand or other wet running ground by freezing the ground by means of the ammonia process. In Alaska the placer ground is usually found already frozen and miners thaw it by building fires in their shafts and tunnels, or by means of steam-thawing machines. Frozen ground is difficult to cut, particularly when in the form of gravel. As sand, however, it can be removed by use of chisel-shaped digging tools.

FOR filling in grooves of transmission pulleys various materials have been used, such as tarred oakum, jute yarn, hard wood, india rubber and leather, but that which is said to give the greatest service consists of alternate segments of leather and rubber, soaked in tar and packed in the groove, and then, when dry, turned out to a true surface. Where a running rope is subject to considerable side vibration the flanges are sometimes lined with leather riveted on. These protect the rope from excessive wear.

THE area of a circle is equal to the circumference times the diameter, divided by 4 or multiplied by 0.25. The circumference squared times 0.07958 also equals the area, or the diameter squared times 0.7854. To find the area of an annular ring formed by the space between two concentric circles, add the two diameters and multiply the sum by their difference, and this product by 0 7854. The areas of circles are to each other as the squares of their diameters.

THE rock sample from Missoula, Mont., is quartzite of fine and uniform texture with some secondary silica developed in places, the crystalline structure of which obliterates the normal granular texture of the rock. The yellow mineral is iron oxide. "Free gold" can be seen in the specimen. The fine-grained soft material with black color is probably the filling by fine granular silica and graphite of a pre-existing cavity in the rock. There is no indication that the rock does or will contain copper in depth, though such might prove to be the case. The rock should amalgamate readily, and, if the fine gold is not saved by that process, the tailings would probably be well adapted to cyanidation.

SCHOOL LANDS in the State of California may be declared mineral upon the presentation of affidavite or otherwise to the satisfaction of the Surveyor-General that any portion of the sixteenth or thirty-sixth section belonging to the State is valuable for its mineral. The Surveyor-General shall then not approve any application for the purchase of the same, nor shall the Register of the State Land Office issue a certificate of purchase therefor until the question of the character of the land shall have been determined by a court of competent jurisdiction, and the sixteenth and thirty-sixth sections of any township (school lands) of California, when determined to contain valuable mineral, are subject to location of mineral claims under the Federal laws.

COPPER ORES generally are dissolved by digesting in c. p. nitric acid. Sulphur separating in the process will contain little or no copper. One of the most reliable methods of determining the percentage of copper in ores is by the electrolytic method. The conditions essential to proper working of this process are a sufficiently dilute solution, not too much free acid, and a low current of electricity. Hydrochloric acid must not be present, nor much nitric acid. The presence of much antimony, bismuth, arsenic or silver will cause the copper to be impure and will give misleading results. Bismuth is particularly obnoxious, a small amount giving a higher apparent percentage of copper than really exists. Fortunately they are rarely present in amounts sufficient to produce annoying results.

THE Federal Statutes permit assessment work to be done outside the boundaries of an unpatented claim to count as work actually performed upon the claim when it is evident the work so performed is for the benefit and ultimate development of the claim. Consequently work done outside the claim upon another claim which is patented, if for the benefit of the one unpatented, may be considered as work done upon it. (Hall vs. Kearney, 18 Colo., 503; 33 Pacific Reporter, 373; Sherlock vs. Lighton, 9 Wyo., 297; 63 Pac., 580; also Little Dorrit G. M. Co. vs. Arapahoe M. Co., 71 Pac., 391—a recent Colorado decision.) When one owns a group of contiguous claims it is not necessary that all of the group should be patented at one time. The several claims may be patented singly and at different times.

IN the case of the Northern Pacific Railway Co. vs. Soderberg, the Supreme Court of the United States decided a question that involved what constitutes mineral lands, under the act of Congress of July 2, 1864. The case arose out of an application by the railroad company for an injunction to restrain the appellee from removing or disposing of granite from a quarter section of land in the State of Washington, of which he had taken possession under a mineral location. The Supreme Court decided in favor of Soderberg, holding that the legislation in question coincided with rather than opposed the overwhelming weight of authority to the effect that mineral lands include not merely those that are metalliferous, but also all such as are chiefly valuable for their deposits of a mineral character which are useful in the arts or valuable for purposes of manufacture.

THE "pounding mill," as the stamp mill was originally known, is supposed to be of European origin, and was in use in Europe, before the discovery of America, for the pulverizing of ores. One of the first stamp mills built in the United States was one of six stamps, erected at the Tellurium mine in Virginia in 1836. These stamps weighed 50 pounds each. The following year a similar mill was built at the Haile mine in South Carolina. These mills had wooden stems shod with iron. The dies were iron. They were similar in mechanical working to modern mills. The stems were square and did not revolve. The cams worked in slots cut in the stems. It is stated that a 10-stamp mill of this primitive design could be constructed for about $150 and have a capacity of about 300 to 500 pounds of ore per stamp daily. Amalgamation was accomplished on a strip of copper plate the width of the battery and a foot wide.

A STEAM ENGINE or air compressor indicator is a device by means of which the fluctuations of pressure and volume of the steam within the cylinder may be measured. It also shows the work done and the power developed by the action of the steam upon the piston and the gross work performed by the transformation of heat energy. The dynamotor is an instrument employed to measure the net work of the engine, the work done and power available at the shaft of the engine for actual application. The difference between the measures of these two indicators is the energy lost, due to resistance in the machine itself, the sum of frictional resistance and the loss due to back pressure on the exhaust side of the piston. The indicator is attached to a pipe connecting with the cylinder of the engine, and the variable pressure of the steam during every part of the stroke is recorded on a card by a pencil which forms part of the indicating instrument. The indicator itself consists of a small cylinder with movable piston, the latter held by a spring, and this is compressed or extended as the pressure varies, this being indicated on the card.

PHOSPHORESCENCE is a property possessed by a variety of minerals. The continued emission of light by a substance (not incandescent) produced, especially after heating, exposure to light or to the electric current is called phosphorescence. The mineral fluorspar (calcium fluoride) is highly phosphorescent after being heated to about 300° F. The several varieties of fluorspar emit light of different color. Chlorophane, one variety, emits an emerald green light; others purple, blue and reddish tints. The phosphoresence may be observed in a dark place by subjecting the mineral to heat below redness. Some varieties of white marble emit a yellowish light upon slight heating; tremolite, a variety of amphibole, also emits phosphorescent light. Some minerals, naturally phosphorescent, appear to lose this peculiar property upon being heated, but it may be restored by passing an electric current through the calcined mineral. Some varieties of calcite, fluorite, apatite (calcium phosphate) and some specimens of diamond, which are not phosphorescent, may become so by application of electricity. Exposure to rays of the sun often produces a very pronounced phosphorescence in many diamonds, though some diamonds appear to be wholly destitute of this property. It has been noticed that exposure of the diamond to the blue rays of the spectrum intensifies the light, while exposure to the red rays causes it to rapidly fall and disappear.

Igneous Rocks: How to Identify Them.

Written for the MINING AND SCIENTIFIC PRESS by CHARLES J. O'BRIEN, M. E.

The matter, perhaps, in which the average prospector or miner is least apt to show concern is in the name which he bestows upon the rock formations among which he pursues his vocation. As a general rule, his nomenclature is apt to be more fanciful than exact. In mineralogy he evinces, perhaps, somewhat more interest. He does, however, consider it proper to christen the hanging and foot walls of his lode, and his error is not always so palpable as that of the miner who recently stated that his hanging wall was granite, while his foot wall was syenite.

It is, of course, neither necessary nor advisable that the miner should try to make fine but useless distinctions. The comparatively few rocks, however, which constitute the ore-bearing series can be distinguished with reasonable certainty after a little practice, prefaced by an intelligent and systematic study of their composition and characteristics, mode of occurrence, etc.

This paper is addressed to the task of supplementing the ordinary text-book descriptions of the more common igneous rocks with a few practical hints for identifying them without microscopical examination. As a rule, petrographical text-books are far less explicit than could be desired upon those points which enable us to identify a rock in the field. To this may be added the fact that scarcely two authors coincide in all particulars, at times touching but lightly on essential characteristics, lingering over those of only secondary importance. As a rule, there are seldom more than one or two minerals which, combined with the mode of occurrence, determine the identity of a rock. When this is the case it should be made plain in works purporting to be text-books, and when other minerals, or forms of the same mineral, are merely subsidiary, this fact, also, should be plainly brought out.

Let us take trachyte as an instance to the point:

I. C. S. Text Books: Of the acid group, trachyte is one of the most common forms. It is usually a light-colored rock, and has a peculiar characteristic rough feel, on account of the fact that the ground mass is composed of sanidin, in which are needle-like crystals of the same material. Augite is always present, and other minerals may occur associated with it, especially boitite.

Le Conte: Orthoclase; crystals of sanidin; glassy magma, with or without embedded crystals.

Kemp: Chief feldspar orthoclase; biotite (or) (and) hornblende, (or) (and) augite.

Dana: After orthoclase, shows that trachyte may have sanidin, forming sanidin-trachyte, or it may have hornblende, augite or biotite.

Now, to the student the main fact is that trachyte is an orthoclase lava; its name is, therefore, determined by its feldspar and its mode of occurrence. Thus, any orthoclase lava is trachyte, and other minerals, should they occur, may be regarded as subsidiary, since they do not change the character of the rock.

The subjoined table gives a list of the more common igneous rocks, arranged so as to have those of essentially the same composition in the same line:

	LAVAS.	INTRUSIONS.	PLUTONIC.	FELDSPAR.
ACIDIC	Trachyte (Augite, etc.).	Felsite.	Syenite (Hornblende).	Orthoclase (potash).
	Rhyolite (Quartz-trachyte).	Quartz-felsite (Quartz-porphyry).	Granite (Quartz, mica).	
BASIC	Andesite (Hornblende).	Diorite (Hornblende).	Diorite (Hornblende).	Plagioclase. Oligoclase (Soda-lime).
	Dacite (Quartz-andesite)	Quartz-diorite.	Quartz-diorite.	
	Basalt (Augite, olivine).	Diabase (Augite).	Diabase, Gabbro (Augite).	Labradorite (Lime-soda).
	Occurring only as overflow; fine-grained and glass-bearing.	Intrusions—dikes, sheets, bosses, laccolites; fine-grained.	Occurring in underlying masses; coarsely crystalline; uncovered by erosion	

TO IDENTIFY THE FELDSPARS.—The important feldspars in igneous rocks are the potash feldspar, orthoclase, and the soda-lime and lime-soda feldspars, called collectively plagioclase. Orthoclase has two cleavages at right angles, while the cleavage angles of plagioclase are oblique. The two systems look much alike, however. Where the ground mass is in a somewhat carious condition it may be coarsely broken up in a mortar, when the crystals will separate in a more or less perfect state, and may then be studied to better advantage. The crystals may be examined for the fine straight ridges or striations peculiar to plagioclase. All of these tests may fail, however. Perhaps the most speedy and reliable test is to try a fine, clean splinter before the blowpipe. Orthoclase fuses with extreme difficulty, plagioclase with comparative ease.

HORNBLENDE AND AUGITE.—Look for 4-sided and 8-sided outlines in augite; acute rhombs and hexagons in hornblende. The cleavage angle of hornblende is about 124°, that of augite about 87°. There is thus little difficulty in distinguishing them, even when the crystals are small, should they be well crystallized.

THE MICAS.—The micas of most general occurrence are muscovite (white mica). and biotite (black mica). Often occur in disseminated scales, sometimes as aggregates. Try lifting an edge with the knife point. The laminæ are flexible and elastic; sometimes have a green tint, due to alteration. Laminæ have a tendency to scale off upon weathering.

OLIVINE (CHRYSOLITE).—Occurs in irregular grains and nodules, disseminated throughout the magma of basaltic rocks; sometimes looks like broken pieces of green bottle glass, but may be yellowish, or brownish, from incipient oxidation. Very hard.

QUARTZ.—Generally colorless or bluish, in irregular grains or nodules, but sometimes partly crystallized. Cannot be scratched with the knife or fused before the blowpipe.

This completes the list of determining minerals in the classification of all the common igneous rocks—certainly the most important of them, unless we except phonolite, which is a rare rock.

It should be borne in mind that igneous rocks are more or less changed for varying depths below the surface, and this is especially true where these rocks are contiguous to veins or dikes. A basic rock containing considerable iron, like the average diorite or andesite, weathers to a red or brown color on the surface. Below this, the zone of complete oxidation, we shall encounter a zone in which green is the prevailing color, the dark silicates having mostly changed to chlorite. At a still greater depth we come upon the gray, unaltered rock.

In classifying a rock, therefore, the first step should be to ascertain the condition of the specimen—whether altered or not—and to try to form some idea of its original appearance. The student should not be misled by colors, because, as shown, a rock may be of several different colors, corresponding to different stages of decomposition or metamorphism.

The next step should be to ascertain the different modes of occurrence. A granitoid structure is almost invariably the characteristic of the primeval or abysmal (plutonic) rocks, though erosion may cause them to outcrop or even to show considerable superficial areas. Let it be borne in mind, however, that quartz porphyries sometimes simulate the texture of granitoid rocks closely enough to deceive anything short of a close scrutiny. Plutonic rocks have a characteristically granular texture, which is generally coarse, but may be somewhat fine; but the regularity and uniformity in the size, number and distribution of the several minerals distinguish them from quartz porphyries. Again, although the crowding together of the minerals prevents them from developing fully their respective crystal forms, the feldspars always show their cleavage planes distinctly, while the feldspar of quartz porphyries is fine-grained or amorphous.

Diabase differs from other granitoid rocks in that the feldspars are automorphic—that is, their crystal forms are not modified, as in granite, by the accompanying minerals. The feldspars are lath-shaped and form a network the meshes or interspaces of which are occupied by augite, the other essential constituent of the rock.

Intrusive rock masses usually assume forms that make their classification obvious, even at a distance. Where cuts or faults have exposed them they are sometimes seen as long, relatively narrow ribbons, called sills—which is but another name for the cross-section of an intruded sheet. Laccolites are rounded, often flattened, domes; but instances are not wanting of denuded cones and spires reaching to a great height, so attenuated that they could by no possibility have been projected upward without lateral support, yet so hard and impervious as to resist the agencies which have worn away hundreds of feet of the circumjacent rock, as well as an unknown thickness above them. Dikes are another common form, but these should be distinguished from mere cracks or fissures which have been filled from above by overflows. Subsequent erosion may strip the overflow, leaving what appears to be the outcrop of a dike, or of a series of dikes.

Lavas may be recognized as superimposed bodies of rock covering considerable areas, and having a fine-grained or glassy texture. Of course, a lava may be covered by a subsequent overflow. Probably the lava having the most characteristic mode of occurrence is basalt, which is seen rising in successive steps or terraces, having well-defined angles, and often faced with rows of hexagonal columns.

In fine-grained or glassy rocks—intrusive or eruptive—it is, course, impossible to study the crystals, unless the rock be porphyritic, in which case the crystals are an index to the magma. As a rule, orthoclase rocks are light-colored and quite hard, as well as fusible with difficulty. The dark silicates occur sparingly, or not at all. Plagioclase rocks, on the other hand, are prevailingly dark—some shade of gray, when unaltered. They are easily scratched with a knife, fuse readily, and the ratio between the light and dark minerals approaches a parity.

There are, however, diorites and andesites which are light in color, but these can readily be distinguished from orthoclase rocks by their fusibility. There is little difference between diabase and basalt, but the former does not occur in overflows. Basalt of the typical kind is porphyritic with olivine, and sometimes contains a brown variety of hornblende, which is peculiar to basaltic rocks. Diabases sometimes contain olivine. These are very basic rocks, dark-colored and heavy.

Comparing the textures of intrusive and eruptive rocks, the former are apt to preserve the even and regular distribution of minerals which characterize their plutonic prototypes. Eruptive rocks, on the other hand, present a varied and uneven texture. Such crystallized minerals as may occur are irregularly distributed, being much more abundant in some places than in others, even in a small specimen. The magma may be more or less glassy.

There are, of course, all degrees of variation from the typical rocks of any series. Thus, there is micaceous granite, mica-diorite, soda-rhyolite, etc., besides the multitudinous distinctions made by petrologists; but the student who has learned to classify the typical rocks with reasonable accuracy will be able to deal with their variations.

Another class of rocks important in mining is the metamorphic series, especially the schists, but their consideration is not permissible within the limits of this paper.

Precipitation of Gold From Cyanide Solutions.

TO THE EDITOR:—Concerning the precipitation of gold from cyanide solutions by acidulating same with sulphuric acid and precipitating the gold by means of sheet zinc, in applying the method there are some fundamental principles which must be observed, and to carry these through will entail a cost which, in my opinion, will make the method prohibitive from this standpoint alone.

To overcome the normal working alkalinity of an ordinary cyanide mill solution and produce a degree of acidity which will give precipitation takes from 3 to 8 pounds of commercial sulphuric acid per ton of solution, according to the strength of cyanide solution and the amount of protective alkali used. Commercial sulphuric acid, delivered at most of the Western plants, costs from 3 cents to 4 cents per pound. The average cost, then, for acidulation alone would be 15 cents per ton of solution. The solution once acidulated would require to be brought back with alkali to its normal working degree of alkalinity before it could be used on the ore again. This practically means the neutralization of the added acid with an equivalent of caustic soda, and would cost approximately 24 cents per ton of solution, or a total cost between acid and alkali of 39 cents per ton of solution. Add to this the cost of the zinc consumed by the acid, which will bring the total cost for precipitation alone to considerably over 40 cents per ton of solution. In practice the quantity of solution to ore varies greatly, from ½ to 1 part of solution to 1 of ore. Take the best condition, ½ solution to 1 of ore, and the cost for precipitation per ton of ore will at least be over 20 cents per ton for chemicals and zinc only. Against this place the cost for precipitation on zinc shavings in the usual manner, which varies from 3 cents to 12 cents, depending on the strength of solution used and the value of ore treated. Besides the prohibitive cost of this process, it has other disadvantages. When a cyanide mill solution is rendered acid, a large quantity of cyanides (of copper, iron, zinc, manganese, etc.) is precipitated. These would necessarily be collected with the gold precipitated and would give a product much more impure and harder to refine than the ordinary gold slimes from the zinc box.

There are other features in connection with this process which would have to be considered in discussing the same minutely, such as the regeneration of a certain amount of cyanide, i. e., part of the cyanide which goes to form the double cyanide, all of which is more than counterbalanced by the loss of cyanide by volatilization, together with the loss of

cyanide combined with the metals thrown out on acidification, the latter loss being recoverable to a certain extent by other methods (in regular practice), the gradual fouling of solution with alkaline sulphate, and the increased cost for handling solutions by this method over the general zinc box method. But the few points discussed in detail above are, in my opinion, sufficient to condemn the method.

Denver, Colo., July 18. WILLIAM ORR.

From Parral to Guadaloupe y Calvo, Chihuahua, Mexico.

Written for the MINING AND SCIENTIFIC PRESS by H. Z. OSBORNE.

In January and February of the present year the writer made a visit to Mexico, which included the Parral district, in the State of Chihuahua, and afterwards a muleback trip from Ojito, the then western terminus of the Parral & Durango Railroad, westward across the Sierra Madres to Guadaloupe y Calvo, Boborigame, Cebollitos, Mala Noche, Cerro Colorado and La Cumbre, in the southwestern corner of the same State, where it adjoins Sinaloa and Durango, and back again eastward, recrossing the Cordilleras to Ojito. This muleback trip occupied twenty-nine days, and, while the distance traveled was not so very great horizontally, probably less than 400 miles, my traveling companions and I were in the saddle at least a portion of twenty-seven out of the twenty-nine days.



1—Road to Jacalitos. 2—Piedad Mine. 3—Arrastra Burro Canyon. 4—Burro 5-Stamp Mill. 5—Guadaloupe River.

Mining Scenes in Mexico.

A party traveling in the mountains of Mexico must be "self-contained,"—that is, it must carry everything that is needed for sustenance, comfort, health and safety. In our party were three Americans beside myself, one of whom was familiar with the country and spoke Spanish—a most valuable acquisition in that country. We outfitted partly in Los Angeles, Cal., and partly in Parral. In Los Angeles we bought a small 9-foot centerpole tent, the centerpole in two sections, for convenience in packing; light folding military cots and blankets. In Parral we obtained mules for riding and packing; such provisions as flour, beans, bacon, fresh meat, lard, coffee and sugar, and frying pan, coffee pots, tin plates, cups, spoons, knives, forks, etc. We also hired three "mosos," or native servants. Upon the kind of mosos that one gets much depends for the comfort and pleasure of the trip. The moso's work is to care for the mules—to feed, pack and unpack them, and drive the pack animals, prepare the camp at night, cook the meals, wash the dishes, and be good natured and respectful. Our party was fairly fortunate in this regard. We took one moso (Santiago) the round trip, and picked up two others at Guadaloupe y Calvo in place of two worthless ones that we started out with. These mosos will trot behind the pack mules all day long, with nothing on their feet but boraches—a piece of leather like a sandal, held to the sole of the foot by leather thongs passed around the ankles. Frequently they must cross streams and travel through mud, and in the high mountains we encountered some ice and snow; but the good nature of the mosos was rarely disturbed, and they would often come into camp at night after the day's journey whistling or singing. At night, if they have a good camp fire, a manta to lie on and a serape to wrap up in, they will sleep soundly until the hour for hunting up the mules in the morning—usually 3 or 4 o'clock—and apparently want nothing better. Their compensation is $1 a day (Mexican)—about 40 cents of our money—and "found." This moderate figure enables one to indulge in personal service that would be extravagant at home. The mules, with their packs of supplies for the trip, camp outfit, etc., were sent out from Parral a day or two ahead, and were met at the end of the railroad, at Ojito, the last station on the road, a few kilometers from its terminus in the timber. The start from Parral was made at 6 o'clock in the morning and Ojito was reached about 10 o'clock. It was expected that a ride of three or four hours would be made the first day, just to get accustomed to the trail. So, after the arrival at Ojito, the packs were made up for the mules and the first meal in camp prepared and served. Although the sky was clear, our first meal was prepared and eaten in a high gale of cold wind, most unlike one's first conceptions of Mexican weather. For a table a manta, or mat, or a piece of canvas spread on the ground, and, with a good open-air appetite, a meal of frijoles and bacon, or, perhaps, a little fresh meat and good biscuit, baked on an ingenious device of tin for catching and reflecting the heat from the camp fire upon the baking bread, is by no means bad.

The station of Ojito is south and a little west of Parral and but a few miles from the boundary line of Chihuahua and Durango. The course traveled from Ojito to Guadaloupe y Calvo is about southwest, and the distance is probably a little more than 100 miles. Distances, however, in that country are popularly measured by time, rather than by miles, and an inquiry as to how far it is to a certain point will be answered: "It is 3½ hours," or "two hours," as the case may be. This takes into account the difficulties or steepness of the trails, which are frequently more important than the number of miles. But I observed that it always required the full amount of time claimed to make a given point, and when I was told that it was a ride of "3 hours and 35 minutes" to Cebollitos, or wherever it was, I generally calculated on about five hours of stiff travel, and was rarely disappointed by an earlier arrival at the destination. The trip from Ojito to Guadloupe y Calvo is considered 3½ days' muleback travel, and it can be made in that time; but 4½ days is more comfortable.

Between the two points the much-traveled trail passes through a great variety of country and scenery. It passes over mountains and through valleys, but, while thus alternating in elevation, it gradually rises from 5000 or 6000 feet above sea level on the eastern slope of the Sierra Madres until the continental divide is crossed the second day out at an elevation of 10,500 feet. The point of division is not sharply marked; but, on the contrary, there are miles of comparatively level country at the summit, covered with pine and oak timber with a good growth of grass in the abundant soil underneath. There are occasional small mountain lakes, and altogether the resemblance to the timbered parts of our own Sierra Nevadas in California, in the character of the timber and general appearance of the country, is quite marked, though the timber is not so large nor are the trees so near each other as in our mountains.

The scenery is often grand. Four rivers were crossed, and some of these cut the mountains with deep canyons which would be notable if they were in the United States. One of these, the Rio Verde, compares favorably as to impressive grandeur with the Grand Canyon of the Yellowstone, although it lacks the brilliant and varlegated coloring of the latter, its precipitous walls, as its name implies, being a deep shade of green. The trail crosses this canyon, passing down to the bottom, from the comparatively level tablelands on one side to the same on the other. A half day is needed to cross the canyon, although the horizontal distance across can be scarcely more than 3 miles. It is a piece of the trail that is most trying to both mules and riders.

Of the four rivers that were crossed, one, the Reparo, flows northeasterly into the Concho, which finds its outlet in the Rio Grande, and thence into the Gulf of Mexico. The other three flow westward and have their outlet in the Pacific. They are the Rio Verde and the Turache, which flow into the Rio Fuerte, and the Bozanopa, which is one of the branches of the Sinaloa river. The latter river was crossed two days west of Guadaloupe y Calvo.

After leaving the rich mineral districts of Parral, Minas Nuevas and Santa Barbara, the entire country westward nearly to Guadaloupe y Calvo is covered with light-colored, eruptive rhyolite rock, locally called cantara, in which little or no mineral of value is found. At Guadaloupe y Calvo the cantara has been eroded away so that the underlying rocks are exposed in which the veins exist, and to the westward of Guadaloupe y Calvo, although still somewhat in evidence in places, the cantara has been worn out over large areas, exposing the older formations and their inclosed mineral veins. East of the Sierra Madres, while gold veins are occasionally found, silver prevails, and on the western slope the reverse condition exists, gold veins predominating. This is especially true in the western part of the Guadaloupe y Calvo district.

Because of the rhyolitic overflow referred to over the higher parts of the Sierra Madres, covering as it does to a great depth such possible veins as may exist in the lower formations, the trip has not the economic interest that it would posses were it a region traversed by mineral veins. But the scenery is grand and the trail for long distances passes through forests of pine, oak and madrona. There are no towns or hamlets between Ojito and Guadaloupe y Calvo. About five hours out from Ojito is a ranch at the Rio Reparo. Midway between these points is a small stream, called Chivete, and a spring in the Navarro valley, an hour farther along. Three and a half hours west of Reparo is the Arroyo del Mais, pretty well up in the main Sierras. This was our second camping place, on the night of January 21, and, as the ice froze an inch thick during the night, it may be inferred that it was a cold camp. As no one lives within miles of this desolate arroyo, and no corn or other cereal is raised there, there appears no particular reason why it should be called the arroyo of corn. From Arroyo del Mais to Rancho de las Lagunas is about three hours and a good ride for lunch. Here are the ruins of an old adobe ranch house and corral. From the Lagunas to the bottom of the Rio Verde canyon is three hours more. The clambsr down this canyon and up again on the western side, embracing a drop and raise of from 1700 to 2000 feet, is something to remember. A stream of hot water flows into the Rio Verde near the ford, carrying a good volume of water. Its source is a series of hot springs a mile or so above. From Rio Verde to Cuevo del Burro is three hours' ride. We were caught in a storm of rain and snow at this camp for a day on our way out. From Cuevo del Burro to Cienega Prieta is another three hours, and here we camped the fourth night out. The Cienega Prieta is the first "going" ranch beyond the Reparo and is conducted by an American, Mr. Rhodes. A supper and breakfast, that included eggs and fried chicken, was a welcome change from the ordinary camp fare. From Cienega Prieta to Guadaloupe y Calvo the ride is made in one day, the Turache river and canyon being reached about two hours out, Ojo Frio in six hours and Guadaloupe y Calvo in eight hours. The riding time from the railroad is considered twenty-eight to thirty hours. While there are many grander places in the world than Guadaloupe y Calvo, after this ride there are few that are more welcome to the arriving traveler.

Guadaloupe y Calvo is the capital of the mining district of that name. Here all mining locations, or denouncements, must be made and recorded. Here, also, is a postoffice and a telegraph office combined, the telegraph line being owned and conducted by the Mexican Government. One of the wise policies of President Diaz is to run telegraph lines into the re-

mote sections of Mexico, enahling the rapid transmission of news. This makes revolutions difficult and almost impossible. The rates for telegraphing are reasonahle and can hardly he sufficient to fully indemnify the Government for maintaining and operating the lines. When a message is received and paid for, the operator issues to the sender an official receipt for the money paid. At the postoffices, upon receipt of the mail, a list is made of persons for whom there are letters and the list is posted in the office. So there is no necessity to inquire for mail. This system would hardly do in a large American office, where thousands of letters are received each day. The officers of the postal department—the Administracion de Correos—are usually polite and accommodating. In Guadaloupe y Calvo the principal official is the Jefe Politico. His powers are very great and include to some extent those of hoth an executive and a judicial character. With evil-doers of a desperate type the Jefe Politico does not hesitate to exercise the power of life and death. The present Jefe Politico at Guadaloupe y Calvo, Don Angel P. Ariza, is a man of education and good judgment, and has the reputation of administering his office with courage and justice. In two years of his incumbency twelve men had either heen executed in the district or killed by the rurales while in pursuit for crimes of pillage or violence.

When an individual or a hand of men are known to he criminals they are treated with very little ceremony. The rurales follow them up, hut rarely capture them. A mound of rock along the trail, surmounted hy a rude cross, is the sole reminder of their existence. Ahout two days' travel northwest of Guadaloupe y Calvo, and an hour before reaching Bohorigame, we came upon a mound in the forest—a very large one. It was ahout 20 feet long, 10 feet wide at the hase and 5 feet high. A neat cross marked the head. In this pile of rock thirteen handits were huried—an entire hand, who twelve or fifteen years ago infested this section, killing and rohhing travelers on the trail. The rurales surrounded and killed every one of them, then huried them in this decent way and placed a neat cross at the head of their tomb for the repose of their souls. So rigorous are the Mexican officials in dealing with this class of criminals that it is douhtful if there is an organized hand of bandits in Mexico. Certainly there is not in this section. The crimes of murder and rohhery on the trail or highway are rare. Nevertheless, every one travels armed, although the necessity does not seem apparent. It is, however, the custom of the country, and possihly one would receive less consideration and not be so safe if he traveled unarmed.

Guadaloupe y Calvo is a town of 2000 or 3000 people, and thoroughly Mexican in its architecture and characteristics. One of the accompanying illustrations is a street scene in Guadaloupe y Calvo. The houses are generally of adobe and one story in height The streets are very narrow and paved with cobblestones No vehicles ever pass through them, as all the traffic is done on pack animals. The principal store, that of Don Tiburcio Garcia, is a fine building of two stories, which also includes his well-furnished residence. A large stock of merchandise is carried, embracing ahout everything that is likely to be needed in the country Don Tiburcio has also built a two-story hotel—the Hotel Mina—in anticipation of a considerable American and European patronage; hut thus far there have not heen a sufficient number of patrons to justify its being kept open. The town was built hetween 1835 and 1840 as a result of the leasing hy an English company of the Rosario mine, which was discovered in 1835. It was constructed on the hacienda of the English company for the accommodation of its employes. The company also obtained a concession from the Mexican Government to erect a mint to coin the production of the mine. This mint has not been in operation since 1848, hut its massive walls are still for the most part intact. (See illustration.) The English company had a cannon as part of their equipment and mounted it so that the main streets of Guadaloupe y Calvo could he raked with grape and cannister at any time. This was during revolutionary times; hut it is said that during the occupancy of the English company Guadaloupe y Calvo was always a quiet and peaceable town. The Rosario, which is a gold mine, has heen worked in a small way only during the past fifty years. It is reported to have been sold recently to a son of W. A. Clark of Montana. The only other mine of importance at Guadaloupe y Calvo is the Independencia, helonging to Don Tiburcio Garcia, which runs intermittently.

California at the St. Louis Exposition.

In view of the desirahility of making a representative exhibit of the resources of California at the St. Louis Exposition, L. E. Auhury, State Mineralogist of that State, has appointed collectors, who are now at work securing specimens of ores, minerals and rocks for this exhihit. It is the intention to in this manner secure an exhihit of that State's mineral resources which will be a duplicate of that now on exhibition at the State Mining Bureau in San Francisco, and to use this new collection for exhibition purposes hereafter, together with such additions as may he made when occasion requires.

Velocity of Objects Floating in Water.

Discussing the velocity of water flowing in streams and the relative velocity of objects floating in or on the water, G. H. Gihson in the Electrical Review says in part as follows:

Starting with the river hed, which for the sake of simplicity we will treat as a rough hut uniformly inclined plane, water, or anything that is placed upon it, will move downward with increasing velocity until the frictional resistance to motion is equal to the component of the earth's attraction parallel with the surface of the plane. If this first hody of water he treated as a continually running sheet, and a second sheet he superposed on the first sheet, the second sheet will reach a final velocity higher than that of the first, hecause it is sliding upon a surface itself in motion and offering less frictional resistance.

This argument may he continued until we have any supposable depth of water.

If, now, an object he placed upon the stream, we might suppose it to act like a superposed sheet of water. However, if it projects into the water to any depth, as a solid floating ohject would do, the upper parts would be in contact with water moving with greater velocity than the water helow. The deeper water will naturally retard its tendency to float as fast as, or faster than, the water near the surface, and it will have an intermediate velocity.

It might he possihle for a very thin floating object —as a hoard, for instance—to float as fast or nearly as fast as the surface water, and considerahly faster than the water at a depth. On the other hand, since the water at a depth would move more slowly than the surface water, it would retard deep floating bodies, and hodies of different shapes would have slightly different velocities.

It is known to hydraulic engineers that the velocity of water in a stream increases with the distance from the hed and banks. It is impossible to conceive how a floating hody, since it must have depth, could float faster than the very surface of the water, which is in no way tied to the water helow it.

Transportation in Peru.

In the high Andes mountains of Peru the development of mines hy modern equipment and methods is much retarded by lack of transportation facilities. In Peru, the land of the Incas, who huilt up and ruled one of the most extensive empires known to the world's history, the roads as constructed and maintained hy them are described by the Spaniards, their conquerors, under Pizarro, early in the sixteenth century, as heing wonderful pieces of engineering work. These splendid highways during the succeeding 400 years have received little or no attention,



Heavy Mortar on Steel Wagon for Transportation in Peru, S. A.

and the result is that the roads leading to the mines are not always in first-class condition, or, in fact, much hetter than roads in the mining regions of the United States, if as good. The Chuquistamho mines of Peru were described herein May 30, 1903, accompanied hy several views of the village, mill, mine, etc. The accompanying engraving shows the method hy which the heavy mortars of the mill were transported into the mountains. The vehicle upon which the mortar rides is of steel and was constructed for this purpose. The mill of the Chuquistamho mine is helieved to he at the highest altitude of any gold mill in the world—that is, a mill not huilt of sectional machinery. It is situated at an altitude of 12,000 feet ahove sea level, the greater portion of the timber and machinery used in its construction having heen to an altitude of 15,655 feet in transit from the coast.

Use of Alkalies in the Cyanide Process.

Written for the MINING AND SCIENTIFIC PRESS by ERNEST G. SWEETLAND.

There is no doubt that the use of certain alkalies in proper amounts, as a neutralizing agent to overcome the destructive effects of the acid which is usually present in tailings, is a very important factor in the successful application of the cyanide process.

The alkalies usually employed for this purpose are lime, or the hydroxide of potassium or sodium.

The amount necessary to add to the tailings to produce the most economical working results is usually determined in the lahoratory by one of two methods:

The first is to extract the acid from a weighed quantity of ore with water and titrate with a $\frac{N}{10}$ solution of potassium or sodium hydroxide, and from the results ohtained calculate the amount necessary per ton of ore.

The second is to determine what amount of alkali will he most effective by making several trials in the laboratory, using a different amount of alkali in each case.

I do not think the first method is to be preferred, as in many cases an amount of alkali in excess of that which is necessary to neutralize the acidity of the ore will effect a practical saving of cyanide, and the amount in excess which produces the hest results can hest be determined hy the second method. However, I think the results indicated by the second method are in general higher than is practical on a mill scale if the tests are made with a new cyanide solution, and if these results were strictly adhered to in the mill the protective alkalinity would soon hecome excessive.

This would suggest using mill solution for the test rather than a solution which had never heen used, and in that case I think the results would he still more reliahle than hy either of the other methods.

In this connection the effect of the alkali on the zinc of the precipitation boxes should he considered, as the consumption of zinc in the mill will depend greatly on the alkalinity of the solution.

As to whether the hest results are ohtained hy using the alkali in the form of a wash previous to cyanide treatment, or hy adding it to the ore as it enters the vats can best he determined hy experiment in each individual case. When the percolation process is employed it is not always practicable to use a preliminary wash on account of the extra time which is consumed hy so doing; particularly if the ore is of a slimy character; hut as a rule less cyanide is consumed when this method is practiced.

In considering the merits of the different alkalies as neuralizing agents we find that in general, when the ore is not of a refractory nature, lime is the most economical; hut in certain cases where the solution has a tendency to become fouled by solution of soluhle salts of iron and alumina from the tailings, and zinc from the precipitation boxes, the hydroxide of potassium or sodium possess certain regenerative properties which should not he lost sight of.

To prove this I took a sample of a mill solution which was fouled with zinc, iron, alumina and copper, which tested .035% of free cyanide. Upon the addition of a small amount of KOH a gelatinous precipitate of the hydroxide of these metals was formed, which upon analysis proved to he principally zinc, hut also contained appreciahle quantities of iron, alumina and copper; and the solution after the removal of the precipitate tested .09% of free cyanide. This is a regeneration of .055% KCy or 1.1 pound of potassium cyanide recovered for each ton of solution treated. The reaction which took place, considering only the zinc, I think was as follows:

$$ZnCy_2KCy+2KOH=3KCy+Zn(OH)_2.$$

This suggests a method hy which fouled mill solutions might he put in a better working condition hy either adding the alkali to the sumps and collecting the precipitate hy means of a filter press, or by adding it to the solution hefore it enters the vat and allowing it to he deposited on the tailings in the vats to be discharged with the residues later. In that case it should he added as near the end of treatment as possible so as to give it the least chance to he redissolved. In general the sooner the precipitate is removed from the solution the hetter, as at least

some of the metals precipitated would be re-dissolved by continued contact with the solution.

The weaker the solution the more marked would be the success of this method.

Possibly where lime is used and the solution has a tendency to become fouled the best working results could be obtained by occasionally using caustic potash or soda for a short period instead of lime.

As the use of the correct amount of the proper neutralizing agent is not only of prime importance in keeping the cyanide consumption at a minimum, but is also an important factor to the successful precipitation of the metals in the zinc boxes, too much care cannot be exercised in keeping the alkalinity of the solution properly adjusted.

Mining in Broken Hill, New South Wales.*

NUMBER II.

Written by EDWIN K. BEAUMONT.

The term underground open-cut system may at first seem erroneous or misleading, as the term open cut is generally applied to excavations from the surface

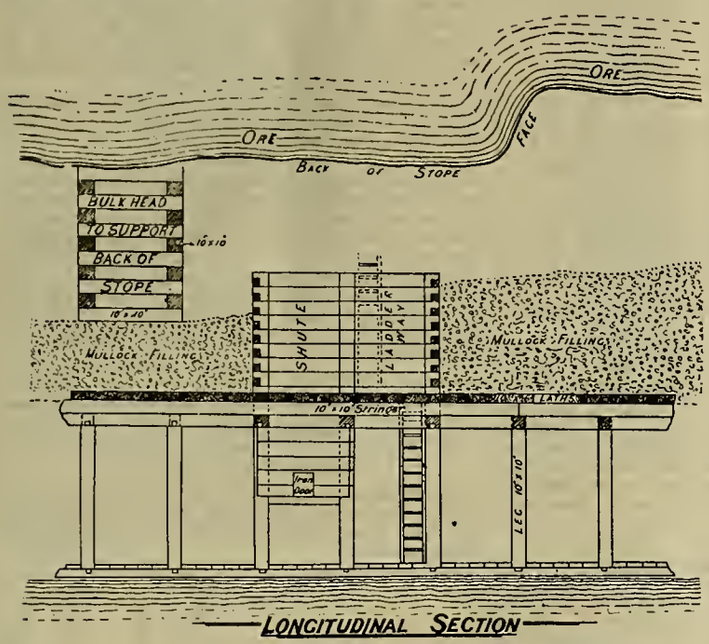


Fig. 4—The Underground Open Cut System.

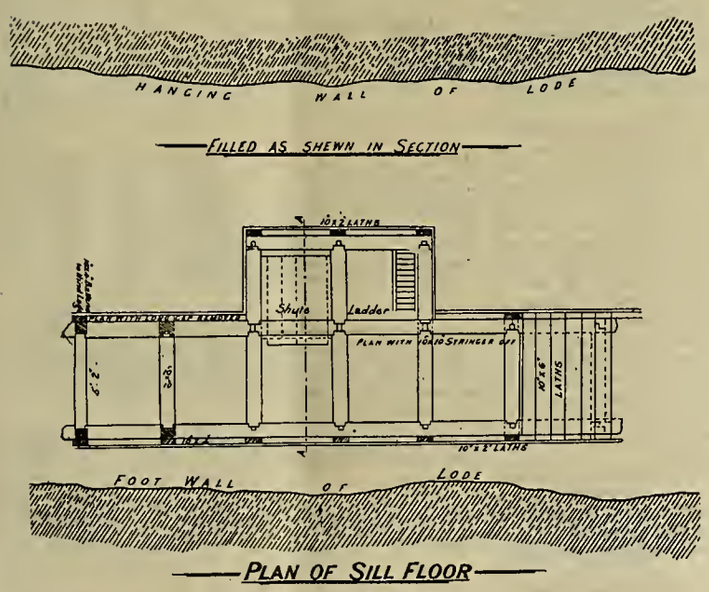


Fig. 6.

downwards, but the above name is that generally given by the miners to the large stopes which are worked under this system. A comparison of Figs. 4, 5 and 6 with Fig. 3 shows the great difference. The drives are first run along the foot and hanging walls, and then through the ore body. From the upper levels winzes are sunk and crosscuts driven at convenient intervals. The winzes serve several important purposes. They ensure a complete and lasting ventilation to the stopes during their upward way by carrying off all noxious gases as they form on the lower workings or are given off by the sulphide ore, and thus enable the miners to work with a greater degree of comfort, and also to do a fair shift's work, which could hardly be expected in a hot stope with a constant atmosphere of about 90°. The winzes serve as passes or chutes through which the filling is conveyed from the upper levels, and, by a succession of chutes and winzes from the surface, is deposited where desired. This system is successful in the Central mine, for the mullock or waste is broken in a large open cut on the surface and is conveyed in side-tipping trucks of capacity of one cubic yard, drawn by horses through a tunnel, then discharged into a chute, from which, by a series of winzes, chutes, etc., it is distributed throughout the mine where required. The winze is used as a starting place or face from which to work the stope, and, after the ore is extracted, say, the first 10 or 20 feet, it is timbered up closely into two compartments, as shown in Fig. 4. One compartment serves as a chute or pass for the ore to the sill floor, as the stope works upwards, and the other compartment as a ladderway and means of ingress and exit for the miners and others to the upper workings of the stope. The sides of the initial drives on the sill floor are extended to the desired width along the lode, and thus the stope is formed on the sill floor, the sill timbers placed in position and then filled up. On top of these timbers the bedding for the filling is placed, as shown in the section, Fig. 5, being 10x10-inch and 10x3-inch timbers, arranged to carry the burden. Above these "sollars," as they are called, the only timbering is that of the chute and ladderway, all other spaces being filled in with mullock from wall to wall, as indicated, which is placed in layers of 7 feet to 12 feet. As the broken ore falls and the traffic also is all the on mullock filling, each succeeding layer gets well rammed and solidifies before the next one is placed on it. In the large open stopes in the Central mine almost all the boring is done by machine drills driven by compressed air. These bring down the ore in large pieces, frequently from 7 feet to 8 feet by about 2 feet wide. These pieces are then bored by hammer and drill and popped into smaller sizes, then spawled into sizes—generally less than 1 foot long—for throwing down the chutes and removal in the trucks, which are all end-tipping and hold about 1600 pounds of broken ore. When the "back" or top portion of the stope is "heavy," or seems dangerous and likely to come away, bulkheads are built under it. These consist of 10x10-inch timbers placed at right angles to each other, one above the other and tightly wedged. (See Fig. 4.) When bulkheads are built on the mullock filling, a bed of 10x4-inch sollars is first laid on the mullock to distribute the pressure over as large area as possible; then the first 10x10-inch timbers forming the bulkhead are laid transversely across the sollars. These timbers are afterwards removed, the burden shot down and the same timbers used over and over again.

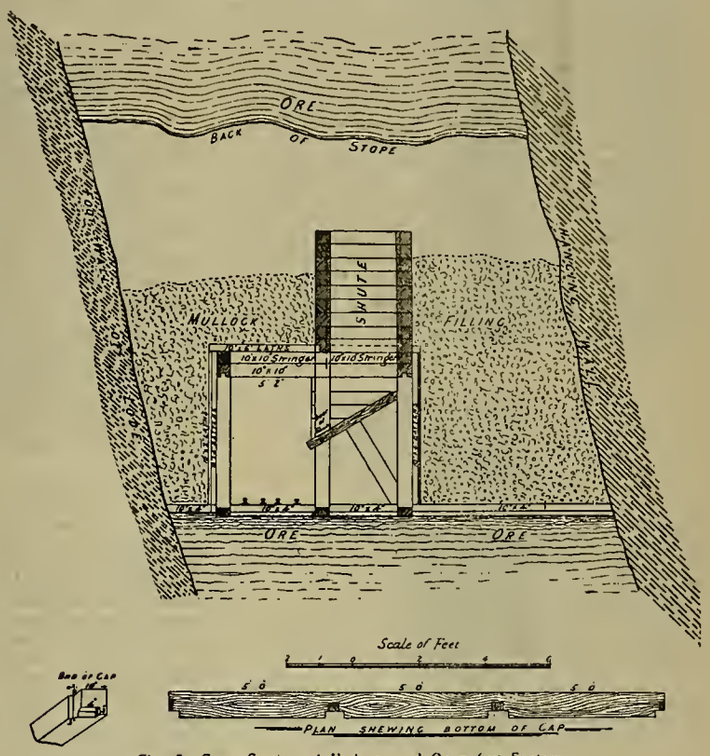


Fig 5—Cross Section of Underground Open Cut System



Fig. 7.

— Stoping in Horizontal Layers —
— Adopted in Hard Ground —

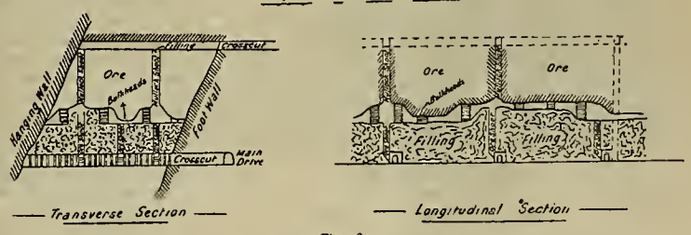
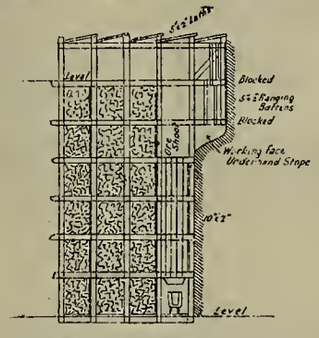


Fig. 8.

SLOPING STOPE SYSTEM.—A somewhat similar modification of the same system, called the "sloping stope system," is shown in Figs. 7, 8 and 9. This method is extensively used on the Broken Hill Proprietary mine, and I am indebted to E. J. Horwood, C. E., mining manager, for permission to copy his drawings showing this system. In many instances the same description will apply as in the foregoing notes on underground open-cut stoping, viz., the levels on the sill floors are first formed, taking notice that the width of the stope depends on the nature of the ore

*Trans. Aus. Inst. Min. Eng. (condensed).

to be mined, or its ability to support itself by leaving the back in the form of an arch; the whole stope when formed is somewhat in shape like an isosceles triangle, of which the level or sill floor forms the base and the winze the apex; also, the winze (as before) is sunk from the level above, and the stope is started from the winze, as in the other open-cut system, while the winze serves the same purpose for ventilating and as a pass for the mullock filling into the stope, also chute for the ore to the sill floor. The great difference is that the stope slopes laterally to each side, instead of going up with a level or even floor, and as these sides rise with the stope, provision must be made for preventing the mullock filling from running into the adjoining stope when it rises; this is done by placing vertically at the sides of the stope, about 5 feet apart, 10x4-inch stringers, which overlap at the ends, and are then covered with 10x2-inch planks placed horizontally against the face of the ore. These may be removed and used over and over again. When the adjoining stope is afterwards being worked, the stoping advances forward from 5 to 8 feet at a time, and from 8 to 12 feet upwards. The advantage of these sloping sides is that the broken ore falls on 10x4-inch sollar boards placed on the incline plane of the mullock, and thus rolls to the chutes at the sides without further handling, excepting, of course, the large pieces, which require hand boring, popping and spawling, as before mentioned. It will be noticed on referring to Fig. 7 that the stope is filled in with mullock to within 2 or 3 feet of the back, and the stope is always worked downwards, starting from the winze; but, if the back is heavy or faulty, it is secured by 10x10-inch legs resting on the sollars (or on bed logs left in the mullock), or at right angles to the sollars and also to the back, as they are nearly parallel; these are tightly wedged and blocked and only re-



Section of Stope on the Square Set System.

Fig. 9.

moved as the ground is taken out. When the stope is about 9 feet high the sollars are taken up and stored aside for further use. The stope is mullocked up again to within 2 or 3 feet of the back, when the chutes are again built up a proportional height and the sollars replaced on the mullock, the sloping process, as before, taking another slice from the back, also starting from the winze downwards. The Broken Hill Proprietary Co. has of late years been adopting a modification of the square set system in working these "sloping ores" by timbering up the middle of the stopes with square sets, which are filled with mullock as the work proceeds; but as the back—or working face in this instance—is sloping as in the last mentioned method, each successive floor of sets stands back one or in such manner that the outside faces of the sets follow as nearly as possible the same angle of inclination or inclined plane as the face of the ore body.

In this way the miners are always within a safe distance of working and examining the face and back of the workings, and all the favorable points of the other adaptation of the sloping stope system apply to this system, with the advantage that the miners have a good footing on the set timbers, and the great convenience offered for the despatch of the ore through the chutes constructed in the square sets.

(TO BE CONTINUED.)

Values in Sluice Concentrates.

J. B. Hobson, manager of the Consolidated Cariboo Hydraulic Mines at Bullion, writes in the Mining Record: "I send you herewith copy of analysis of a sample of heavy sand, sulphurets and other concentrates obtained after cleaning up the sluices at the Consolidated Cariboo hydraulic mine. Having made qualitative tests before sending the sample to the assayer, I found indications of the presence of palladium. I do not remember of having noted any report of the presence of palladium in any of the assays of concentrates from the auriferous alluvials of British Columbia; and it might be well for those operating alluvial mines to have their concentrates carefully examined for the presence of this metal—which belongs to the 'platinum-osmium-iridium' group and possesses a commercial value higher than that of platinum."

COMMERCIAL VALUE OF SLUICE CONCENTRATES.

Metal.	Ounces Per Ton of 2000 Lbs.	Value Per Ounce.	Value Per Ton.
Gold	147.51	$17.00	$2,507.67
Silver	138.34	.50	69.17
Palladium	46.55	19.00	884.45
Platinum	15.12	16.25	245.70
Osmiridium	4.73	29.00	137.17
Copper, 14.30% (wet), 10c. per pound.			28.60
Total value per ton			$3,872.76

Leaching Siliceous Copper Ores With Acids as Solvents.

It is only within the last few years that the discovery of large deposits of comparatively low-grade siliceous copper ores has occurred in suitable quantities to warrant the erection of plants for working same. In some cases the distance of these deposits from an easily accessible source of flux supply, and in others the low grade of ore, has led to many experiments for the purpose of extracting values by leaching with sulphuric acid.

The process, as a commercial proposition, is in its infancy. Numerous patented processes for leaching copper ores with varied mechanical devices for the utilization of sulphurous acid and sulphuric acid have been presented. The former of these two acids has been the more extensively used, but owing to the large consumption of iron in the process of precipitation, after treatment, and also owing to the difficulty in obtaining a thorough washing of the pulps to free them from the weak acid solutions, and the loss of acid necessarily occasioned thereby, these experiments have not heretofore been thoroughly successful.

The use of sulphurous acid obtained from the combustion of pyrite is theoretically much cheaper, owing to its readily solvent qualities upon the metal, and the cheaper methods of precipitation that can be used. But, heretofore, no readily and commercially usable device has been devised for the employment of this extremely volatile acid. That is to say, many schemes have been placed before the public for the utilization of the latter, but none of them have proven such a commercial success as to warrant their extensive use.

The value of any chemical oxidizing agent in conjunction with a dissolving acid on ores containing a low percentage of sulphur is somewhat problematical, as it may be a question whether the use of potassium permanganate, or other oxidizing agents, have been really effectual in their action.

In any case, the practical outcome of all experiments so far seems to have demonstrated the fact that the attainment of an oxide from a low-grade sulphuretic copper ore by means of any chemical oxidizing agent, is more or less hypothetical, and what would in one case be suitable to one ore, would be absolutely ineffectual on another.

The field for the practical and commercial exploitation of the process seems to be narrowed down to the following: The pulverization of the ore to 30 or 40 mesh. The classification of the pulp into two grades, namely "coarse" and "slimes." The direct leaching of the "coarse" in percolation vats under lengthy periods of contact, and the draining of the solutions from the vats by natural gravitation. The treatment of "slimes" by some method of forced filtration, whereby the solvents are passed through the pulp in such a manner as to obtain a thorough permeation of the whole of the bulk. The separation and washing of the solutions from the pulps so as to obtain a thorough extraction and a precipitation of values therefrom by means of iron or lime.

The latter method of precipitation is at present only used in the districts where limestone occurs with or near the copper deposits.

The extraction of values from cyanide potassium solutions containing gold and silver values by means of filter presses is familiar, and a somewhat similar method is advocated in the extraction of values and the washing of the acids from the slimes in the treatment of copper ores.

Taking the following as the method employed for the preliminary application of the solvents and the pulps: The classification of "coarse" from "slimes." The treatment of slimes in circular cone-bottomed vats, wherein an agitation of the pulps is obtained by means of pump circulation in which the mass is taken from the bottom of the vat and constantly circulated again at the top in the presence of the solvent. The separation of the solvents from the pulps and the washing of the latter free from all trace of the solvent by natural subsidence or gravitation or by filtration.

There is at present no means of efficiently displacing the whole of the solvent used in the extraction of values from any ores by any of the known methods of gravitation or natural subsidence. The only efficient method for so doing is by an urged or forced method of filtration. That is to say, any process of displacement by wash waters, of the solvent contained in a mass of pulp non-homogeneous in character, and possessing little uniformity or compactness, such as takes place in the open vat, is practically impossible, owing to the non-uniformity, unpermeability and non-homogeneity of the pulps.

The filter press method of extraction as applied to gold ores is equally applicable to the extraction of solvents from copper ores, and the method recommended is as follows:

After the application of the solvent to the slimes, and when a thorough dissolution of values is obtained, there is in the vat a certain portion of solids containing little or no values that were heretofore component parts of the solids.

The whole of this pulp may now be forced or gravitated into a pressure tank and thence into the filter press. Seventy-five per cent of the solutions are extracted in the process of filling the press, leaving 25% in the cakes.

Charges of wash water are then passed through the cakes, which will come out at the common eflux valve or from the separate valve on each filter frame, and this process may be continued until the liquids coming from the press show no sign of acid.

The solutions are passed direct to the precipitation vats. By this means the whole of the solvents containing values are extracted from the pulps and taken direct to the precipitation tanks and the solvents thence taken to the percolation vats, made up to requisite strength and reused.

The filter press, as constructed by the American Filter Press Extraction Co., of Denver, Colo., is of iron throughout, with the exception of the valves, which are of copper. The iron frames and plates, which come in contact with the acid, are coated with asphaltum, applied hot and burnt in. The channels for the conveyance of the pulps, and subject to friction, are lined with lead, and the machine throughout devised to withstand the chemical erosion, etc., that is inseparable from the use of strong acids.

The pressure tank (or monteju) should be constructed of iron (lead lined), copper or wood. The latter method is preferable, with a lead-lined iron hopper bottom.

Cost of Mining and Reducing Ores, New York & Nevada Copper Co., Ely, Nev.*

Compiled by S. W. TRAYLOR.

The following estimate on cost of mining and reduction of the ores of the New York & Nevada Copper Co. refers particularly to cost of smelting in blast furnaces:

CONCENTRATING ORE.	Tons of Ore.	Cost per Ton of Ore.	Cost per 1000 Tons.	Cost Producing and Marketing 1 lb. Refined Copper.
				Cts.
Mining	1,000	$1.00	$1,000	2.12
Transportation	1,000	.125	125	.26
Concentration	1,000	.300	300	.63
Smelting	1,000	.360	360	.76
Converting	1,000	.258	258	.55
Refining	1,000	.355	355	.75
Freight and commission	1,000	.496	496	1.05
Depreciation and managem't.	1,000	.200	200	.42
	1,000	$3.094	$3,094	6.54

In smelting the concentrate product an additional loss of 5% is figured, which would show the net amount of copper accruing from the 1000 tons of concentrating ore to be:

47,310 pounds, at 13 cents per pound	$6,150 30
Less cost of production	3,094 00

SMELTING ORE.	Tons of Ore.	Cost per Ton of Ore.	Cost per 600 Tons.	Cost Producing and Marketing 1 lb. Refined Copper.
				Cts.
Mining	600	$0.750	$ 450.00	1.17
Transportation	600	.125	75.00	.19
Smelting	600	2.500	1,600.00	3.90
Converting	600	.258	154.70	.40
Refining	600	.355	213.00	.55
Freight and Commission	600	.496	297.60	.77
Depreciat'n and managem't.	600	.150	90.00	.24
	600	$4.634	$2,780.20	7.22

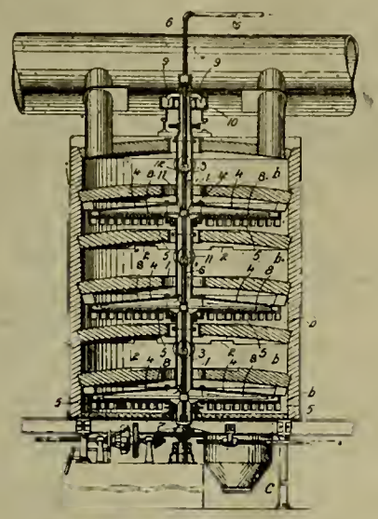
*Condensed.

Mining and Metallurgical Patents.

PATENTS ISSUED JULY 14, 1903.

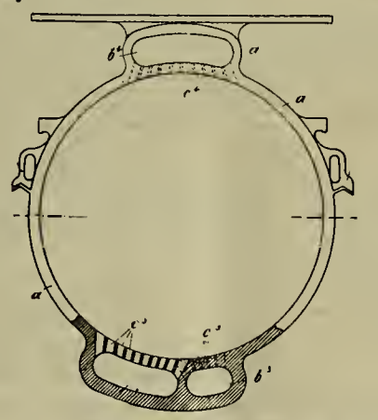
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

ROASTING FURNACE.—No. 733,658; F. Klepetko, New York, N. Y.



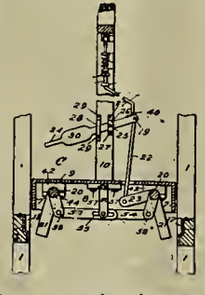
In furnace having plurality hearths, rotatable hollow shaft passing through hearths, series hollow arms radiating from shaft, and extending into several hearths, inner stationary water-feed pipe located within shaft, series distributing pipes located within and communicating with interior hollow arms freely rotating therewith about feed pipe, latter discharging water through peripheral walls into inner ends of distributing pipes, whereby same is caused to circulate through arms and hollow shaft to point adjacent to feed end of feed pipe.

FILTERING PRESS.—No. 733,663; V. Lapp, Leipzig, Germany.



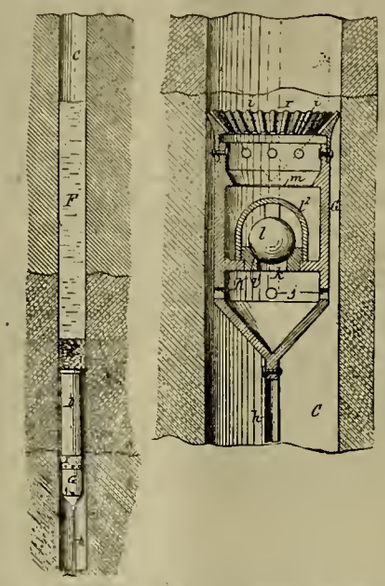
In filtering press, combination with set of trays, another set of trays, trays of one set alternating with those of other, and filtering cloths located between various trays, each tray having sloping lower portion, upper elongation forming portion of channel, and lower elongation forming portion of two channels; trays of one set communicating with upper channel and at bottom with one of lower ones, trays of other set communicating at bottoms with other of lower channels.

SAFETY CHAIR FOR MINING CAGES.—No. 733,907; H. Hanson, Los Angeles, Cal., and F. L. Dwight, Bisbee, Ariz.



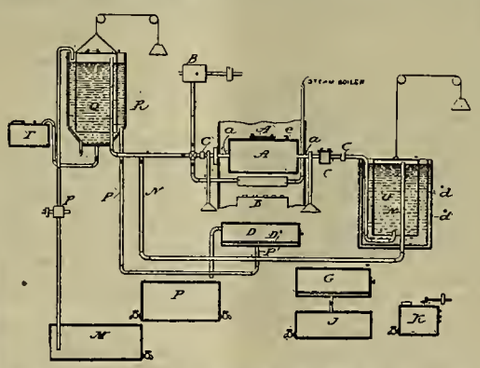
In safety devices operating between shafts mines and buildings, cages provided with hangers having guides on outer faces, guide posts, cable for suspending cage, hand lever pivoted to one of hangers, pitman-rod pivoted one end hand-lever and opposite end to crank arm, cage provided with platform having slots in rear end thereof, oscillating rods journaled within downward perforated lateral flanges of platform, oscillating rods carrying legs fastened thereto, one leg projecting upward through one slot in platform, connecting-rod pivotally connected at end thereof to upwardly projecting end of leg, opposite end connecting-rod pivotally connected near lower end of one of front legs, whereby all legs simultaneously thrown in contact with frame and cage caused rest temporarily at predetermined station.

PARTITION PLUG FOR OIL WELLS.—No. 733,492; C. S. Little, Montpelier, Ind.



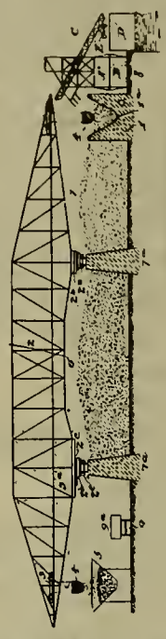
Device isolating different portions of oil well from each other consisting of partition plug adapted to bear against wall of well and provided with anchor or support for sustaining same at proper height in well.

PROCESS OF EXTRACTING PREOIOUS METALS FROM THEIR ORES.—No. 733,859; J. W. Maxwell and J. W. Sawyer, Louisville, Ky.



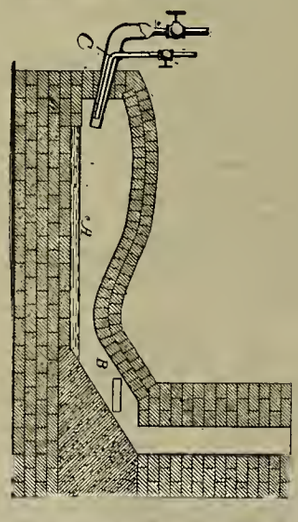
In process of extracting precious metals and other values from ores, extracting metalloids; removing them from ore and ore treating receptacle; by treating powdered ore with heat, chloride of sodium, oxygen, nascent chlorine, current of chlorine gas; volatilizing metalloids; carrying volatilized metalloids, and metalloid compounds and metallic chlorides produced by treatment, out of ore and ore treating receptacle, by passing rapid current of chlorine gas, under superatmospheric pressure, through ore and ore treating receptacle; collecting, condensing them; collecting, storing for reuse excess of chlorine gas used; treating powdered ore with rapid current of chlorine gas, under pressure, at temperature of 360° Fahrenheit, raising it slowly to 755° Fahrenheit, maintaining higher degree, continuing rapid current of chlorine gas, under pressure, for one to three hours, according to nature of ore; then treating powdered ore at temperature of 755° Fahrenheit, with current of hot hydrogen gas and superheated steam for one-half hour, remove base metal compounds, or chloride of silver, deposited as film on precious metals before, or during previous treatment; to remove excess of chlorine gas used in previous treatment; prepare powdered ore for further treatment; treating powdered ore with hot vapor of mercury, under superatmospheric pressure, one-half hour to amalgamate floured gold; prepare coarse gold for treatment; then treating powdered ore with water holding free chlorine in solution; whereby base metal chlorides and precious metal chlorides, except chloride of silver, not removed by previous treatment, are dissolved and removed from pulp by filtration; treating filtrate with solution of sulphide of sodium; whereby chloride of metals in solution are precipitated as sulphides; treating pulp with solution of hyposulphite of soda; whereby chloride of silver is dissolved; removing chloride of silver from pulp by filtration; precipitating from filtrate chloride of silver with solution of sulphide of sodium, sulphide of silver.

APPARATUS FOR HANDLING ORES, ETC.—No. 733,647; F. K. Hoover and A. J. Mason, Kansas City, Mo.



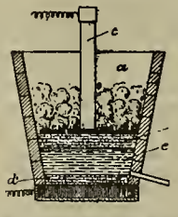
In plant for handling ore and other material, combination unloading devices located along dock or other place delivery, stationary temporary receptacle within reach unloading devices adapted receive cargo of vessel or other carrier, and transfer truss or frame equipped with carrying devices located inland receptacle and capable reaching every part of latter and serving transfer its contents inland receptacles.

PROCESS OF MAKING LITHARGE.—No. 733,896; J. W. Bailey, Jersey City, N. J.



Process of making litharge which consists subjecting metallic lead to flame of hydrocarbon fuel atomized by jet steam.

PROCESS OF SMELTING METALS AND METAL COMPOUNDS.—No. 733,578; G. Egly, Charlottenburg, Germany.



Process of smelting metals consisting in smelting same in electric furnace, lower carbon electrode which is covered by scoria possessing sufficient conductivity and remaining solid or nearly solid at temperature at which smelting process takes place.

Mining Summary.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

G. Mitchell reports having taken up his options on the Simenstad and Conley-Little groups of claims on Galena Bay, and signed a two-years' lease and bond on the Blel property. The option on the Gladhaugh mine is not yet closed, pending further negotiations. He expects to begin development work this season on these groups and also on the Bell & Gilneau groups in Copper River district, near Valdez.

The Nowell hydraulic plant in Silverbow basin, near Juneau, has started up. Another pipe line will be built and an additional giant put in.

The Spokane-Alaska Oil Co. has been incorporated at Spokane, Wash., to drill for oil in Washington and Alaska, by J. A. Finch, M. J. Sinclair and C. Hussey.

The De Soto Placer M. Co., owning ground in Council City district, are putting in a dredger and other machinery, says President De Soto. The dredger will be used on the company's claims on the Neukluk, and has a capacity of 10,000 yards per day.

ARIZONA.

COCHISE COUNTY.

The Postmaster mine and Oriental mill, near Bisbee, will start up for a steady run next week, says the Review.

MARICOPA COUNTY.

(Special Correspondence)—The Wickenburg smelter will be blown in in a few days. The mines of the district furnish all the ore that can be used.

It is reported that one of the deposits of bismuth ore in this county is to be worked.

It is reported that the stamp mill recently erected at Buckeye by Burson & Langley is in operation.

J. K. Murphy, of the Black Rock mine, near Wickenburg, is preparing for a shipment of mining machinery which will arrive at Wickenburg in a few days.

Wickenburg, July 20.

C. F. Goddard of the Goddard M. Co., operating a group 2½ miles from Wickenburg, says preparations are being made to put machinery on the Daniel Webster claim and sinking will begin by Sept. 1.

The Quishenberry mine, on Castle creek, near Wickenburg, will be reopened by J. H. Aaggard with Phœnix men.

MOHAVE COUNTY.

Work will be started on the Maguire mine, near Kingman, recently taken over by E. R Holden & Co. of New York. Water for a plant has already been developed and machinery will be put in.——At the Treasure Hill mines a whim has been put in, the intention being to sink the shaft to depth of 200 feet. At the 200 level crosscuts will be run to the Dictionary and Time Check. L. M. Teal is superintendent. —— Sinking on the Gold Road mines, near Kingman, will be resumed. A 30 H. P. gasoline hoist will be put on the 100-foot level to carry the shaft below that point.

PINAL COUNTY.

(Special Correspondence).—Superintendent J. H. Pratt, of the company operating the Golden Fissure group of claims, near Florence, says more men are being put on and development work increased.

Florence, July 20.

SANTA CRUZ COUNTY.

L. A. Teague, C. W. Hibbard and C. O'B. Reddin of San Francisco, Cal., are reported to have bought an interest in the mining properties of G. Schwab, consisting of two groups, 4 miles north of Calabasas, and organized the Calletano M. & S. Co. Development work started this week. The ore values are in silver, copper and gold.

YAVAPAI COUNTY.

(Special Correspondence).—The fire in the United Verde mine, which was supposed to have been extinguished by means of carbonic acid gas some months ago, is still burning and making increasing headway. It is now on the 500-foot level and slowly progressing downward toward the 700 level—the bottom of the mine. If the fire were confined to the timbers, there would be no particular difficulty in controlling and eventually extinguishing the fire, but the sulphide ore is burning, and it discharges great volumes of sulphurous acid and carbon dioxide, and cannot be reached by any other way than flooding the mine with water, and water is not available for this purpose. It is now thought the fire can never be extinguished until it burns itself out for lack of combustible material (sulphur), which now keeps it going. Mining is in progress in other parts of the mine.

Jerome, July 19.

The 100-ton mill at the Iron King mine of the American C. Co., near Val Verde, 23 miles southeast of Prescott, was put in operation last week.

A half interest in the Rosaline group of claims on Copper creek, owned by W. Nellis and J. Mayer, has been sold to D. N. Bartholdi of Jerome, who will start development work this week.

The Josephine M. Co. has started up work on the Black Lode near Pickerell's camp, near Jerome. —— Work will be resumed on the Verde Chief mines in Black canyon, near Jerome.

It is expected the Home Run mine at Groom Creek will be in operation by August 15.

D. N. Bartholdi has bought a half interest in the Rosalie group of claims on Copper creek, south of Mayer.

Superintendent Tibbett of the Pfau G. M. Co., operating the B B property near Cherry creek, reports work progressing and fourteen men working three shifts. A gasoline hoist has been put in.

ARKANSAS.

NEWTON COUNTY.

The North Arkansas Land Co, of Jasper, has been incorporated with J. B. Moss, W. P. Spears and B. F. Ruble as officers.

CALIFORNIA.

ALAMEDA COUNTY.

Superintendent Newhall, of the Phœnix quicksilver mine, southeast of Livermore, and owned by A. Hayward, of San Francisco, reports at the end of the 1200-foot tunnel the vein was struck, showing a thickness of 47 feet. The ledge was again cut in driving an air shaft on a higher level. One oven for the reduction of ore is being built. More brick is in the kilns for the second one.

AMADOR COUNTY.

At the Defender mine, F. B. Joyce, superintendent, near the Mokelumne river, in Pioneer district, 7 miles from Pine Grove, the 10-stamp mill is running steadily on high-grade ore ——The Grand Prize mine (the Horn & Andrews mine), near Pioneer, is being developed. A hoist has been put in and a shaft is being sunk. It is down 100 feet.——The Tom & Dick mine, adjoining the Defender, which has been worked at intervals for a few years past, will be operated again, work beginning this month, says Superintendent Turk. The 5-stamp mill is run by water power.

CALAVERAS COUNTY.

The starting up of the new 120-stamp mill of the Royal Con. M. Co. at Hodson was made the occasion for a celebration on the 21st inst. This is the largest individual mill on the Pacific coast outside of the Treadwell mines in Alaska. A full description of this property will be found in the issue of the MINING AND SCIENTIFIC PRESS of May 23, 1903. J. C. Kemp Van Ee is manager, and the company is made up of English men.

FRESNO COUNTY.

Bryner & Smith have drilling operations under way in the Devil's Den district, 20 miles from Coalinga.

INYO COUNTY.

The Anabarbara Co. at Ballarat started their 10-stamp mill last week.—— The Radcliff mine continues working twenty men. They are running one shift in the mill.——The Cecil R. Co. have replaced their steam power with gasoline and are putting in a 30 H. P. gasoline engine for their mill.——Flint Bros., owners of the Tuba Canyon mine, are cyaniding. They expect to start up their mill September 1 with increased capacity, says the Randsburg Miner.——The Golden Argus Co., of Snow's canyon, have let a contract on their tunnel and expect to start up their mill by September 1st.——J. C. Cress is putting in a gasoline engine at his mill near Ballarat and expects to start up next week.

KERN COUNTY.

Pumping oil by means of natural gas from the well is the latest plan of operations to be adopted at the Kern river field near Bakersfield. Last month the East Puente Oil Co., owned by San Diego men, put in such a plant which has been giving satisfaction, and this week the Associated Oil Co. has put one in on its Red Bank lease in the same section. The gas is allowed to flow into a gasometer, and from this it is supplied to the engine.

The Standard Oil Co.'s Bakersfield-Point Richmond (Contra Costa county) pipe line is in operation, oil reaching the refinery tanks at Richmond on the 19th inst. Now that the line is in working order, the company proposes to enlarge its refining plant at Point Richmond. Additions to the stills and retorts will be made. There are 700 men at present at the plant. Two tank barges are loading oil at the company's wharf for foreign shipment. The pipe line is 350 miles long, 280 miles on the main run and 70 miles in branches. On the main line the pumping stations are 10 miles apart.

Building will begin next week on the plant of the Pacific Smelting Co., near Bakersfield. The surveys have been made and the smelter will be located on the McKittrick branch of the Southern Pacific. There will be two 50-ton furnaces.

G. Sanderson has a lease on the La Grange claim, in Stringer district, near Randsburg.——C. Taylor, S. Tyler and F. Rose have a lease on the Mattie mine and are stoping on the 165-foot level and running a drift on the 120-foot level.

The Associated Oil Co. is starting to drill new wells in both the McKittrick and Kern River fields. The 408,000-barrel reservoir at Kern river, near Bakersfield, is completed, and work is being pushed on the McKittrick reservoir.

NEVADA COUNTY.

It is reported arrangements are being made to reopen the Thomas (New England) quartz mine on Gold Flat, near Nevada City, owned by R. C. Walrath of Nevada City and the estate of A. Walrath.

The mill at the Grey Eagle mine, near Maybert, is again in operation, after a temporary suspension due to the water supply being shut off by a break in the flume. Superintendent Kaler reports a new body of ore was opened last week in an upraise started 150 feet in the tunnel. The ledge is 14 feet wide.

The F. Brophy placer interests on Shady creek, near North San Juan, have been taken over by R. I. Thomas of Nevada City and J. A. Yeatman and C. L. Miller of San Francisco. A centrifugal gravel pump, with a capacity of handling 100 cubic yards of gravel per hour, and other hydraulic equipments, will be put in.

At the Buckeye mine, in Willow Valley district, near Nevada City, the drain tunnel is in 170 feet, with 150 feet more to the main ledge. A 10-stamp mill will be built.——A compressor is being set up at the Sterling mine. —— The Lecompton mine is putting in an additional pumping rig and a heavier hoist, says Superintendent Nihell.——H. L. Body reports work progressing on the 10-stamp mill that is to be put up at the Posey.

R. I. Thomas, S. M. Cheyney, W. A. Palmer, et al. have bought 140 acres of land in Penn valley along Squirrel creek, near Grass Valley, which will be used for dredge mining.

ORANGE COUNTY.

The Olinda Crude Oil Co., operating near Fullerton, has changed its name to Olinda Land Co.

PLACER COUNTY.

The Sacramento Dredging & M. Co. is building a dredger to operate on the North Fork above Colfax.

T. H. Wilkins, president of the California M. Co. which recently bought the Cedar Creek drift mine at Shady Run, says he has twenty men at work at this mine, which has been drifted 1400 feet into the gravel. Steam is used for power, but they expect to put in electricity next month.

PLUMAS COUNTY.

At the Plumas G. M. Co., Ltd., mine on the north side of North canyon, adjoining the Johnny Bull group, near Greenville, W. D. Lawton has a bond on it and preparations are being made to build a 15-stamp quartz mill. It is to be completed by Sept. 1st. The company will also put up a cyanide plant to handle the concentrates. Water power will be obtained from the Round Valley Reservoir. Five Impact wheels will be used, one to supply power to each, the rock breaker, the batteries, air compressor, concentrators, and an electric generator. The last named will be of 75 H. P., to light the mill, mine, etc., and to run a train of ten cars for the delivery of ore to the mill.

At the Johnny Bull group of mines in North canyon, near Greenville, under bond to Droege Bros. of Covington, Ky., and F. W. Day, who have organized the North Canyon M. & R. Works, the cyanide plant continues in operation, handling rock from the 5-stamp mill.

SAN MATEO COUNTY.

The Paxton Oil Co. has resumed drilling in its well at 1560 feet in oil bearing stratum. While waiting for a string of 5⅝ casing 200 feet of 50 gravity oil has raised in the well, says the Reporter.

SHASTA COUNTY.

Superintendent W. Hooper of the Inca Treasure G. M. Co., operating the Inca Treasure mine west of Delta, reports shipping ore to the Keswick smelter averaging $20 in gold per ton.

E. F. Adams, as president of the Northern California G. M. Co, has filed notices of location of seven claims, being the Summit in Bully Hill district near Winthrop, and the Douglas, Little Surprise, Friday No. 1, Saturday No. 1, Washington No. 1 and Little Tenderfoot in North Cow Creek district.

The Americus M. Co. has bought the Americus, McGinnis, Homestake and Ormolu claims, southwest of Redding.

The Old Spanish mine, in Lower Springs district near Redding, will be reopened, work resuming this week, after an idleness of three years, says B. M. Newcombe of Oak Hill, Napa county, a stockholder in the Old Spanish G. M. Co. that owns the mine. S. Davis is superintendent. There is a mill and a pumping plant on the ground.

SIERRA COUNTY.

At the Telegraph Drift M. Co. mine at Fir Cap near Downieville, Superintendent J. W. Finney reports work on the stamp mill progressing. He is also putting up a sawmill near the mine to get out lumber for the stamp mill and other buildings.

C. Brown, of Alleghany, has bought the Wright half-interest in the Gold Nugget placer mine, near Alleghany, for $1500—W. Barrett retaining the other half-interest.

The Gold Canyon quartz mine, on the north bank of the Middle Yuba river and 6 miles above Moore's Flat (Nevada county), has been bought by Manager F. B. Hill, of the Oriental mine, for a New York company, who have started development this week. A tunnel will be started from the river at a point 1000 feet below the apex of the ledge, and later a plant will be built on the mountain and a shaft sunk.

At the Tabor mine, on the Gibsonville ridge, near Gibsonville, they are widening the track from a 16-inch to 18-inch gauge in the main tunnel, and an electric plant is being installed. A. F. Eaton of San Jose is superintendent.

TEHAMA COUNTY.

Near Bee Gum, J. Hesselwood of Red Bluff reports making preparations to develop a body of iron ore. He has filed twenty-two mining locations and has a ledge 200 feet across. It is 37 miles northwest of Red Bluff, and is near the proposed route for the railroad to connect Red Bluff and Eureka.

TRINITY COUNTY.

Work is reported progressing in the Potillo quartz mine, owned by F. and P. Potillo, and at the General Lee and Klondike quartz mines, owned by J. Isbell and Meckel brothers. These mines show free gold. The General Lee and Klondike are extensions of the Potillo, all at the head of West Weaver creek, near Weaverville.

H. E. Pickett of Placerville, who has a bond on the Egan Flat placer mine at Junction City, will prospect the same with a drilling machine, and a dredger will be built if the prospects are satisfactory, says the Trinity Journal.

The Brown Bear mine at Deadwood was sold this week by the sheriff, under execution, for $31,000 to M. A. Phillips of Oakland.

TUOLUMNE COUNTY.

Sinking from the 500-foot level continues at the Mt. Jefferson mine at Groveland and it is the intention of Superintendent Meighan to go to a depth of 800 feet. On the 500 they are drifting on a 6-foot vein.

Work at the Crystalline mine, near Jamestown, is suspended.

E. C. Day of Columbia, superintendent of the Black Slate and Tapple mines, one mile north of the Rawhide mine, near Jamestown, has men at work clearing ground for several buildings, including a hoist.

The Campo Seco mine, near Jamestown, is closed down pending installation of a heavier air compressor, says J. H. Hall, superintendent.

The trouble at Stent and Quartz between the managers and the men has been adjusted. The lockout has been raised at the Jumper, Golden Rule and Mazeppa mines at Stent and at the Santa Ysabel mine near Quartz. The settlement is a compromise. Manager Kerr of the Jumper Co., acting for several companies, conferred with the officers of the union and an agreement was reached, by the terms of which all the underground men except muckers are to receive $3 for ten hours' work and surface men of all kinds are to return to work at the same wages paid before the trouble began. The agreement lasts for six months. The App mine, which is one of W. A. Nevill's properties, is not a party to the agreement.

YUBA COUNTY.

Near Oroville, a company composed of B. C. Warnick, P. Russ, S. Presser, A. Buchanan and A. L. Solenburg of Pennsylvania and H. W. Knight of Overbrook, Or., has bought the Marigold dredgers and land.

COLORADO.

CUSTER COUNTY.

The Ute Creek G. Co., composed of Boston, Mass., men, has bought the Burnette claim at Querida.

DENVER COUNTY.

(Special Correspondence). — The strike situation at the Denver smelters remains unchanged. No trouble is feared at the Durango plant, as the men have not fully recovered from the effects of the strike of a few years ago, and they are not willing to enter into another strike unless compelled to.

Denver, July 21.

DOLORES COUNTY.

(Special Correspondence).—The United Rico Mines Co. are sinking a shaft through the Devonian limestone, which is impregnated under the fault fractures with lead-zinc ore carrying an average of eleven to twelve ounces in silver. The company owns 1100 acres at Rico. They will remodel the old mill and also build a new one.

Rico, July 20.

FREMONT COUNTY.

The Florence Con. Oil Co. has started drilling another well for oil. The Consolidated has one well pumping. Two other wells are being drilled by companies on adjoining ground. The Columbia Crude Oil Co. has started the drill in well No. 2. A. P. Mackey and H. Graham of Denver are interested. The Keystone Oil Co. is boring in well No. 6 and is down 1800 feet with favorable indications. It is estimated there are thirteen wells being put down in the Florence belt at this time and six more wells are projected, work on which will begin before the end of the summer.

The United Oil Co. has bought a block of 1200 acres of ground 2 miles south of Florence and will start drilling there. There are some producing wells on the ground.

GILPIN COUNTY.

E. C. Sherman and T. R. Cudahy of Central City have incorporated the Mont D'Oro M. & M. Co. to operate the New Century group (the Tippecanoe group) of claims on the north slope of Winnebago hill, in Quartz Valley district. They are sinking a shaft, have reached a depth of 70 feet, and report a 4-foot vein of milling ore, with a smelting streak showing an average width of 4 inches. Hoisting is being done with a windlass at present, but they will put in machinery.

GRAND COUNTY.

(Special Correspondence). — Forty-five miles of the Moffat line, which will extend through Grand and Routt counties, is nearly graded. A machine is being used for laying the track. A large tunnel will be driven through the divide.

Denver, July 21.

HINSDALE COUNTY.

The Bullion King mine, owned by B. F. Cummings of Lake City, and in the Burrows Park district, is to be developed. The Bullion King is said to be on the Illinois Boy vein, which carries copper and gold ore. Cummings proposes to open the ore measures by a crosscut tunnel.

LAKE COUNTY.

(Special Correspondence). — Leadville business men have formed an alliance for the purpose of combating the labor organizations.

Leadville, July 21.

LA PLATA COUNTY.

(Special Correspondence).—E. W. McConnell of Durango has men at work on the Southern Boy mine, near La Plata City. The tunnel is in 645 feet and drifting for the Southern Boy vein. They have cut one vein which runs well. E. N. Beach is manager.

The county commissioners have agreed to spend $5000 on a wagon road from La Plata to the county line between La Plata and East Mancos, if J. Doyle will build the road from East Mancos to the top of the hill. There is already a good trail between the two places. Doyle says he will start work shortly from his end of the line. A good wagon road over this range will greatly shorten the distance to the railroad. Manager Doyle of the East Mancos G. M. Co. intends building a mill on the La Plata side and to put in a tramway from the mine to the mill. Several other properties are working a few men in the neighborhood of La Plata.

La Plata, July 18.

SAN JUAN COUNTY.

(Special Correspondence).—The Silver Wing mill, owned by the Eureka Exploration Co., has closed down. They have been making test runs on ore from the Silver Wing and Frederica mines and will put in a tramway, 1 mile in length, from the Frederica to the mill. This same company owns the Ridgway and Scotia mines, being operated by lessees who are taking out some rich ore from the Scotia. J. H. Moreland is manager.

The Silverton, Northern Railway has started work on the line from Eureka to Lake City, a distance of 35 miles. They expect to have the road completed to Animas Forks this year. The grade will average 5%.

Eureka, July 18.

(Special Correspondence). — It is reported some of the mines in this locality are unable to run full capacity owing to scarcity of miners.

The Smuggler-Union M. Co. are handling 400 tons of ore per day. Everything is running smoothly, says Manager Buckeley Wells.

Telluride, July 20.

TELLER COUNTY.

The Gold Bond M. Co. has given a lease to Sider & Co. on the north end of its Gold hill ground at Cripple Creek, which adjoins the Moffatt tunnel. The lease is for two years with royalties ranging from 20% to 25%, and it is expected it will be worked through the tunnel.

At the annual meeting of the Golden Cycle M. Co, held at Colorado Springs last week, the head offices were changed from Denver to St Louis, Mo. Their mines are at Cripple Creek.

Stoveken & Zimmerman have leased the Beatty mill at Goldfield and will convert it into a cyanide mill for the treatment of the low-grade ore of the dump of the Theresa mine.

The August Flower Leasing Co., operating on the Chickenhawk claim on Guyot hill, Cripple Creek, have put in a heavier plant of machinery, capable of hoisting from 1000 feet.

The Great Western Co. has put in a plant of machinery on its Orange claim on Trachyte mountain, near Cripple Creek. The shaft has been sunk to a depth of 80 feet.

Operations were resumed last week by the Lincoln Mines Co., at the Lincoln mine, on Globe hill, Cripple Creek, their surface plant having been rebuilt after loss by fire. Manager F. A. Wright says the new plant is of heavier capacity, capable of hoisting 1000 feet, also a five-drill compressor. The shaft is down 200 feet, and sinking will be resumed to the 400-foot level. It is intended to build a cyanide mill also.

IDAHO.

BINGHAM COUNTY.

The Pittsburg mine, in Mount Pisgah mining district (Caribou district), consisting of a group of twelve claims, together with mill and other improvements, water rights, etc., were sold by the receiver last week, being bid in by McCornick & Co. of Salt Lake City, Utah, for $25,000. They propose to improve the mill and develop the group.

BLAINE COUNTY.

The Carbonate Hill M. Co. has been incorporated at Hailey by H. J. Davis, C. B. Dunton and D. E. Moulton, of Portland, Me. W. A. Brodhead is local agent in Hailey. The company owns the Black Carbonate lode, located at the head of Wood river, above Galena, and also the Maine lode on Cherry creek.

CUSTER COUNTY.

The Challis Messenger says it is reported negotiations are under way for a consolidation of the mines owned by the Ramshorn M. Co. at Bayhorse, and the mines owned by the Omaha S. Co. at Clayton. It is expected the railroad will be extended up Salmon river.

IDAHO COUNTY.

H. Brant, operating a group near Roosevelt, in Thunder Mountain district, says he is sacking ore for shipment. He proposes to put up a 20-stamp mill this season.

OWYHEE COUNTY.

Bruton & Ellis of Nampa and Salt Lake City, Utah, have a bond on the Sugar Loaf group of claims, near Silver City, and are making preparations to begin development work. The ore can be worked by cyaniding.

SHOSHONE COUNTY.

The Reindeer M. Co., operating 3½ miles southeast of Mullan, in the copper district, started its new compressor last week. It is operated with water power under head of 500 feet.

Twenty-two hundred men are employed in the mines and mills of the Cœur d'Alenes and the monthly payroll aggregates $200,000, says the Deseret News. The wages for underground men are $3.50 per day except at Wardner, where the wage is $3 per day. The number of men in the mills and mines of the district are distributed as follows: Morning, at Mullan, 317; Bunker Hill & Sullivan, at Wardner, 300; Tiger-Poorman, at Burke, 300; Standard, at Wallace, 291; Last Chance, at Wardner, 194; Mammoth, at Wallace, 177; Frisco, at Gem, 157; Hecla, at Burke, 116; Gold Hunter, 66; Hercules, 60. In addition to these, there are a number of smaller ones in the district that are working from three to fifteen men, which bring the total up to 2200 men.

KANSAS.

NEOSHO COUNTY.

J. H. Cook of Carthage, Mo., operating with Illinois men in the Chanute oil and gas district, reports organizing a company to lease 10,000 acres of land north and west of Golden City, to prospect for oil.

WILSON COUNTY.

The Prairie Oil & Gas Co. has bought a tract of 153 acres, 1½ mile north of Neodesha, and will establish a "tank farm." Two 55,000-barrel tanks will be removed from Texas and set up there, as well as building other reservoirs. It will be made the central storage station for Kansas and Indian Territory.

MICHIGAN.

BERRIEN COUNTY.

The Michigan Oil Co. has been organized at Niles to drill for oil. They have leased 1500 acres west of Niles and will start work this month. At Three Oaks the Southwestern Michigan Oil & Prosperity Co. has been organized and has leased 4000 acres near Galien.

HOUGHTON COUNTY.

The Lake Superior Smelting Co. at Dollar Bay is building two more furnaces, due to the increase of mineral to be smelted. One is to refine mineral reduced in the cupola and the other is a regular reverberatory smelting and refining furnace. The Michigan, near Houghton, has cut the Minnesota conglomerate by crosscut from the Calico lode in the 11th and 13th levels.

Ground has been broken on the east side of the Champion mill at Freda, west of Painesdale, for the head additions. Two heads are to be added, giving six in all. New devices to crush the "ragings" from the present heads are being tried by the Champion. A pair of heavy crushing rolls have been set up in the west end of the mill and a Chilean mill is going in, for separating the tailings from the rough jigs. If the experiment proves successful one pair of rolls will be required for each head and a Chilean mill for every two heads, says the News.

The average mineral yield of the Winona mine at Winona for June was forty pounds of copper per ton of rock stamped. The last of the company's stock pile has been treated and hereafter rock shipments will come direct from the mine openings.

At the Franklin mine, near Hancock, on the seventh level south in the Junior, the management have struck copper ground 266 feet south of where No. 2 shaft will be sunk. It has been crosscut for 12 feet. The drift will be continued ahead and a machine put behind the drift to open further. This Albany & Boston conglomerate is to be further developed.

The No. 7 shaft at the Quincy mine at Hancock is sunk to the 56 level and the openings below the 14 are said to be uniformly good. Rock shipments from this source aggregate 1000 tons daily. At the mill six stamps are treating the entire output instead of eight as formerly. The two idle heads are being changed over to the coarse system of stamping. The Quincy is stamping at the rate of 900,000 tons of rock per annum.

KEWEENAW COUNTY.

The foundation work for the new stamp in the Mohawk mill, near Allouez, is progressing, as also the surface improvements at the mine, and they expect to supply rock to three stamps by Aug. 1st.

At the Phœnix mines at Phœnix the dam across the Eagle river, 3000 feet above the mill, is finished. The water will be carried through the flume, 12x24 inches, to the mill and this will be sufficient for all purposes until the mill is enlarged, when the dam can be thrown across, 2000 feet below, giving all the power that will be required, says the News. The mill will go into operation by August 15th.

MISSOURI.

JASPER COUNTY.

C. A. Emery, S. A. Stuckey, S. Chitwood, C. J. Smith, B. L. Van Hoose and J. Flory, who own the VanGuard mine, on the Amsden land, northwest of Carthage, report making a lead strike in their mine at depth of 20 feet, a prospect drill having previously located the ore.

Heavier pumps have been added to the plant of the Missouri Zinc Fields Co., near Joplin, and their mines unwatered, so that the mines on this lease can be worked below the 200-foot level.——The Winner Lead & Zinc Co., who bought the Reagan lease, south of the Georgia City mines, adjoining the O., M. & R. on the east, near Joplin, expect to be running dirt through their mill that will produce fifteen tons per day.——G. E. Forrestall, owner of the Florence F. mine on the Forrestall & O'Donald lease, will sink the mill shaft from 165 to 240 feet and drift, says the News.

At Webb City, the Bosch Scogin M. Co., having unwatered their mine, have resumed operations. They have put in a heavier pumping plant.

The Leo M. Co., at Webb City, have their mill in operation.——Construction work has started on the third mill of the Aylor twelve acres, leased by Patton & Dodge. The plant will be known as Avondale No. 2, the other two being Avondale No. 1 and the Dominion. The new mill will be 250 feet from No. 1. The conditions of the lease were that a mill should be built on each four acres. The new shaft on the Holy Smoke, on adjoining lots, is down 80 feet and in ore.——The Webber M. Co. has put in two 8-inch cross-head pumps in the Hayseed mine.

J. Mortoo, for the Con. Troup M. Co., has bought the J. Dermott tract near Webb City, covering forty-five acres, for $50,000. This land adjoins the Pleasant Valley mines on the south and is partially developed. The Troup Co. are owners of the Hudson mine, which is near this lease.

The Narragansett mine and mill, north of Webb City, on the spur of the Memphis Railroad, has been sold to a company of which C. E. Force of New York is manager. The mill will be put in operation.

The Waddell Zinc Co.'s mill is ready to start. It is 3½ miles northwest of Carthage, in Waddell mining district.

The Cornucopia M. Co., composed of C. Ball, A. M. Wagoner, O. Duenweg et el., is building a mill at Alba which is about finished.

MONTANA.

FERGUS COUNTY.

N. J. Littlejohn of Lewistown has a bond on a group of prospects in South Moccasin mountains, near Kendall.

M. J. Hall of Maiden says he will build a cyanide plant to work the ores of the Maiden Queen claim, north of Maiden, and adjoining the Maginnis mine on the north. —— P. Rousseau has a cyanide plant in operation on his group near the Spotted Horse mine, near Maiden, and is making it pay the expense of developing his mine.

FLATHEAD COUNTY.

G. Robinson of Libby reports having bought the Cain group of claims in West Fisher district, and a company will be formed to operate them. There are four claims in the group and they are on Great Northern mountain, below the American Kootenai M. Co.'s ground. —— It is reported J. H. Greiger, manager of the Illinois & Montana M. Co., has made arrangements to resume work on that company's group in West Fisher district, near Libby, says the Inter-Mountain, and they will also build a mill.

Work is reported progressing at the Banner & Bangle mine, 6 miles south of Troy, operated by Larson & Greenough under a bond. As soon as the road from Troy is finished shipments of ore will be started. Also they propose to build a concentrator at the mine.

GRANITE COUNTY.

At Henderson gulch, near Phillipsburg, Superintendent C. E. Van Barneveld has men at work prospecting on 500 acres of ground which the company has under option. Tests are being made preparatory to working by dredging.

J. H. Grant, part owner, operating the Dakota mine, adjoining the Bluebird, near Willow creek, near Phillipsburg, reports opening up a 3-foot body of gold ore, carrying also 1% copper. He has a Huntington mill in operation. Cyanide tests are being made on a large body of low-grade ore.

A system of exhaust fans and flues have been put into the dry-crushing mill of the Granite-Bimetallic Con. M. Co., near Phillipsburg, to carry off the dust from the batteries.

D. H. McDonald and L. N. Van Vranken have a lease on the Salmon mine at Tower, near Phillipsburg, and begun development work with W. G. Harper in charge. —— O. Smith is operating his cyanide mill on Lower Rock creek, near Phillipsburg. Arrangements are being made to enlarge the plant. —— It is reported the Bimetallic mill will be dropping 100 stamps by August 1 instead of 50.

JEFFERSON COUNTY.

Manager G. B. Drankenfeld of the Montana Mineral Land Dev. Co. says development work has been resumed. The company owns the Eva May mine in Cataract district, near Basin, but has not worked it for three years. Arrangements are being made to build a smelter for the treatment of their sulphide ores.

The Pittsburg Smelting Co. has bought the Jacquemin iron properties near Corbin for $60,000. The ore will be used for flux in the smelter built by the company south of Butte. —— The Evening Star

mine, 6 miles from Basin, leased by the Pittsburg Co., will have a new shaft to he sunk 350 feet, as the old shaft is in bad condition.

In Cataract district, near Basin, men have been put to work by the Cataract C. M. Co. on the smelter, which is being built, and to develop the ore bodies in the Crystal mine, one of the group owned by this company.

LEWIS AND CLARKE COUNTY.

J. C. Cory et al., who control the King Solomon mine near Helena, report development work progressing, opening up in a winze in new workings an ore body which carries high-grade silver ore.

Operations are again under way on the North Star mine, near Marysville. Preparations are being made to start up the Bald Butte mill, which has been shut down for a short time ——There is greater activity in the Wickes-Corbin district, 21 miles from Helena, than for a number of years.

MADISON COUNTY.

Near Pony timbering shaft No. 2 of the Norwegian M. & Dev. Co. is finished and development work begun.——Work continues on the Strawberry mine. A crosscut is being run to the hanging wall from the face of the drift. The mill will he started up.

NEVADA.

ELKO COUNTY.

Manager G. L. Moats of the Latham M. Co., operating in the Spruce Mountain district, near Clover, south of Wells, says the mill has been started and is giving satisfaction. Owing to the scarcity of water, the full capacity of the plant is not being used, only twenty-five tons of ore being put through the crushers daily. The concentrates produced average 56% lead, 10 ounces silver and $3.20 gold.

LINCOLN COUNTY.

Operations are reported suspended at the El Dorado canyon mines at El Dorado canyon for the summer, and will not resume until September 15 on account of the extreme heat.

The Gordon M. & M. Co. has been incorporated at Salt Lake City, Utah, to operate a group of five lode claims in Old Highland mining district; R. G. Bosley, G. W. Poague and S. Fowler.

LYON COUNTY.

The company has men at work cleaning out the Douglass ditch at Dayton. The Federal M. Co. of Como will begin operations with its mill as soon as the water is turned in to produce the power.

NYE COUNTY.

The Sapho group of claims at Tonopah has been bonded by E. W. Griffith & Co. for $100,000.

The Arivada M. Co. has been incorporated to operate a group of seven claims near Tonopah; J. S. Cook, W. Rogers, I. Morasci and W. McWilson.

T. J. Lamoraux, president of the Tonopah-Aspen Co., has started work on their three claims, the Aspen, Black Diamond and Sans Sahe, 1 mile north of the Tonopah and adjoining the Belle of Tonopah on the northeast.

The crosscut from the 770-foot station in the Ohio-Tonopah shaft at Tonopah is in 90 feet and has passed through the ledge cut at a depth of 730 feet in the shaft. The air compressor is being set up.

STOREY COUNTY.

The flume being built to convey ore pulp to the Butters cyanide plant in Six Mile canyon, near Virginia City, from the Best & Belcher mill is expected to he ready for use by August 1, and crushing rock from the Hale & Norcross mine waste dump will begin by August 10.

An electric drill plant has been put in at the Overman mine, near Virginia City.

WASHOE COUNTY.

In Olinghouse canyon, near Wadsworth, the Springfield-Nevada M. Co. have their mill No. 2 in operation after making alterations and increasing the capacity. Three feet of quartz has been cut in their Renegade mine, showing values of $8 in free gold. The raise in Cahin No. 2 has connected with upper level and another raise started, blocking out 100 feet of stoping ground.

WHITE PINE COUNTY.

For $5000 the Owl and Snowbird claims, in Granite mining district, near Cherry Creek, have been bonded to R. G. Smith of Salt Lake City, Utah.

NEW MEXICO.

GRANT COUNTY.

The Samson group of mines, 16 miles south of Silver City, and in the Burro Mountain district, has been sold to Canton, O., and Pittsburg men, W. Capthorn of Canton, O., manager, for $25,000. The group comprises five copper claims, and as soon as the best method of treating the ore is determined the company will build a mill.

SOCORRO COUNTY.

The Dividend M. & S. Co. is drilling for water at Estey City for the development of mines in Oscura district. The Colorado F. & I. Co. has twenty men working 15 miles north of Estey City, and if iron is opened in sufficient quantities to warrant it a railroad will be built from Ancho to Oscura to handle the product, says the New Mexican.

TAOS COUNTY.

Near Red River a wagon road has been finished up Placer creek to give access to several mines in that section. The Jayhawk and Scarlet have ore on the dumps ready to be hauled to the Jayhawk concentrating mill at Red River. Rogers & Luce Bros. have men at work on the Jayhawk and are taking out ore. They expect to cut the main vein. If this proves to he the case and the values hold out as hoped, they will probably put in a plant at the mine for the treatment of their own ores, leaving their mill down on the river for custom work. Their ores are gold and silver-bearing.

OREGON.

BAKER COUNTY.

Preparations are being made to put up a 10-stamp mill at the Belcher mine, near Sumpter, which will later he enlarged to twenty stamps, says President G. W. Daines. Water power will he used.

GRANT COUNTY.

J. W. Larkin and D. R. Evans, Spokane, Wash., owners of the Cougar mine, near Granite, have operations under way. The plant is being overhauled. Two new roasters of larger capacity will be built in place of those put in last season.

JOSEPHINE COUNTY.

Carr & Terry, of Galice, have bought the Bradford placer on Silver creek and will develop it, putting in hydraulic equipment. This ground is on a bench 150 feet above the creek bed. Todd creek, a tributary of Silver creek, furnishes a water right. The ground has been worked to some extent by hand.

Ingram & Ramsey are continuing development work on their copper group in Slate Creek district, near Grant's Pass. Assays show values of 10% copper.

LANE COUNTY.

(Special Correspondence) —At the Black Butte quicksilver mine the contract for a 450-foot crosscut tunnel on the 850-foot level was completed last week, and W. B. Dennis, manager and principal owner of the mine, has let a new contract for a 100-foot extension. In the first 450 feet three veins were cut—7, 12 and 20 feet wide, respectively—corresponding to the veins in the upper levels. There are over 12,000 feet of development work on the Black Butte mine, besides extensive surface improvements. The property consists of 1500 acres of land and thirty mining claims.

The Bald Butte quicksilver mine, in the Black Butte district, is owned by Portland, Or., men. The principal owner visited the property last week and is making plans for resumption of work at an early date. Considerable development work has been done, showing up a wide vein of low-grade ore.

Among the mines in the Bohemia district there is much activity in anticipation of the completion of the railroad, which is to give the camp an outlet by connection with the Southern Pacific at Cottage Grove. Work on the road is in progress.

Eugene, July 19.

WALLOWA COUNTY.

Eleven and one-half miles of wagon road will be built by the Tenderfoot G. M. Co. This company owns mining properties 18 miles southeast of Joseph. As soon as the road is completed to the Tenderfoot mines, a 20-stamp mill, with complete cyanide and concentrating apparatus, sawmill, etc., will be hauled in.

SOUTH DAKOTA.

LAWRENCE COUNTY.

T. T. Cornforth of Denver, Colo., chairman of the executive committee, and A. E. Phillips, superintendent of the Lexington Hill G. M. Co., at Deadwood, report machinery on the ground for the enlargement of the Highland Chief mill, in Spruce gulch, owned by the Lexington Hill Co. They will increase the leaching facilities to correspond with the full capacity of the crushing plant of twenty stamps.

The Lead Call says it is reported operations will be resumed at the smelter of the Golden Reward M. Co. at Deadwood, which was closed down last March on account of a strike. The Golden Reward Co., besides the 250 tons of ore mined to keep its cyanide plant in Deadwood in operation, mines 400 tons daily, which is sent East to outside smelters for reduction. It is said these shipments will be continued even after the smelter in Deadwood has again blown in. During the time the smelter has been idle many improvements have been made in the plant. The company's workings and plants require the employment of 500 men.

The Reliance G. M. Co. has been incorporated as a result of a consolidation of the University, Ak-Sar-Ben and other companies operating on the west side of Bald mountain, near Lead. A cyanide plant will be built on Annie creek.

Work is being resumed on the Brown & Pollack ground on False Bottom creek, 2 miles from Carbonate. Plattsmouth, Neb., parties are interested and are arranging to sink a shaft on the vein. This is a silver property.

The Homestake M. Co. will put in 100 additional stamps at the Amicus mill (formerly the Highland), in Lead, says Superintendent T. J. Grier, which will give the mill 240 stamps. It will give the Homestake Co. a total of 1000 stamps in its six mills. Grier denied the report that the company was contemplating the erection of an additional mill. To operate the increase of stamps the company will put in a compound engine in the west end of the mill and the old simple engine at the east end will be removed. The work of placing the new engine will be done first, and as soon as power can be supplied from that source the other will be dismantled, making it possible in this way for the company to operate the present 140 stamps while the others are being set up. It is expected to have the additional stamps running during the coming fall. They will be practically the same as the stamps in use in all the other Homestake mills, weighing 900 pounds apiece. The new air compressor at the Ellison hoist of the Homestake in Lead was put in operation last week. Its capacity is 150 drills at one time. This compressor will double the air pressure in the Homestake mine. An additional battery of boilers was put in to supply it with steam. Their cyanide plants are handling all the mill tailings at present.

PENNINGTON COUNTY.

All work has been stopped at the Holy Terror mine, near Keystone.

The Burlington M. Co., owning ground on the head of Friday gulch, near Hill City, is preparing to increase development work. The shaft will be continued down on the vein and later it is intended to put in more machinery for this work. J. B. Taylor is superintendent. They have a sawmill on the ground, which has been busy several months.

The Sunbeam M. Co., ½ mile from the Burlington, is building a 20-stamp mill. A shaft has been put down 300 feet and they are drifting on the vein from the bottom of the shaft.

The J. R. mine, near Hill City, owned by the Cumberland M. Co., is having an air compressor put in, says Manager Crocker at Deadwood. Cumberland, Ky., men compose the company. The shaft is 500 feet deep.

UTAH.

JUAB COUNTY.

To the battery of boilers at the Centennial Eureka, near Eureka, will he added a fourth of 150 H. P., giving a total of 600 H. P. This addition in compressed air required has been necessitated by the increase for the twenty drills and the hoists used underground. At the same time an additional stoker will be put in.

PIUTE COUNTY.

The holdings of the Mt. Baldy M. Co. on the gold-bearing zone extending south from the Annie Laurie mine on Gold mountain, near Marysvale, have been bought by the Log Cabin M. Co., of which P. A. H. Franklin of Salt Lake City is manager. P. S. Merrill of Buffalo, N. Y., president of the Log Cabin Co., says to open this ground a tunnel has been started from the Marysvale side that will be extended into the zone for 2000 feet. From the side on which is located the Elephant group a tunnel will be driven 700 feet.

The Wedge and Treasure Vault mines, in Mount Baldy district, near Marysvale, have been bonded to the Gold Vein M. Co. G. F. Dalton is manager.

At the Sevier Con. mines, near Kimberly, it is expected the mill will he ready for operations by Sept. 1, says Superintendent C. W. Foster.

SALT LAKE COUNTY.

The Queen M. Co. has been incorporated at Salt Lake City by D. T. Powell, E. Feller, J. K. Shaw and J. R. Morris.

The annual report of the Utah Con. C. Co., at Bingham, shows the average yield per ton of the 167,713 tons of ore treated (of which only 691 tons were oxidized ore) was 70.9 pounds of copper with $2.80 in gold and silver. These figures compare with 53¾ pounds of copper and $2.25 in gold and silver during 1901. The smelter treated an average of 460 tons of ore daily. Including expenses of every character, interest, maintenance and development, etc., and deducting the precious metals values from the total costs the company's product of 11,840,431 pounds of copper was made for 5.7 cents per pound against an average price of 11 9 cents received. The improvement in the character of the ore in 1902 over 1901 is shown by comparison of ore tonnage and its contents for the two years as follows:

	1902.	1901.
Ore treated, tons....	167,713	167,823
Copper, pounds.....	11,840,431	9,043,937
Silver, ounces.....	160,915	176,331
Gold, ounces.....	19,078	13,983

SUMMIT COUNTY.

It is expected the Keith-Kearns mill at Park City will be ready for operations by October 1, says the Deseret News. There are thirty-five men employed on construction of the plant.

UTAH COUNTY.

Development will be increased at the Union Chief mine, near Santaquin, for which additional equipment is being put in.

The Whirlwind M. & M. Co. has been incorporated to operate in American Fork canyon, near American Fork, with J. J. Mercer, C. W. Earl, E. J. Wild, J. H. Wootton, W. H. Greenwood, J. Greenwood and H. D. Wild as directors.

W. S. Lyle of California and W. H. Grant have a bond and lease on the Ontario group, near American Forks, and have started a new tunnel.

WASHINGTON.

FERRY COUNTY.

Manager Norman of the Apollo G. M. Co. says operations will be resumed at the California mine, near Republic.

Work will be resumed on the Nova mine, southwest of the Mountain Lion mine, near Republic.

The shaft going down from the tunnel level of the Morning Glory mine, near Republic, is completed to the No. 4 level, 300 feet below.

The News-Miner says negotiations are pending for resumption of work on the Nova mine, southwest of the Mountain Lion mine, near Republic. Two tunnels have been driven, cutting the vein at depths of 50 and 100 feet; a third started that would reach the ledge at 275 feet with depth of 150 feet and in 240 feet.

Manager A. Dunphy has men at work on the Mineral Hill group, near Danville. The company has twenty-six claims in the group.

J. L. Safford and A. Rambo, of Wardner, Idaho, have started sluicing operations on their group of placers near Republic.

WYOMING.

CARBON COUNTY.

A strike of copper ore is reported in the tunnel level of the Ferris-Haggarty mine, near Rudefeha, of the North American C. Co. at Encampment. The 16-mile tramway is reported transporting 300 tons of ore per day at a cost of $42, or less than 1 cent per ton per mile. J. S. Cary of Denver, Colo., is president of the company.

FOREIGN.

AFRICA.

TRANSVAAL.

Manager Way of the New Kleinfontein mine, near Johannesburg, reports during the month of May the eastern incline shaft of the New Kleinfontein Co. was sunk 213 feet 6 inches. The shaft is 21 feet by 6 feet and is down 2100 feet, where sinking will cease for the present. This shaft in five months has been sunk 858 feet and the whole of the unskilled work has been done by natives.

NATAL.

The Natal Navigation Collieries & Estate June output of coal was 11,128 tons.

AUSTRALIA.

NEW SOUTH WALES.

The S. & R. Co. of Australia report during month of June: Dore bullion was shipped to London containing 8743 ounces of gold and 52,550 ounces of silver; also, 114 tons copper matte, containing 239 ounces gold, 8550 ounces silver and fifty-five tons copper. The soft lead produced during the month and disposed of in the colonies was 515 tons.

QUEENSLAND.

The Brilliant Central G. Co., at Charters Towers, July 1, report: Crushed during month of June 3040 tons of quartz for a yield of 2219 ounces of gold; value of cyanide bullion, £1497.

TASMANIA.

The Mount Lyell M. & R., at Mount Lyell, July 2, report: From May 28 to June 24, inclusive, a total of 21,342 tons of ore were treated, the average assay value being: Copper, 2.02%; silver, 2.18 ounces; gold, .088 ounce per ton. The converters

produced during same period 496 tons of blister copper, containing: Copper, 491 tons; silver, 49,293 ounces; gold, 2070 ounces. During same period there were treated 5086 tons of metal-bearing fluxes and North Mount Lyell Co.'s ore.

BRITISH COLUMBIA.

Development work was started last week on the Clyde group, on Silver Cup mountain, owned by N. Emo of Ferguson, who also owns the Red Deer group in same section. The ore on these groups is a carbonate carrying values in gold.

The shaft at the Marble Bay mine, Texada island, which is down 400 feet, will be deepened and a heavier hoisting plant is being put up. The hoist is of 75 H. P., with 5-foot drum and capacity of 700 feet of cable.

The Boundary Coal Mines, Ltd., of Spokane, Wash., have bonded the property of the company to J. R. Carling of Exeter, Ont. A diamond drill outfit will be put in to prospect the ground. The holdings comprise 2560 acres in North Fork coal basin, 50 miles north of Grand Forks.

A third stamp mill on Wild Horse creek will be running before the end of the year, as the Pilot Ymir M. & M. Co. has made arrangements to build a mill. The mine is 9 miles up the creek from Ymir.

On the Oyster-Criterion mine, near Ferguson, men are at work on mill, aerial tram and power flume, says Manager W. B. Peal, and by Sept. 1 the mine will have the compressor, mill and aerial tram lighted throughout with electricity.

Development work has been resumed on the Betts & Hesperus group, owned by the Hesperus G. & C. M. Co. of Chicago, Ill. The group is on Hardy mountain, 4 miles from Grand Forks. C. Magee of Chicago is president.

C. Wolfe and J. F. Davanit of Spokane, Wash., have a bond on the Gold Cup group, 2½ miles north of Ymir and within 2 miles of the Nelson & Fort Sheppard Railroad. The ore is free-milling. A steam hoist and drill plant are being put in.

It is reported the strike in Dunsmuir's Cumberland mines has been declared off, the Mongollan strike breakers having been too many for the men. Little hope is entertained of the success of the proceedings against the company for employing Chinese underground, which Crown Counsel D. M. Rogers has started, who says a test case will be fought through the Privy Council in England, which some years ago killed a law similar to the present one.

CANADA.

ALBERTA.

The International Coal & Coke Co., operating coal properties at Blairmore, report work on the erection of 100 coke ovens is under way. It is expected they will be ready for use by Sept. 1.

ONTARIO.

Superintendent T. Campbell of the Seneca G. M. Co.'s mines at Tache, near Wabigoon, reports preparations under way for increasing development. Additional machinery, including a mill, will be put in. The company proposes to quarry the property for some time before sinking a shaft.——It is thought Michigan men, who are interested in the Beehive mine, near the Royal Sovereign mines, will reopen it. C. Brent of Rat Portage is manager.——W. P. Davidson of St. Paul, Minn., manager of the Royal Sovereign mines, says work will be resumed.

INDIA.

The Champion Reef G. Co. return for month of June: 14,895 tons of ore produced 14,960 ounces gold; 19,332 tons of tailings (cyanide process) produced 2332 ounces gold.——The Ooregum G. Co., at Ooregum, return for month of June: 11,911 tons of ore produced 5939 ounces gold; 10,135 tons of tailings (cyanide process) produced 1198 ounces gold.

MEXICO.

CHIHUAHUA.

The Terrenates M. Co. of Parral has decided to build a railroad from Minas Nuevas to its property.

La Luz G. M. Co., W. D. Pearce general manager, operating at Maguarichic, will put in additional machinery this summer.

It is reported that an option has been given on the Lluvia de Oro mine, near Urique, for $2,000,000 gold, to the United Mexican M. & E. Co., of which H. E. Cary of New York is a member.

M. Wicks, C. E. Delno of Austin, Tex., and W. J. Jones of Chihuahua have denounced 270 pertenencias of mineral ground in Santa Eulalia district, west of the Baltimore mine and on the mountain west from the railroad station of Santa Eulalia.

GUANAJUATO.

At El Cubo, near Guanajuato, a 30-stamp mill is being erected by El Cubo M. & M. Co. (the reorganized International M. & M. Co.). On Guanajuato river, Manager E. G. Spillsbury, for G. W. Bryant of Guanajuato, says plans are being drawn for building a dredge and concentrator for treatment of amalgam, etc., which have gathered in the river from the patios of Guanajuato.

MEXICO.

Two companies were organized at Mexico last week to operate in El Oro district: The Amistad Co., owning fifty pertenencias on the Descubridora vein and on which there is a shaft 100 meters deep. They intend to clean out the shaft and sink deeper, for which they are putting in hoist and pumping machinery. The officers of the company are E. Schroeder, J. C. Mordough and W. O. Staples. The other incorporation is the Descubridora M. Co., which will work a claim of eighty pertenencias called La Descubridora, adjoining El Oro mine on the south. This mine is said to have the Descubridora, Chihuahua and Calera veins running through it. The officers are J. C. Mordough, J. Devereaux and J. Keeler.

NUEVO LEON.

W. Hauser and A. B. Callender have begun operations on the Santa Catarina mine at El Salado, under lease and bond, says the Monterey News.

OAXACA.

Texas men have begun the exploitation of a group of twenty claims near Zimitlan, near Ayoquesco, 17 miles south of Ocotian.

PUEBLA.

The Altos Hornos Mexicanos Co. at Tepeyahaulco has its first furnace of 200 tons capacity in operation and has started work on a second one. Pig iron, steel rails, structural iron and castings of all kinds are to be made. A. Zevalza is president and E. Segura is manager.

SAN LUIS POTOSI.

The Begona mine at San Pedro, H. Sturgis superintendent, has been leased by the San Luis Potosi smelter, which will improve its workings. A narrow gauge railroad has been completed connecting San Pedro with the smelter's Mesa Verde road, says the Enterprise. The output of the mine is 5000 tons per month of $25 ore.

SONORA.

On the Cerro del Basaitequi, near Arizpe, a large number of locations have been made with the respective pertenencias on veins which give good grades of gold ores. The Adan, Cinco Senores, Don Ramon and Dos Amigos have been sold for $110,000 gold to R. K. Clancy, who proposes to start work on the mines and build reduction works.

The Nogales Copper Co., whose mines are near Magdalena, is preparing to equip a 100-stamp mill.

The La Gran Central copper mines have been sold to C. Y. de Lay and C. F. Kapp of San Francisco, Cal., C. R. Lewis of Oakland, Cal., H. E. Owen of El Paso, Tex., and R. Kirman of Reno, Nev.

It is reported that the Moctezuma Copper Co. will increase their production in Nacozari to thirty-five tons of fine copper per day. The concentrator is running full blast and the ores in the Porvinir tunnel will be handled.

The Cerro Prieto mine, southeast of Magdalena, owned by C. N. Thomas, has a 20-stamp mill in operation. A 100-stamp mill and cyanide plant are proposed. It is claimed that the vein is 70 feet wide. There is a main working tunnel.

ZACATECAS.

A concession, exempting it from taxation for ten years, has been granted the Zacatecas Smelting Co., that is to build a smelter at Zacatecas.

Obituary.

THOMAS CHALMERS, one of the founders of the firm of Fraser & Chalmers of Chicago, died on the 13th inst. Thomas Chalmers was born in Dronley, near Dundee, Scotland, June 14, 1816, and was just entering his eighty-eighth year. His father was William Chalmers, a manufacturer of linen. At the age of 14 he was apprenticed to a Dundee machinery firm to learn the trade of machinist, which he followed in all its branches in Scotland and England for thirteen years. He came to America in 1843. In 1855, with P. W. Gates, E. S. Warner, A. G. Warner and David R. Fraser, Mr. Chalmers formed the firm of Gates, Warner, Chalmers & Fraser, which was succeeded in 1857 by the Eagle Works Manufacturing Co. In the winter of 1871-72 this corporation was dissolved, and with Mr. Fraser, Robert Anthony and David Marchant, Mr. Chalmers formed the firm of Fraser & Chalmers. Two years ago this company, with three others, was merged into the Allis-Chalmers Co., and Mr. Chalmers, Sr., withdrew from active participation in its management.

LUTHER STIERINGER of New York, an electrician of note, died at Pasadena, Cal., on the 17th inst. Mr. Stieringer was the designer of the electrical display at the Pan-American Exposition at Buffalo, N. Y. He was consulting engineer for the General Electrical Co. of New York and patented many well-known electrical appliances. During his stay in California Mr. Stieringer received the John Scott medal, awarded to the man most noted in his achievements in electrical science. He was a member of the Franklin Institute of Pennsylvania for the promotion of mechanical science and of the American Association for the Advancement of Science.

PERSONAL.

G. L. CARR of Carrville, Trinity county, Cal., is in San Francisco, Cal.

ALBERT C. KOCH is manager of the Alta Mines Co. at Telluride, Colo.

G. MITCHELL of Los Angeles, Cal., is in San Francisco, Cal., on mining business.

F. L. BROWN of Brown & Beal, San Francisco, has returned from the East.

S. R. YOUNG, interested in mines near Lovelock, Nev., is in San Francisco, Cal.

W. S. GUFFY of Pittsburg, Pa., interested in oil properties, is in San Francisco, Cal.

S. NEWHOUSE of Salt Lake City, Utah, is at Redstone, near Glenwood Springs, Colo.

C. W. CONKLING of Tekama, Neb., is in Chihuahua, Mexico, on mining business.

M. L. REQUA has returned to San Francisco, Cal., from his copper interests near Ely, Nev.

W. F. BRAY of Placerville, El Dorado county, Cal., is in San Francisco, Cal., on mining business.

J. E. POINDEXTER, interested in mines near Grass Valley, Nevada county, Cal., is in San Francisco, Cal.

CHAS. M. DOBSON, a New York mining engineer, is inspecting mining properties in Shasta county, Cal.

R. S. BAVERSTOCK has returned to Los Angeles, Cal., from an examination of lead mines at Arivaca, Ariz.

R. KELLER, manager of the Emma mine, Dunton, Colo., returned there last week from Denver, Colo.

A. L. ROBINSON of Auburn, Cal., interested in Placer county mines, is in San Francisco, Cal., on business.

M. L. EFFINGER is superintendent of the Wolverine mine at Park City, Utah, vice L. A. Jeffs, resigned.

GEORGE W. LLOYD of Boston, Mass., who has extensive Oregon mining interests, is in San Francisco, Cal.

H. L. WESTLAKE is superintendent of the Coronado mine of the W. B. Thompson M. Co., near Clifton, Ariz.

J. T. MORROW, of Great Falls, Mont., is general manager of the Cananea Con. C. Co., at Cananea, Sonora, Mex.

C. L. SHIRLEY is superintendent of the Aberdeen Copper Co., near Lordsburg, N. M., vice H. N. Bowen, resigned.

PRESIDENT E. L. WHITE of the Bingham Con. M. & S. Co. has returned to Boston, Mass., from Bingham, Utah.

J. H. PRATT of New York, head of the Golden Fissure Co. with mines near Florence, Pinal Co., Ariz., is at the mines.

W. A. HEWITT, president of the Compressed Air Machinery Co., has returned from New York to San Francisco, Cal.

W. E. THORNE, formerly of Georgetown, Cal., has returned from Alaska to develop a California cinnabar deposit.

H. F. BROWN, E. M., has returned to San Francisco, Cal., from mine examinations in the Okanogan country, B. C.

W. A. WILSON returned last week to Salt Lake City, Utah, from examining mining interests in Bagdad district, Cal.

W. C. OREM of Salt Lake City, Utah, manager of the Utah-Apex properties at Bingham, Utah, is visiting in California.

W. L. WATTS, E. M., has returned from San Francisco, Cal., to Los Angeles, Cal., for the purpose of making oil land and mine examinations.

W. G. DODD, president of the Union Iron Works of San Francisco, Cal., is expected to return from New York next week.

J. L. MERY has resigned as mechanical engineer for the United Verde C. Co. at Jerome, Ariz., and is in San Francisco, Cal.

V. C. ALDERSON of Chicago, Ill., has assumed the duties of the presidency of the Colorado School of Mines at Golden, Colo.

C. T. MIXER, superintendent of the Creole and J. I. C. mines at Park City, Utah, returned last week from a business trip to Colorado.

L. C. DOTY, formerly superintendent of the Ely M. & M. Co., at Ely, Nev., is superintendent of the Pilot Knob mines at the same place.

P. S. MERRILL, of Buffalo, N. Y., president of the Log Cabin M. Co., is conducting operations at their properties near Marysvale, Utah.

N. B. KNOX, E. M., of San Francisco, Cal., has been making examinations of copper deposits in the high Sierras in Tulare county, Cal.

PRESIDENT G. W. DAINES of the Belcher mine, near Sumpter, Or., has removed his headquarters from Spokane, Wash., to Sumpter.

W. B. MUCKLOW of Hartford, Conn., president of the Majestic C. Co. at Milford, Utah, is visiting in California after a trip to their mines.

W. KRAFT, part owner of the Descubridora mine (the Goat Ranch mine), near Chihuahua, Mexico, returned last week to Chihuahua from New York.

H. D. SMITH, recently with the Tomboy G. M. Co., Ltd., of Telluride, Colo., is in San Francisco, Cal., from an examination of mines near Butte, Mont.

T. B. COMSTOCK, of Los Angeles, Cal., is consulting engineer of the Carmen Copper Co. of New York, whose properties are in the State of Durango, Mex.

J. B. COPLEN, of Tucson, Ariz., manager of the Pacific M. & M. Co., is at Globe, Ariz., to remain for some time, superintending development work.

J. E. BEVERIDGE has resigned as manager of the Dixie mines and smelter near St. George, Washington county, Utah, to devote his time to personal interests.

L. A. JEFFS has resigned as manager of the Wolverine mine at Park City, Utah, to give his entire attention to operations at Alta, Salt Lake county, Utah.

J. A. CHANSLOR of the Associated Oil Co., and also interested in the Coalinga fields, returned to Bakersfield, Cal., last week from a six weeks' visit in the East.

W. W. HARTS, captain U. S. Corps of Engineers, relieves Captain R. P. Johnston as secretary and disbursing officer of the California Debris Commission, San Francisco, Cal.

C. DOOLITTLE, former superintendent of the Bimetallic smelter of Leadville, Colo., is manager of the Dixie mines and smelter, near St. George, Utah, vice J. E. Beveridge, resigned.

FRANCIS V. GREENE of New York, formerly president of the National Asphalt Co., was in San Francisco, Cal., this week, and has returned east via Ogden, Utah, and Yellowstone Park.

THEO. F. VAN WAGENEN, E. M., who has charge of extensive mining developments at Salisbury, Rhodesia, South Africa, is of the belief that some of the present workings of the Rhodesia Goldfields, Ltd., are on the site of the ancient gold fields of King Solomon and Hiram of Tyre.

G. W. PRICE, for the past eight years manager for the Krogh Mfg. Co. of San Francisco, Cal., has retired from that firm and organized the manufacturing enterprise of G. W. Price & Co. Their principal product will be centrifugal pumps for irrigation and reclamation of land, dredging and draining; also, tailing pumps.

Commercial Paragraphs.

MEESE & GOTTFRIED CO., San Francisco, Cal., are Pacific coast agents for the Link Belt Machinery Co. of Chicago, Ill.

THE Mining Company de Penoles, of the State of Durango, Mexico, is installing four Jeanesville Iron Works electric station pumps for 1000 feet lift.

HENSHAW, BULKLEY & CO. of San Francisco, Cal., report preliminary tests made with the Kinkead mill, being run against five stamps at the Keystone mine, in Amador county, Cal., show thirteen tons of rock crushed per twenty-four hours, using but 3½ H. P.—which equals the guarantee.

Catalogues Received.

The Jeffrey Mfg. Co. of Columbus, O., has issued a handsome catalogue (No. 19) on mining machinery manufactured by them. It describes electrical coal-cutting machinery, boring apparatus, underground locomotives, electrical motors, etc., electric mine pumps, hoists, conveyors, etc. It is handsomely illustrated.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING JULY 14, 1903.

733,572.—ROD—C. F. Axelson, Los Angeles, Cal.
733,795.—LOGGING SPOOL—R. Barr, Carrollton, Wash.
733,803.—CHAIR—C. C. Black, Healdsburg, Cal.
733,455.—ELEVATOR CLUTCH—J. A. Bridges, S. F.
733,372.—NIPPLE—F. A. Colwell Oakesdale, Wash.
733,629.—RAFTING DOG—T. H. Curtis, Astoria, Or.
733,463.—OIL BURNER—E. D. Dennison, Stockton, Cal.
733,823.—MITER BOX—R. H. Dorn, Los Angeles, Cal.
733,704.—MAIL BOX—W. G. Dougall, S. F.
733,711.—WATER LEVEL INDICATOR.—Flood, Sayer & Campbell, Spokane, Wash.
733,636.—SHARPENING SAWS—G. A. W. & J. H. L. Folkers, S. F.
733,907.—MINING CAGE—Hanson & Dwight, Los Angeles, Cal.
733,583.—FREIGHT BARGE—L. R. Harvey, S. F.
733,652.—LOCK FOR SIDEWALK ELEVATOR DOORS—P. H. Jackson, S. F.
733,397.—MECHANICAL STOKER—E. W. Jones, Portland, Or.
733,487.—WASHER—E. H. Krebs, Oxnard, Cal.
733,488.—WEATHER STRIP—J. B. A. La Jeuneese, Alameda, Cal.
733,489.—WEATHER STRIP—J. B. A. La Jeunesse, Alameda, Cal.
733,552.—MINER'S CRATE—G. R. MacDonald, Seattle, Wash.
733,730.—BOILER-H. A. Miller, Crockett, Cal.
733,418.—LOADING DEVICE—T. M. Park, Darrington, Wash.
733,740.—GAS GENERATOR—J. S. Philpott, Windeor, Cal.
733,748.—SEWER TRAP—F. W. Rathbun, S. F.
733,749.—DRAG SAW FRAME—E. E. Redfield, Grants Pass, Or.
733,599.—LOOSE LEAF BINDER—W. Saunders, Oakland, Cal.
733,754.—NUT LOCK—P. C. Secor, S. F.
733,683.—FRUIT CARRIER—G. W. Stevens, S. F.
733,882.—PROPELLOR—C. H. Taylor, Seattle, Wash.
733,770.—PIPE WRENCH—J. B. Tupper, S. F.
733,771.—TIN FOILING BOTTLES—Twitchel & Brown, Los Angeles, Cal.
733,444.—CARBURETOR—L. F. Washburne, S. F.
733,449.—BAG HOLDER—B. H. Willisie, Redding, Cal.
733,889.—BABY BUGGY—Susan C. Wolfskill, Winters, Cal.

Notice of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

MAIL BOX.—No. 733,704. July 14, 1903. W. G. Dougall, San Francisco, Cal. Assigned to W. W. Montague & Co., of same place, a corporation of California. This invention is especially designed for the rural delivery and collection of mail matter. It consists in such construction of the box or receptacle with a securing hasp and a signalling target that the box may be locked with the target exposed when there is any mail matter within it to be collected either by the postman or the parties to which it is to be addressed, and in the same connection means for similarly locking the box with the target concealed when there is no mail matter within.

ACETYLENE GAS GENERATOR.—No. 733,740. July 14, 1903. J. S. Philpott, Windsor, Cal. One-half assigned to G. A. Nalley, of same place. This invention relates to an apparatus for the manufacture and storage of acetylene gas and the means for automatically supplying the calcium carbide when necessary and cutting it off at proper intervals. It consists of a generator, a rising and falling gasometer, a reservoir for the carbide movable in unison with the gasometer, a cut-off device and the rising and falling bell and with an exterior stationary point whereby the two operate to actuate the cut-off valve and open it upon the reduction of the supply and descent of the gas holder and to close it and cut off the supply by the ingress of gas and the rise of the gasometer.

LOCKING ATTACHMENT FOR SIDEWALK-ELEVATOR DOORS.—No. 733,652. July 14, 1903. P. H. Jackson, San Francisco, Cal. This invention relates to improvements in locking attachments for doors which are closable upon sidewalks and in like places, and especially used in conjunction with elevators which run between the basement and the sidewalk level. Such doors are usually provided with spring or gravity-actuated latches which operate automatically to lock the doors from within after they are closed and which are retracted to release the doors by the upward movement of the elevator. This invention consists in such a construction of the gravity-actuated latch that they will be retracted by the closing of the doors when the latter are allowed to close without losing the hail.

FRUIT CARRIER.—No. 733,683. July 14, 1903. Geo. W. Stevens, San Francisco, Cal. This invention is designed to provide an automatically adjustable compartment case suited to fruits of different sizes and character, and so that those of the most delicate nature can be safely transported on account of the perfect fit within the compartments and the taking up of any slack between each of the upper and lower series of compartments by reason of the double horizontal diaphragme.

DEVICE FOR SHARPENING SAWS.—No. 733,636. July 14, 1903. G. A. W. & J. H. L. Folkers, San Francisco, Cal. This invention relates to improvements in saw-filing and sharpening machines of the type employing rotary cutters or grinders. The object is to provide a sharpener which may be applied to any ordinary saw and may be held and operated in a uniform relation to the teeth thereof and which shall have its file or grinding members so disposed as to act upon the teeth to best advantage, and without the nerve-racking noise ordinarily accompanying such work.

Latest Market Reports.

SAN FRANCISCO, July 24, 1903.

METALS.

SILVER.—Per oz., Troy: London, 25⅝d (standard ounce, 925 fine); New York, bar silver, 54½c, refined (1000 fine); San Francisco, 54½c; Mexican dollars, 41c San Francisco, 42½c New York.

COPPER.—New York: Standard, $13.50; Lake, 1 to 3 casks, $13.25@13.50; Electrolytic, 1 to 3 casks, $13.62½@13.75; Casting, 1 to 3 casks, $13.00; San Francisco: $14.00. Mill copper plates, $17.00; bars, 18@24c. London: £56 spot per ton.

The copper market shows much weakness and prices are falling. The heavy buyers still defer placing the anticipated large orders and the producers seem unwilling to urge them by cutting prices to a still lower point. The result is an uneasy and bearish market. Production has been stimulated to such a degree by the high price of the past year and the generally low cost of production that this increase in output is now probably being felt in the metal market and somewhat lower prices are anticipated.

LEAD.—New York, $4.30; Salt Lake City, $3.50; St. Louis, $4.00; San Francisco $4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 5½, sheet 6, bar 5½c; pig, $4.75. London: £11 7s 6d per long ton=2.75c per lb.

SPELTER.—New York, $6.12½; St Louis, $4.85; London, £20 15s per ton; San Francisco, ton lots, 6½c; 100-lb lots, 7c.

ANTIMONY.—New York, Cookson's, 9½c; Hallett's, 8½c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots. 13@15c.

TIN.—New York, pig, $27.25@27.50; San Francisco, ton lots, 29½c; 500 lbs., 30c; 200 lbs., 30½c; less, 31c; bar tin, ℔ lb, 32½c @35c. London, £125 5s spot.

PLATINUM.—San Francisco, crude, $18.00 ℔ oz.; New York, ingot, $19.00 per Troy oz. Platinum ware, 75@80c per gram.

QUICKSILVER.—New York, $44.50@46.00; large lots; London, £8 15s; San Francisco, local, $44.50 ℔ flask of 76½ lbs.; Denver, $49.50. Export, $43.50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 34c.

SOLDER.—Half-and-half, 100-lb. lots 19½c; San Francisco, Plumbers', 100-lb lots, 16c.

NICKEL.—New York, 50@60c ℔ lb.; ton lots, 45@48c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, $19.50 @19.85; gray forge, $18 60; San Francisco, bar, 3c ℔ lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $28.00@29.00; open hearth billets, $29.00; San Francisco, bar, 7c to 12c per lb.

LUMBER.—(Retail): Pine, ordinary sizes, $20.00@22.00; extra sizes higher; redwood, $22.00@23.00; lath, 4 feet, $4.25 @4.50; pickets, $19.50; shingles, $2.35 for No. 1 and $2.00 for No. 2; shakes, $13.50 for split and $14.50 for sawed; rustic, $26.00 @32.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, $3.25; Cut, $3.35; 10d to 16d, Wire, $3.35; Cut, $3.35; 8d, Wire, $3.40; Cut, $3.40; 6d and 7d, Wire, $3.50; Cut, $3.50; 4d and 5d, Wire, $3.60; Cut, $3.60; 3d, Wire, $3.75; Cut, $3.75; 2d, Wire, $4.00; Cut, $4.00. Special rates for carload lots.

LIME.—Santa Cruz, $2.25; Roche Harbor, $2.25 per bbl.

CEMENT.—Germania, $2.50 @ 2.75; Hewmoor, $2.90; Trowell, $2.90; Portland, $2.50@2.75 per bbl.

GENERAL SUPPLIES.

POWDER.—F. o. b. San Francisco: No 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton. 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2 35%, carload lots, 9½c; less than one ton. 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10½c ℔ set; 14 oz., 40s., 9½c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 24@25c ℔ lb.; carloads, 23@24½c; in tins, 35c; soda ash, $2.00 ℔ 100 lbs.; hyposulphite of soda, 2½@2½c ℔ lb.; caustic soda, in drums, 3@3½c ℔ lb; Cal. s. soda, bbls., $1.25@1.50 ℔ 100 lbs.; sks., $1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb tins; borax concentrated, 7@8c ℔ lb.; roll sulphur, 4@6c; powdered sulphur, 2@3c; flour sulphur, French, 2@3c; alum, $2.00@2.25; California refined, 2@2½c; sulphide of iron, 9c ℔ lb; copper sulphate, 5@7c; chloride of lime, spot, $2.50@2.75; sulphuric acid, in carboys, 66% B, 2½c ℔ lb.; nitric acid, in carboys, 8c ℔ lb.

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6c; less than 500 lbs., per lb., 6½c; in 25-lb. tin pails, ½c per lb. above keg price; in 1 and 5 lb. tin cans, 100 lbs. per case, ½c per lb. above keg price. Dry Lead—In bbls., 1 ton and over, 6c; do. in kegs, 6½c.

RED LEAD.—500 lbs. and over at one purchase, per lb., 6c; less than 500 lbs., 6½c.

LITHARGE.—Pure, in 25-lb. bags, 8 @9c per lb.

BONE ASH.—Extra No. 1, 5@6c per lb. No. 1, 4@5c.

BORAX.—Concentrated, 7@9c per lb powdered, 9@12c; fused, 25@30c.

BORAX.—Crystal, 7c; calcined, 25c.

MANGANESE.—Pure, ℔ lb., 60c.

MOLYBDENUM.—$2 per lb.

CHROMIUM.—(90% and over) per lb., $1.00.

BISMUTH.—Subnitrate, per lb., $1.60.

MERCURY.—Bichloride, ℔ lb., 90c.

PHOSPHORUS.—(American) ℔ lb., 75c.

SILVER.—Chloride, ℔ oz., 90c@$1.00; nitrate, 55c.

ALUMINUM.—No. 1, 99%, small lots, 37c ℔ lb.; 100 lbs., 35c; 1000 lbs., 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

URANIUM.—Oxide, ℔ lb., $3.50.

ZINC.—Metallic, chemically pure, ℔ lb., 50c; dust, ℔ lb., 10c; sulphate, ℔ lb., .04c.

COAL.—San Francisco, coast, yard prices: Wellington, $8.00; Seattle, $6.50; Coos Bay, $5.50; Southfield, $8.00. Cargo lots, Eastern and foreign: Wallsend, $6.50 Brymbo, $7.50; Pennsylvania, bd., $14.00 Scotch, $8; Cumberland, $12; Cannel, $9.00; Welsh Anthracite, $11.50; Rock Springs, $9.50, long ton; Colorado Anthracite, $14.00. Coke, $10.50 per ton in bulk, $13 in sacks; Sunnyside, $8.50, long ton.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

FOR SALE.

FOR SALE.—Good interest in a copper and gold property; 160 acres, near R. R. in California. Large quantity of ore shipped; last shipment 25.45% copper, $9 50 gold and silver. Fine ore supply. One-half purchase price from mine, balance easy cash payments. Fine property for incorporation. Address "Manager," this office.

Tonopah Claims for Sale.

I have several good prospects for sale, located in known mineral belt in Tonopah mining district. Groups suitable for incorporation. Claims $100.00 to $250.00 each. Correspondence solicited.

Address WALTER OSBORN,
BOX 309, TONOPAH, NEVADA.

LILLOOET, FRASER RIVER & CARIBOO GOLD FIELDS, LIMITED.

In Liquidation.

List of Properties to Be Sold by Private Tender, Pursuant to the Directions of the Liquidators.

Trout Lake Mining Division.

ALPHA GROUP (better known as "Broadview Group"), comprising 9 Crown-granted mineral claims, or fractional claims, situated on Great Northern mountain, above Ferguson, B. C., together with two blocks of land, namely: Lot 1144, situated just west of Ferguson townsite, and lot 2949, situated about 2 miles northeasterly from Ferguson on the North Fork of Lardeau river, at the foot of Great Northern mountain.

LANDS situated on Galena Bay, Upper Arrow Lake. Three blocks of land comprising, in all, about 650 acres.

Rossland Camp.

The **"CITY OF SPOKANE"** and **"NORTH STAR"** mineral claims, together with the buildings and equipment thereon.

Boundary District.

The **"NETA"** mineral claim, Crown-granted, situated in what is known as "Brown's Camp," and the **"QUEEN OF SPADES"** mineral claim, Crown-granted, situated in what is known as "Central Camp."

Illecillewaet Mining Division.

The **LANARK GROUP**, comprising 15 Crown-granted mineral claims, or fractional claims, situated on the main line of the Canadian Pacific railway, near Illecillewaet, B. C.

Parties desiring to put in a tender for any one or more of the above mentioned properties should have their engineer on the ground, and examination made, without delay.

Further particulars and conditions of sale and forms of tender (which are to be sent in not later than August 15th, 1903,) may be obtained gratis of the Liquidators, College Hill Chambers, College Hill, London, E. C., and J. V. Armstrong, Revelstoke, British Columbia.

Dated June 15th, 1903. July 31.

SITUATIONS WANTED.

ASSAYER AND CYANIDE MILLMAN DESIRES position. References. Address "Assayer," care of Mining and Scientific Press.

CHEMIST AND ASSAYER DESIRES POSITION in mine or refinery. No objection to foreign countries. Address V.J.H., this office.

FIRST-CLASS MINING AND LAND SURveyor, Draughtsman, etc., desires position. Address H. W. K., Box 74, Long Beach, Wash.

MINE SUPERINTENDENT WANTS POSITION with a substantial company that has a mill on property. A qualified mining engineer who can run a mine or mill, cyanide plant, assaying and surveying. Address "Mining," this office.

MINING ENGINEER AND METALLURGIST, at present general manager of a large mining concern in Mexico, desires to change his position. Would need four months' notice. Address F.B.A.S., care of this office.

HELP WANTED.

Required for Copper Mines in Arizona

employing about 250 men, young mining engineer of good technical education and some experience in mining and mechanics, to act as assistant to superintendent. Address SHANNON COPPER CO., Clifton, Ariz.

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CAPABLE ENGINEER OF GOOD STANDING and experience would like to purchase an interest in an established engineering business—mining or civil. Only a business capable of expansion and doing high grade work is desired. Address "Experience," care of Mining and Scientific Press.

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Gold, silver or lead, in New Mexico, Arizona or old Mexico. Will buy or lease. Give location, quantity and value. A. E. VAN VELSAN, Telluride, Colorado. Box 181.

Backing Desired to Look Up Mining Properties.

References exchanged. Address "R", this office.

WANTED—Nitrate of Soda Deposits on the Pacific Coast.

Address "Nitrate," Mining and Scientific Press.

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Requests that its proposition be investigated. Send for prospectus and engineer's report. Price 50 cents.

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382-3-4 Wilcox Bldg.,
Los Angeles, Cal.

Reference—State Bank & Trust Co.

COPPER MINES

Near two railroads; 300-ft. vein; large amount of ore shipped; area ¾ mile by ¾ mile. A good interest will be given for 300 to 500 ft. working shaft, or diamond drill work. Address Agent, this office.

EXCEPTIONAL BARGAIN!

ONE FOUR-FOOT FRUE VANNER, fitted with Brownell Patent Lip Flange Belt. Vanner and Belt absolutely new. Address Fricot & Miller, Latrobe, El Dorado Co., Cal.

MINING AND SCIENTIFIC PRESS.

Whole No. 2245.—VOLUME LXXXVII. Number 5. SAN FRANCISCO, CAL., SATURDAY, AUGUST 1, 1903. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Mining Methods.

Every miner is interested in all that pertains to the practice of his profession. Theories are well enough, and necessary to advancement, but the practical miner desires practical methods—those which have actually been applied and are known to work satisfactorily. He desires methods which may be employed to his advantage, and while the miner is proverbially conservative, and not infrequently too much so, he seldom fails to realize the value of that which operates to his benefit.

In mining practice there is nothing more practical, more necessary nor more important than methods for supporting underground excavations, whether by timbering or filling or by a combination of both. The methods of timbering mines are almost as varied as the numerous types of veins and deposits. Prior to the opening of the Comstock lode in 1860, the excavation of a large stope was always attended with great difficulty and danger, in a country where there was much water or even moisture in the rocks. In desert regions it was not uncommon to excavate large masses with comparative safety, but the average large vein was mined with great attendant danger and the attempt often met with disaster.

The development of the Comstock mines at Virginia City, Nevada, brought to the miner a new and unheard of condition—a vein of what in that day was considered phenomenal width (65 feet), but which seems small when compared with the subsequent development of the "great bonanza" of the Con. Virginia & California on the same lode, which was more than five times as broad in its widest place. The ore in the Ophir mine—rich, but soft and crumbling—was mined with extreme danger. Surrounded by riches, they were unable to extract the ore except at an extreme risk of the lives of the miners.

Out of this anomalous condition the square set method of timbering was evolved, and this has been introduced into great mines throughout the world, proving sufficient for many years, but the demand for still closer economies has rendered various modifications of this excellent and ingenious system imperative.

In the issue of the MINING AND SCIENTIFIC PRESS of July 4 is described briefly the manner of mining in some portions of the Homestake mine in the Black Hills of South Dakota by the method there known as the block system, and it, or some modification of it, is absolutely essential to the stoping of wide veins of low-grade ore in any country where wages are $2.50 to $4 per day. Other methods have been introduced in other countries where no timber at all was used, but labor was to be had at a few cents per day, as, for instance, at Rio Tinto, Spain, where G. D. Del Prat devised a method of mining a large ore body (200 feet wide) without timbering, filling every excavation carefully by hand. This, unfortunately, is not applicable in many places for commercial reasons.

In the issues of July 18th and 25th and in this issue are described mine methods adopted at the Broken Hill mines in New South Wales, Australia. Mr. Del Prat is manager of a large mine on that great lode, but he finds it inexpedient to apply the methods of Spain to the mines of Australia. The "block system" as practiced at Broken Hill, while similar to that at the Homestake, seems to possess some features which are superior to those of the latter, particularly where the square set is used as a lining, as it were, to the ends of the blocks, there being no timber at all in the center of the stope.

By this ingenious system good ventilation is secured; the breaking and handling of ore is reduced to a minimum; the miners are as safe as they could be in any large mine; the danger of knocking down several sets of timbers previously placed is practically averted, and it leaves the alternate blocks standing in such shape that they may be safely and economically extracted at any subsequent time.

Unfortunately, this open timberless method of stoping can only be employed in those mines having a fairly good, sound back. Where the back is treacherous the full square set should be employed, and the filling kept well up to the back. By the latter system, in very bad ground it would seem advisable to reduce the width of a stope block from 50 feet, as at Broken Hill, or 60 feet, as at the Homestake, to 40 feet, or even 30 feet. This narrower width will facilitate the disposal of the ore by shoveling into the mill holes at the ends of the stope. If the back is good or fairly so, and the 50 or 60-foot block is decided upon, it would appear that it would be economy to provide a center line of mill holes, which would render it unnecessary for shovelers to throw rock more than 15 feet to any mill hole.



Rosario Mine, Guadaloupe y Calvo, Mexico. Mill in Center and Vein Croppings on the Hill at the Left. (See page 64.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION.

United States, Mexico and Canada.....$3 00
All Other Countries in the Postal Union..... 6 00

Entered at the San Francisco Postoffice as second-class mail matter.

BRANCH OFFICES:

NEW YORK CITY, 720 Park Row Bldg. BOSTON, 42 Worcester Square.
CHICAGO, 1115 Monadnock Block. DENVER, 606 Mack Block.

J. F. HALLORAN..... Publisher

San Francisco, August 1, 1903.

TABLE OF CONTENTS.

ILLUSTRATIONS: Page.
Rosario Mine, Guadaloupe y Calvo, Mexico....61
Mala Noche, an American Home in Mexico....64
Open Workings and Tunnel Rosario Mine, Guadaloupe y Calvo, Mexico....64
The Block System of Stoping....67
Thos. Stuart Chalmers....68
The Torpedo Drill, Set on Column Arm....69
Sectional View Torpedo Drill....69
Mining and Metallurgical Patents....70

EDITORIAL:
Mining Methods....61
The March of Progress....62
Chinese for the Rand, South Africa....62
Economies in Mining....62
Evolution of Metallurgy in Butte, Mont....62
"Making Gold"....62
Wage Rate for Poor or Good Workmen....62

MINING SUMMARY....71-72-73-74

LATEST MARKET REPORTS....76

MISCELLANEOUS:
Concentrates....63
The Guadaloupe y Calvo District, Chihuahua, Mexico....64
The Kayak Coal and Oil Fields of Alaska....65
Hints on Amalgamation....66
Notes on the Metallurgy of Copper of Montana....66
Archæan and Algonkian....66
Mining in Broken Hill, New South Wales....67
Passing of a Noted Man....68
United States Geological Survey in the Oil Fields of California....68
Modern Practice in Hydro-Electric Plants....69
Sinking a Shaft in Quicksand by the Freezing Process....69
The Torpedo Drill....69
Mining and Metallurgical Patents....70
Personal....76
Commercial Paragraphs....76
Obituary....76
Catalogues Received....76
New Patents....76
Notices of Recent Patents....76

The March of Progress.

The successful solution of difficult engineering problems, which is so pronounced a feature of modern progress, illustrates, better than anything else, perhaps, the need of a thorough education, without which the young man and youth of to-day will be out of the race in the very near future. Unusual problems are met daily in the ordinary course of mining and metallurgical business. Problems in engineering, in metallurgy, in chemistry and physics are being solved by young men with complete technical education. The rapid onward march of scientific progress is led by men of this character. Old methods, time-honored and trusted, are overthrown to make place for innovations in every department of science. Success overcomes failure or mediocre accomplishment, and the world is being educated so rapidly that one is bewildered in the effort to keep up with the swift moving procession of achievement. That which was good enough a decade ago is no longer given a place in this onward march, where a better method has been discovered. There are few of the modern scientific discoveries that are the outcome of chance. They are mostly the result of long and careful research, pursued intelligently and persistently, until success rewards the effort of painstaking, methodical inquiry. It is the scientific man who is leading the world to-day, and his value as the most important factor in our commercial and mechanical success is rapidly being realized and substantially recognized.

CHINESE are still seriously talked of for the mines of the Rand in South Africa, although there is much opposition to them by merchants and white miners. Mexico, it is said, also contemplates the introduction of Oriental labor in the mines of that republic, for the reason that an insufficient number of Mexican miners is obtainable. It is more than probable that any actual attempt to carry out the idea in either Mexico or South Africa would meet with opposition of a sort difficult to overcome.

Economies in Mining.

The average mine superintendent or manager is anxious to make a record as a successful manager. In some—in most—instances success is synonymous with economy. A noted Western mine owner and manager is quoted as saying, "D——n a mine that won't pay with any kind of management," but this was said at a time when only good—that is, rich—mines could be made to pay, and the experience of this man chanced to be largely with noted and rich mines. Such sentiment is given less attention in these later days, when there are many mines being profitably worked under good management, which would prove a losing proposition in the hands of an inexperienced or extravagant manager.

One of the principal factors in the success of a mine manager who has charge of a low-grade property, where the margin between profit and loss is very small, is the ability to make use of every natural advantage, and to so equip the property in every branch that the greatest possible economy in labor will result. A careful miner will develop his pay shoot before undertaking the expense of running long tunnels or sinking shafts through hard rock, for the further development or exploitation of these ore bodies. But often it is determined by mine owners to do extensive exploratory work, on the strength of valuable developments in adjoining property. If the work it has been decided to undertake be of considerable magnitude, it is desirable to have it accomplished as expeditiously and as inexpensively as possible. If a long tunnel is to be driven, a compressed air plant and machine drills are advisable, and the wise manager will at once provide these, for he knows that time, and therefore money, will be saved by the investment. He will work all the men in a shaft, or elsewhere, that he can employ to advantage, thereby reducing superintendence and general office expenses. He will buy first-class supplies in large quantities, securing the lowest market prices and discounts, and the transportation problem will be given the necessary consideration.

Wherever machinery can be utilized to advantage it is given a place, cheapening the cost by reduction of labor. Ore is sent on wire ropeways or in trainloads, hauled by motors or animals, in place of in single cars trammed by men. If the construction of a tramway is justified by the amount of material to be moved over it, the tramway is built. If a small mill is overcrowded with ore, additional crushing facilities are provided. The rock breakers are set at a point intermediate between the hoist and the mill, so that all crushed rock may be distributed evenly throughout the mill, and not the coarse in one place and the fines in another. This method also economizes labor—something which should never be lost sight of. The entire plant is arranged to operate automatically, by gravity. No longer is the rock breaker placed above the floor in order that the breaker man may get the proper amount of exercise on his shift in shoveling the ore into the jaws of the crusher, and the day of the hand battery feeder has for most part passed away.

All these things the mine manager can anticipate and provide for, but he is not omnipresent and cannot give continuous personal supervision to each of the several departments under his care. It is a physical impossibility for such a man to plan, execute and give individual scrutiny to each and every detail. He must possess judgment of men, and, having this indispensable quality, will surround himself with a corps of lieutenants each a specialist in his department. Make each of these accountable to the manager, and, if his men are well chosen, the result will probably be the best that can be accomplished under existing conditions, whether it be a profitable one or not. There are, however, times when the mine manager must have rare judgment, and that is in the introduction of innovations—untried schemes for beneficiating ores and other similar propositions involving expense and uncertainty of the result. On the face of it the new venture generally promises success, but many have discovered to their cost—or the cost of their company—that "things are not always what they seem."

The manager who always waits for his neighbors to do the experimenting is overconservative, and if all were thus inclined the steps of progress would be slow and hesitating, but one can usually approach contemplated changes of this character with a degree of caution which, while giving a fair trial, in the event of failure will not bankrupt the company. If a change of ore treatment be deemed advisable, experiments can be conducted in a conservative manner and the results made positive on a limited scale before throwing out the old plant and establishing the new.

Tests made on small quantities of ore—a few ounces—in the laboratory may not work in an equally satisfactory manner on a large commercial scale, consequently experiments of this character must be on quantities sufficiently large to demonstrate the adaptation of the process chemically, mechanically and commercially. Instances have not been lacking in the past where large mills or smelters have been built when there was no ore in the mine, or at least none valuable enough to be treated by any known process, and such instances are not of infrequent occurrence still, but it is safe to say that none of these installations were made under the direction of a competent and experienced, honest manager.

Evolution of Metallurgy in Butte, Montana.

No more interesting page in the history of mining in the West can be found, perhaps, than that furnished by the upbuilding of the industry at Butte, Mont. Elsewhere herein will be found the first of a series of chapters on the evolution of the metallurgical practice at Butte, by H. O. Hofman, in the Transactions of the American Institute of Mining Engineers. It indicates the changing situation in the copper camp from year to year, and also is a fair index of the character of the men who have had the direction of affairs in Butte. Any installation, no matter how expensive and how successful it proved to be in the handling of the ores of the district, was quickly discarded for another which was shown to be capable of accomplishing more and better work for less money. Whole plants, costing hundreds of thousands of dollars, were closed down and abandoned for newer and better ones. To effect a stricter and more rigid economy became—and, in fact, still is—the constant aim of the Butte mine manager. In the production of gold the only competition is found in the struggle against unnecessarily excessive cost. The product has a standard valuation, no matter at what cost it may have been produced, but in the production of copper each mine is in competition with every other copper mine in the world, for all eventually reach the same market and prices fluctuate with supply and demand. A great copper mine which could pay dividends on 15-cent copper might not be able to make a profit on 12-cent copper, and should the price drop the expense of production must be reduced as far as possible to meet the drop in price.

To effect this often necessitated a complete change in metallurgical methods, and the consequent expense of large sums of money. A parsimonious policy would be an unwise one to pursue in Butte, as it is anywhere, for the manager who hesitated to take advantage of a new discovery in treatment of ores or an improvement in furnaces soon found himself handicapped by the more economical production of his neighbors. Although these changes have been taking place for nearly a quarter of a century in the Butte district, it is unlikely that the last radical changes have been made, and other and surprising innovations in that district may still be anticipated.

IN Philadelphia the "scientist" has appeared who has at last discovered the long sought secret of making gold, at least, so he says. He claims to have discovered that the only material difference between gold and silver is that gold contains twice as many ions as silver. He has managed, he declares, to separate these ions of silver and reunite them as gold. The financial world has not, as yet, given evidence of great alarm over the possibility of overproduction of gold due to the latest fake discovery.

WHERE workmen of any class receive the same wage rate, irrespective of ability, the poorest worker sets the pace for all the rest, and the good man naturally degenerates, while the poor one does not advance under such a pernicious system.

CONCENTRATES.

A CUBIC FOOT of steam shrinks upon being condensed to about 1 cubic inch of water.

♣

IN a steam engine the "lead" means the amount of steam port opening at the end of the stroke of the piston at either end of the cylinder.

♣

A GASKET on a steam joint can be made easily removable when necessary by rubbing a little graphite and oil on both gasket and metal surfaces.

♣

THE practice of burning tin mill screens before using is not universal, but is recommended, as it anneals the iron and removes the likelihood of the tin amalgamating.

♣

IT IS desirable and advisable to save all the gold in an ore that can be economically saved, but there is a limit to which this can be carried, and the operation still remain a commercial success.

♣

IN substituting a steel hoisting rope for one of iron, the object should be to secure increased service, and, consequently, lower cost per ton hoisted, rather than to decrease the size of the rope.

♣

LATITE is a name employed to indicate a family of rocks intermediate between the andesites and trachytes. These rocks contain both orthoclase and plagioclase, also augite, hornblende, biotite and olivine.

♣

ONE HUNDRED DOLLARS' worth of assessment work is required on placer claims as well as on quartz claims, although the Federal law does not explicitly say so. Both the courts and the Land Department have announced this ruling.

♣

NO AMOUNT of water to be employed in a stamp battery can be stated, as this amount varies much with the character of the ore; but it may be said that it is best to use as little water as will accomplish proper amalgamation and keep the battery and plates clear.

♣

GOLD AMALGAM will usually retort about one-third of its weight in gold if tightly squeezed; but it varies considerably with the fineness of the gold. Ore producing coarse gold gives usually a high-grade amalgam. In ores where the gold is very fine the amalgam runs down to 16% to 20%.

♣

WYOMINGITE is a name that has been suggested for an unusual variety of igneous rock occurring in the Lucite hills in Wyoming. It is largely made up of the mineral lucite and the variety of mica known as phlogophite, with some apatite and subsidiary minerals. This rock is related to the phonolites.

♣

THERE is, unfortunately, no standard of size in shoes and dies of given weight. The difference is usually found in the dimensions of the shank of the shoe which extends upward into the boss head. These vary in height, width and slope angle. There is no reason why there should not be a standard of size for these mill supplies.

♣

WITH increasing altitude, the boiling point of water becomes increasingly lower. Heights can be measured with approximate accuracy by means of an instrument known as the boiling-point thermometer. A table giving the various heights indicated by the temperature of the boiling water is employed in connection with this test.

♣

GASH VEINS are those which seem to be the result of shrinkage of rocks at the surface, and subsequently filled with quartz. They are usually of comparatively short length and shallow depth. They are thought by some to represent isolated lenses of quartz in the formation, which have subsequently been exposed at the surface by erosion.

♣

THE cost of producing a pound of copper varies greatly at the same mine, depending upon the grade and character of the ore. This cost can only be obtained by taking the average expense for a long period—say a year. On ore of the same general character and grade the cost will vary with the difference in situation, magnitude of operations, etc.

♣

WHERE it is desired to employ water power and a large volume is easily obtainable under comparatively low head, a turbine wheel will be found efficient. High heads and less volume are usually sought, but not always readily obtainable. The relative cost of installation depends entirely upon the surroundings, character of stream and other factors.

♣

THE hammer test for boilers is considered superior to the hydraulic or compressed air test, as in the latter the boiler may be strained and upon heating a leak may result. The hammer makes it possible to detect the difference between a flawless and an imperfect sheet, by the sound, and every portion of the boiler can be tested by this means separately. When boilers are tested by hydraulic pressure this pressure should be at least 50% greater than the steam pressure. Thus, if the steam pressure is to be 100 pounds, the hydraulic pressure applied should be 150 pounds per square inch.

♣

IT is desirable where tailings are treated from the stamp mill direct, that they shall be exposed to oxidation as little as possible; particularly is this the case with ores carrying sulphides of copper and iron. The oxidation or semi-oxidation of sulphides produces sulphates and free acid which must be washed out or neutralized with alkalies before cyaniding.

♣

A DYNAMO which is so constructed that the entire current passes through the field coils is called a "series" dynamo, and where an additional external circuit is provided, so that only a portion of the current passes through the field coils, this outside parallel connection is called a "shunt," and the fields are said to be "wound in shunt" with the outside circuit.

♣

STEAM STAMPS weighing 1600 pounds, with rapid drop (126 per minute), have recently been tried on the Rand, South Africa, but were not satisfactory. They are to be replaced with gravity stamps. The endeavor was made to crush nine tons per stamp. The steam stamps were 11 inches in diameter and 20 inches high, and the stems 5 inches diameter.

♣

THE term "lacoolite" was introduced by G. K. Gilbert for those intrusive masses of igneous rock that, coming from below, spread out in flat sheets between layers of sedimentary rock which they penetrate, and do not reach the surface unless exposed by subsequent erosion. It was the result of his exploration of the Henry mountains in southern Utah.

♣

MANILLA ropes for mine hoists are in very limited use, having been replaced by steel. In a few small mines where the acid waters rapidly corroded iron ropes, manilla or hemp ropes have been substituted for iron. One of these is at the Newton copper mine, Amador county, Cal. It is unlikely, however, that such ropes are more economical than modern steel ropes.

♣

THE strike of the gold-bearing conglomerates on the Witwatersrand is approximately east-west and the dip south. There are no extralateral rights, and the superficial area of a claim or group of claims determines the extent of the underground holding. This varies in relation to the angle of dip. The steeper the dip the greater the amount of banket under a given surface area.

♣

THE atmospheric temperature in the Coolgardie district of Western Australia is sometimes so high that only about 20% of the steam of the engines will condense in the surface condensers, which makes steam making expensive in that section. The shortage of water has been overcome by the extensive pipe line and pumping plant recently put in there from the vicinity of the coast to the mines.

♣

GOLD is yellow by reflected light and green by transmitted light. If the gold be alloyed with silver the color by transmitted light is light green, and if with copper, emerald green or even bluish green. When in a fused state gold presents a peculiar greenish color, and at increased temperature emits purple vapors. There is always a certain loss when gold is highly heated, due to vaporization.

♣

THE word "tiff" is of Cornish origin, and was a name originally applied to fluorspar, but by common usage this application has been extended to embrace other spars, until now "tiff" means any kind of spar, though in Missouri lead-zinc mines it is applied to the particular spar which chances to be most abundant in any particular district. This includes calcite, fluorspar, heavy spar, celestite, strontianite and witherite.

♣

THE difference between a high pressure and low pressure engine is that in the former the steam pressure is over forty pounds per square inch and the steam exhausts into the atmosphere, and in the low pressure engine the steam pressure is below forty pounds and the steam exhausts into a coodenser. The condenser accumulates a quantity of hot water, which can be reused in the boiler, and maintains a constant vacuum in front of the piston, which assists in moving the piston to the amount of about one-half the vacuum gauge pressure.

♣

IN running ropes the wear of the rope increases with the speed, in consideration of which it is advisable to increase the load carried rather than the speed. A hoisting rope should never be required to carry over one-sixth of its capacity at its worst—that is, when the rope is worn out and considered unsafe. It is not the constant weight of the load when running that severely tries the rope, but the sudden starting and stopping. The loaded skip or cage should never be started with a jerk, but slowly and with increasing speed until the maximum has been reached.

♣

THE efficiency of compressed air in operating pumps underground in mines is greatly increased by reheating the air at a point near the pumps. This is usually possible where the ventilation is sufficiently good. A compound direct-acting pump, heated sufficiently to prevent freezing, will pump double the amount of water with the use of a given amount of air that a single-acting pump will. Freezing of a mine pump may often be prevented by arranging a drip from a pipe so that a small stream of mine water will fall upon the exhaust opening. This usually keeps the temperature at a point somewhat above freezing. A large exhaust opening is also necessary, and may be kept from clogging with ice much easier than a small one.

♣

WHERE a steam pump is used in a shaft a slip joint is of great service both on the steam and column pipes. In placing these in position arrange them with the smaller pipe uppermost, otherwise grit, being forced upward in the column pipe, will settle around the smaller inside pipe and bind it so tight that the pipe can be drawn neither up nor down. Should this occur as the result of inexperience, the grit may be removed by disconnecting the pipes and loosening the grit by pounding on the outside of the pipe. The removal of the grit may be facilitated by the use of a stream of water under pressure, directed into the larger pipe.

♣

A MINING CLAIM located late in the summer of 1902 has until midnight Dec. 31, 1903, before reverting to the public domain if assessment work has remained unperformed. In California the miner is chiefly to be guided by the Federal statutes, as there is little State legislation of importance. Recording of mining locations is not required by the United States statutes, and is only necessary where the State or local laws make it imperative, and this California laws do not require. However, the miner should surround his claim with every possible safeguard, if it is of any promise, for should a valuable mine be developed, the title should be perfect, and the more valuable the property the greater the necessity for every precaution to make the title secure.

♣

MAGNESITE—magnesium carbonate ($MgCO_3$)—frequently contains a small quantity of magnesium silicate, and sometimes iron carbonate. Its massive form is similar in appearance to unglazed porcelain and is rather hard to drill, though brittle. Magnesite in its crude state is used in the manufacture of carbon-dioxide gas, either by calcining or by treatment with sulphuric acid. In the latter case, the magnesium sulphate, as a by-product, is crystallized out, yielding Epsom salts ($MgSO_4\ 7H_2O$). The residue, after calcining (MgO), is used as a refractory lining for open-hearth furnaces and converters, either in the form of bricks or concrete; it is also mixed with asbestos as a non-conducting covering for steam pipes, boilers, etc.

♣

THE Bruckner roasting furnace is a cylinder of plate iron revolving horizontally on friction rollers between a flue and a fire box. The ore is charged and discharged through manholes in the side of the cylinder. The flame from the fire box passes directly through the furnace, and thence mixed with the gases from the roasting ore passes to a dust chamber. The Bruckner is an intermittent furnace. One charge must be removed from the furnace before another is introduced. The White-Howell furnace is also cylindrical in form, revolving horizontally on friction wheels or carriers between the fire box and the flue, but this type of furnace is continuous in operation, the ore entering at one end and discharging at the other, the flames traveling in a direction opposite to the travel of the ore. The furnace is inclined slightly toward the discharge end.

♣

THE demand for metallic bismuth is considerably exceeded by the supply. The production and price of bismuth and its ores are under control of Johnson, Matthey & Co. of London, England, and the government of Saxony—as the output must be restricted in order to make it profitable to work the mines. Bismuth is found in several districts of the western United States, occurring both free and combined. A telluride and tellurate of bismuth have been found in Colorado. Gold and silver values are also frequently associated. The principal use for the metal is in the manufacture of alloys which melt at comparatively low temperatures—lead, tin and cadmium being the other constituents. An alloy of 50% Bi, 27% Pb, 4% Sn and 3% Cd melts at 60° Centigrade. Bismuth is also a constituent of anti-friction alloys, pewter and type metal. Bismuth subnitrate—$BiNO_3(OH)_2$—is used in medicine and as a cosmetic.

♣

HEMATITE (iron sesquioxide) Fe_2O_3, contains iron 70%, oxygen 30%. It is of several varieties. Specular iron is a micaceous variety, with metallic luster, the crystals often splendent, coarse to fine grained, the latter often resembling some kind of mica schist. It is soft and unctuous to the touch, has a red streak, compact columnar, or fibrous, is often hard—5.5 to 6.5—luster sub-metallic, the masses often radiating, color red, brown, brownish black; sometimes found in reniform masses called "kidney ore," streak red. A third variety is red and earthy, being soft, readily soiling the hands. Reddle and red chalk are earthy varieties of hematite, with some clay. Clay iron stone, common in silver and gold mines and elsewhere, is hard, brownish black to reddish brown, sometimes deep red. Its luster is submetallic to unmetallic. This ore is often siliceous or clayey. When associated with lead carbonate it forms the so-called "hard carbonate" found in Leadville, Colo., and other lead-silver mines. Limonite is the brown variety of hematite. Limonite, if highly heated, parts with its water of crystallization, and turning red becomes hematite.

The Guadaloupe y Calvo District, Chihuahua, Mexico.

NUMBER III

Written for the MINING AND SCIENTIFIC PRESS by H. Z. OSBORNE.

The Guadaloupe y Calvo mining district embraces the southwestern corner of the State of Chihuahua, Mexico, where that State joins the States of Durango and Sinaloa. A Mexican mining district is a rather important political division, and frequently embraces a large extent of territory. All mining claims, or "denouncements," within its boundaries, must be filed with the mining agent for record, at its capital, as well as all other official or legal papers affecting mining titles. The town of Guadaloupe y Calvo is the capital of the mining district of that name, as well as being the largest town in that section. Its elevation above sea level is 7300 feet. It is connected with the outside world by trails east across the Sierra Madres to Parral, and west to the Pacific coast. Most of its commercial supplies come from the East, but a portion comes from Mazatlan. In a former paper the writer described the trip from Parral to Guadaloupe y Calvo, and gave a brief description of the latter town. The two principal mines at Guadaloupe y Calvo are the Rosario and the Independencia, the former being the larger, and having had an interesting history. Walter Harvey Weed, of the U. S. Geological Survey, has visited this section, and contributed two interesting papers on its geology and mines to the American Institute of Mining Engineers. Of the geology of Guadaloupe y Calvo Mr. Weed says:

"The gold occurs in fissure veins traversing altered and fractured andesitic rocks. These quartz veins are older than the rhyolitic rocks, and only show where the light-colored, chalky-white or pink porphyry tuffs have been removed by erosion or mine workings. In part the ores occur in andesitic gangue, but more commonly in true quartz veins. The amorphous or crypto-crystalline nature of some of the quartz suggests replacement, but 'comb quartz' also occurs. The veins are only exposed on the east side of the creek, the west slope being composed of dacitic rocks."

The Rosario mine has been under bond to C. W. Clark, a son of W. A. Clark of Montana, for two years, and it was recently purchased by Mr. Clark for $500,000. During the visit of the writer in February, 1903, the 10-stamp mill was in operation on ore, most of which was sorted from the old dumps, which are very extensive. An accompanying illustration shows the mill and the croppings of the vein. Of the Rosario vein Mr. Weed says:

"This vein is one of the largest producing quartz veins of the world. It varies from 60 to 150 feet in width, and dips with the hillside so that it forms a great reef fronting the valley, and its exposed wall forms a very conspicuous object. It is said to average over 100 feet across, and where I measured it the thickness was 110 feet. The great open cut on the vein is 1800 feet long, 7 feet deep and 130 feet across. Four distinct ore shoots, separated by low-grade quartz, have been worked. The low-grade ore now forms the enormous dump heaps seen at the mine; and, despite the fact that the people of the town have largely obtained a living by picking over this dump, it is said to be all good cyaniding ore, 'averaging better than $10 per ton.' The vein has a N. W. - S. E. course, and dips west. The vein has been worked on one hill to a depth of 430 feet, but a vein of this magnitude will probably not play out at such shallow depths.

"The Rosario vein was discovered in October, 1835, by a Tarahumar Indian from Nobogarne, when it was shown to some miners from the Refugio mine, 30 miles south of Rosario. The extraordinary size and richness of the vein caused a rapid influx of miners to the locality, and two months after the discovery there were 2000 people encamped about it. The vein was located by various individuals, but soon passed, by purchase and debt of the owners, into the hands of the Ochoa family. In 1836 the Ochoas leased the property, in two parcels, to two companies, organized with English capital, and known as the Guadalupe Co. and the Zorilla Co., respectively. The Guadalupe Co. worked the western part and the Zorilla the eastern part of the property. These companies were obliged to work under lease, as the former Mexican law did not permit foreigners to hold real estate. The terms of these leases are said to be in the mining records, and provided for a royalty of 25% for four years and $50,000 for eight years; the lease expired in 1847 or 1848.

"Under these companies the vein yielded largely of gold and silver, so that in October, 1842, a decree was secured from the Government permitting the erection of a mint at the mine. The records of this mint have been destroyed by fire, but custom house records show that coinage began in July, 1844, and that steam power was introduced in 1847.

"The recorded output of the Rosario for the years 1838 to 1846 is $16,000,000, but owing to the heavy tax upon bullion and the ease with which the tax was evaded, reliable estimates place the total output from the discovery of the vein to the closing down in 1847 at $40,000,000. The mine was, during these years, worked by the most primitive methods, and the tailings show that a large part of the value was lost. The ore was carried on men's backs to the surface and then packed on burros to the various crude reduction works located many miles down the creek, where it was treated in tahonas, with an overshot water wheel furnishing the power.

"In 1847 large quantities of water were encountered; and, the working expenses being very greatly increased, the English companies attempted to renew the lease for a rental of $30,000 a year, a proposal that was indignantly refused by the owners. Personal differences, added to the refusal, led to the abandonment of the property by the English company, who removed to the silver mines of Guanacevi. From this time to 1883 no development work was done. Various Mexican miners robbed the pillars of rich ore left in the workings, 'gophered' the rich streaks of ore, and sorted the dump.

"In 1883, Judge Flipper, representing the Guadalupe M. & M. Co., organized at Memphis, Tennessee, secured the property under an agreement with the Ochoa family, who reserved a one-fifth interest and were to receive one-fifth of the gross output of the mine. This company operated the mine until 1887—erecting a 10-stamp mill, and sinking a new shaft, from which a crosscut was driven to the vein and drifts run out from the old shafts. In one year this company shipped $113,000 in gold; but the manager was robbed of nearly $20,000 while taking the bullion across the mountains, and, as a consequence, the property was abandoned by the company in 1887 and reverted to the Ochoas. At that time the Mexican mining laws required properties to be worked by six men for six months of each year; this the Ochoas failed to do, and in 1889 the property was denounced by four Americans, who obtained title from the Federal Government. With three Mexican merchants, admitted as equal partners, the property was operated and the ore treated in a stamp mill with pan amalgamation. In 1892, operating under lease, two of the partners cleared over $100,000 in twenty-two months, working on ore from the dump heap and from the rich pillars left in the workings. Meanwhile the ownership of the property passed into the hands of Tibuceo Garcia, and was sold by him in 1895 to the Rosario Mining & Milling Co."

Such is the history of the Rosario mine to the present day. It will now doubtless enter upon a new era of development at depth. The present workings are several hundred feet deep. No doubt a powerful hoisting plant with big pumps and a large mill will be put on the property. The lack of roads will make this expensive, and possibly the new owners will find it economical to make a wagon road to the terminus of the Parral & Durango railroad, over which to carry their machinery. An extension of that road to Guadaloupe y Calvo is possible, and if constructed it would open up a rich mineral country.

The Independencia property is the second one of importance at Guadaloupe y Calvo. Of this mine Mr. Weed says:

"The Independencia property includes a group of claims situated east of the town of Guadaloupe y Calvo. The claims cover a complexity of veins. The main workings are entered by a tunnel near the mill, and include shafts and drifts on the Independencia ledge. The vein outcrop consists of porous white quartz, which is rusty and drusy in some places. The ledge runs a little north of west, and has been quarried by open cut and stoping from below. These workings show the vein to be 8 or 10 feet wide, with a pay streak from 1 to 5 feet across, showing a well-defined sinuous wall. The ore consists of white quartz and red jasperoid carrying pyrites, and rarely free gold. Some of the ore carries high values in silver, but no recognizable silver minerals were seen, the richest ore showing a black clouding of the quartz. The vein filling is finely crystalline, and shows none of the coarse texture and comb-structure of a filled fissure, its nature being that of replacement quartz. Where crystalline quartz is seen, it is secondary, and cements fragments of shattered original vein filling. A banded structure is rarely seen, and occasionally the vein filling shows fragments of an andesitic breccia, the rock being altered and of a greenish-yellow color. So far as seen, the vein is nearly vertical. Its surface continuity is interrupted by a patch of rhyolitic tuff.

"The workings consist of three tunnels with drifts, and expose the vein for a vertical depth of 220 feet; two winzes of 26 and 30 feet depth, respectively, prove the vein below the lower tunnel. The following assays show the general character of the ore on the Cuauhtemoc vein: Gold, 0.04 oz. to 5 oz. per ton; silver, 3.20 oz. to 167 oz. per ton. An average of twenty-four assays from the various faces gave: Gold, 1.18 oz. per ton; silver, 16.62 oz. per ton. The ore varies in appearance. The pyritic ore is commonly reddish quartz, with veinlets of white and gray quartz. The silver ore contains finely disseminated galena, with zinc blende, and occurs in a mixture of dark gray, white and amethystine quartz. Chalcopyrite occurs in minute specks. The rich gold ore shows dull greenish secondary quartz, often in botryoidal forms, filling cavities; the primary ore often shows rusty gold, suggesting decomposed telluride ores. It also occurs associated with minute specks of copper pyrite and zinc blende. The rocks are altered porphyritic andesites."

Leaving Guadaloupe y Calvo and proceeding westerly, one passes down the bed of the arroyo, the water of which is used for the Rosario mill. The ruins of a good many old reduction works, generally tahonas, or arrastras, are seen, which were run by the English company, or later by gambusinos. These ruins of old works, the buildings generally of stone, are seen along the streams for considerable distances beyond Guadaloupe y Calvo, where it is said the Englishmen used to pack their ore from the Rosario.

A sugar-loaf mountain is a conspicuous object on the landscape west of Guadaloupe y Calvo—thirteen hours ride distant. Indeed, it can be seen two days before reaching that place, from the heights east of the Rio Verde. It is called Mount Milpillas. After leaving Guadaloupe y Calvo the mineralization of the country does not seem so marked before reaching this mountain as it does after it is passed. From Guadaloupe y Calvo the Arroyo Santa Rosalia is five



Open Workings and Tunnel, Rosario Mine, Guadaloupe y Calvo, Mexico.



Mala Noche, an American Home in Mexico.

hours' ride, Arroyo Hondo (deep) is two hours farther, and Los Tarros, in the saddle right under Mount Milpillas and north of it, six hours farther. Los Tarros is at an elevation of 8850 feet. Between Arroyo Hondo and Los Tarros are La Reforma plantations, embracing several thousand acres planted mainly in corn. Plowing was in progress at the time I passed, and it was interesting to observe the Indians manipulating the primitive plows, consisting of a sharpened stick attached to a pole, in turn fastened to the horns of oxen. A dozen or more teams were being worked in one field.

(TO BE CONTINUED.)

The Kayak Coal and Oil Fields of Alaska.

Written for the MINING AND SCIENTIFIC PRESS by P. C. STOESS.

The Kayak district occupies a belt of country extending along the Alaskan coast for a distance of 175 miles from the west side of the Malaspina glacier on its far eastern end to the waters of Prince William sound on the west, being bounded on the north by the high ridge forming the main St. Elias range of mountains, thence south to the tidewaters of the Gulf of Alaska, 30 to 40 miles.

An area, nearly in the center of the belt, 40 miles wide and running from the summit of the St. Elias range to within 2 to 5 miles of tidewater, is taken up by the Behring glacier. The strip in front of the glacier, between it and the gulf, is a gravel moraine for the most part, covered in places with scrub timber, and through which several streams flow from beneath the glacier, varying much in their courses at different seasons.

The country shows a number of low abrupt hills, separated from each other by flat wide valleys, having easy grades and fronted in places on the shore line with level tidewater and mud flats. The tops of the hills are bare, rocky and precipitous generally, the foothills are covered with a fair growth of spruce timber, and the valleys with a thick growth of alder, berry bushes and grass, with, in places, good soil. The moss, usually found in Alaska, is in this section not over 6 inches to 1 foot thick.

The climate is not as severe as that of the interior, but the rain and snowfall are much greater. The climatic conditions are about the same generally as those prevailing on the coast section of Alaska, and there is nothing in the climate to prevent active operations in the way of development the year round, when the conditions are provided for.

The formations consist generally of a series of coal-bearing sandstones, the croppings of which are 15 to 20 miles inland, ranging from gray to reddish-brown in color, and overlying a series of oil-bearing shales and slates, cropping on the beach and shore line and in the low hills bordering the coast.

The thickness of these formations is not known, but from the indications so far as observed the coal measures are not less than 7000 feet thick, while the oil shales appear to have an equal thickness. In the section of country around Catalla the formation is considerably broken, the rock dipping in several directions, within a small area. The general course of the hills and the strike, however, in this part of the fields is north and northeast, the dip varying from vertical to 40° to the northwest. About 15 miles inland, in the area of the coal croppings, the formation is less disturbed and the strike swings off more to the east. In the coal croppings on Carbon, Clear and Canyon creeks it strikes east-west and dips 40° to 60° north. East of the area covered by the Behring glacier, in the Yaktag section, the formation is less disturbed and has a course nearly east-west and dips 35° south. The section to the west of Catalla, west of Martin river, is covered by the immense tide flats of the Copper river delta, subject to inundation by both tidewater and the floods of Copper river, while further west, around the Eyak-Orca section, the country is broken and generally more like the region around Catalla.

Oil seepages of importance are reported on and near the shore line of this entire belt. Extensive gas flows have also been found associated with oil seepages, and in places where no oil has been discovered. The principal oil seepages found are on Johnson creek, White river, Yaktag and Ducktaw rivers in the Yaktag district, up Eight-Mile river, and at the head of the Ochtilee river in the Sucklin district, 3 miles up the south fork of the Neuchawak river, near the head of the Catalla slough, at the head of Martin slough, in the Catalla district, and near and on the south end of Eyak lake in the Orca district.

Beside these there are numerous less important ones. A hot sulphur spring has been found on the southeast end of Eyak lake. It has been stated that the oil-bearing belt does not extend anywhere more than 5 miles inland from tidewater, though gas flows and signs of oil have been found as far inland as Kostakra lake, 5 miles farther in from the coast.

Close to the head of the Catalla slough, and on one of the seepages of oil, the Alaska Steam-Coal & Petroleum Syndicate, Ltd., has sunk a well 365 feet deep and has a flow of oil. The well was capped the second day after the oil was encountered, hence its capacity was not fully determined, but during the time it was flowing it shot up at intervals a jet of oil 60 feet above the top of the derrick through an 8-inch pipe, and since the well was capped there is a heavy leakage of oil and gas around the casing of the well. Following is the log of the well as driven:

	Feet.
Surface drift	5
Broken shale	10
Light colored shale	140
Fine grained sandstone	18
Seam of coal	½
Hard dark shales	190
Stratum of quartz	½
Oil-bearing sand	1
Total	365

A second well has been sunk 1700 feet by the Alaska Coal & Petroleum Co., but so far no oil has been obtained, though the well is going through the same formation as that in the English company's well. This well is situated about ½ mile southwest of the English company's well.

Several other wells are being prepared and inside of sixty days six new wells will be under way.

Practically all the oil-bearing lands that show any signs of being worth anything, and some that are worth nothing, have been located during the past eight months. As near as can be estimated nearly half a million acres of oil lands have been taken up.

The coal croppings, of which most is known, lying 20 miles northeast of Catalla, occur in the valleys of Sheppard, Trout, Clear, Carbon and Canyon creeks, and also on the hills between these streams. There are six veins of importance ranging from 4 to 30 feet thick. The coal in the veins is practically free from shale, though there are occasional bunches of iron sulphide. The veins dip 40° to 60° north. The coal is so situated that it can be mined by tunnels. The grade of the coal in the several veins varies, some of the larger veins carrying as low as 60% fixed carbon, being a fair grade of bituminous coal. One of the veins on Trout creek has been found by working test to make very good blacksmith coal. Most of the veins contain a semi-anthracite coal, which makes good steam fuel. Their general physical appearance is that of bituminous coal. The samples taken so far are from the surface.

Practically all the important available lands known to contain coal have been located and are being developed. The total area of coal land in the section north of Catalla and in the district to the east of the Behring glacier does not exceed 200 square miles. The district east of the Behring glacier has not been explored as fully as that north of Catalla, but the best part has been recently located, and it is stated the coal showings are larger than those in the western end of the field, the coal being of the same quality.

The following is an analysis of coal from the district:

	No. 1. 7-ft. vein.	No. 2. 12-ft. vein.	No. 3. 4-ft. vein.
Moisture	1.5%	1.5%	1.7%
Volatile matter	18.0%	10.5%	10.0%
Fixed carbon	75.0%	85.7%	84.2%
Ash	5.0%	1.8%	3.8%

The oil found throughout the district appears to be of the same character. It is stated by the chemists who have analyzed it to have a paraffine base. The following analysis was made in Seattle from a sample of the crude oil taken from the well at Catalla:

Naphtha	34.2%
Illuminating oil	34.4%
Lubricating oils	16.5%
Coke and residue	14.5%

Specific gravity, .800.

Another analysis made in Los Angeles, Cal., gave:

Specific gravity	.7957 (45.9° B.)
Cold test	Not chilled at 3° below zero
Naphtha	38.5%
Illuminating oil	31.0%
Lubricating oil	21.5%
Coke and loss	9.0%

Oil has a flash test of 70° to 80°.

Oil is light green in color.

In addition to the oil and coal lands a small area of placer gold has been discovered and worked in a small way for the past five years. The bluffs near Cape Yaktag carry small amounts of fine gold, which yield about $3 per man per day. On White river, in the same section, and 5 miles up from its mouth, a year ago a small area bearing coarse gold was discovered and is being worked. It is stated that only about 2 miles of the channel is profitable. The value has not been fully demonstrated as yet. The ground is from 3 to 6 feet deep to bedrock. The gold is coarse, varying from the size of a large pin head to that of a small bean, and is worth about $18.50 per ounce. The source of this gold is probably some deposit under the Malaspina glacier under which the White river rises. The district is not fully explored, but from information available it does not appear that there is a probability of much gold-bearing placer ground being found.

The Kayak district is reached by steamers running direct from Seattle, Wash. The trip occupies seven to nine days, depending on the state of the weather. For the Kayak-Catalla section and the Yaktag section the point of debarkation is Kayak village, on Little Kayak, or Wiggham island, where there is a small settlement, whence Catalla and other points on the mainland are reached by rowboats, launches, etc. To reach Yaktag it is necessary to walk along the beach from the Ochtilee spit, opposite Kayak, 60 miles, as there is no harbor or landing place that is safe and available during bad weather nearer to Yaktag than Kayak, though during fine weather small boats may be landed on the beach at Yaktag. To reach Orca section one can go on the steamers to Orca, where there is a safe harbor. No reliable charts or surveys of the coast from Yaktag to Orca have been made, hence the steamers on this run will not land freight directly on the mainland. All passengers and freight are landed at either Kayak or Orca, but mostly at the former place, thence being transferred on lighters and small boats to Catalla, Chilkat Point, or Ochtilee spit as required. The United States Government has ordered a survey of the shore line made, and will determine whether it will be possible to obtain a landing safe at all seasons at some point either in Controller bay, or near it on the mainland.

There are postoffices at Orca and Kayak and one is to be established at Catalla, which place is a more convenient point for most of those operating in the district. Hotel accommodations are limited at Kayak and Catalla, though there are stores carrying small stocks of staple goods.

There are a number of small boats running between Kayak and the mainland, and there is no difficulty in getting to and from the various points.

White labor, up to a few months ago, was scarce, there having been no demand for it until recently. The natives can be hired for "packing," boating and certain other classes of work, but are not skilled outside the above mentioned things, to which they are accustomed. They are quick to learn, are generally superior to most of the coast natives, but are few in number. They demand and receive the same pay as white men.

The run of the oil stream or pools will probably be difficult to determine at first, owing to the fact that a large portion of the uptilted part of the country, back in the coal range and in front of the main St. Elias range, is covered perpetually with a thick bed of snow and ice, making much of the information that would be of use in determining these matters unobtainable. From known facts, however, it is thought that the best and most permanent wells will be found on the east end of the Yaktag section, as this part of the belt is less broken than any of the rest of it.

Hints on Amalgamation.

Written for the MINING AND SCIENTIFIC PRESS by W. H. KRITZER.

As ore conditions vary in different localities, the directions following for the preparation and cleaning of plates apply only in a general way, for the practical millman will prefer to prepare the copper plates under his charge in a manner that has proven to give the best results in saving the values from the ore that is being crushed.

To keep mercury, it should be placed in a large jar or wide-mouthed bottle, and for every five pounds of mercury a solution of one pound of sal-ammoniac and two pounds of quicklime, with enough water to dissolve, should be added.

An occasional shaking will keep the mercury in this jar in proper condition for dressing plates.

To retort and clean foul mercury, fill the retort about one-half full and cover with a layer of powdered charcoal or quicklime. Lute and wedge the cover on the retort, and, if the pipe has no water casing surrounding it, cover it with wet cloths and keep wet, allowing the lower end to extend into the vessel of water placed below to catch the distilled mercury. Heat the retort gradually until nearly red. Remove the fire before it is fully red, and allow to cool, keeping the water running in the meantime.

To clean mercury without retorting, place the foul mercury in a jar or large bottle. To this add a mixture of one cupful of nitric acid and ten cupfuls of distilled water. Shake occasionally and allow it to stand for twenty-four hours.

DRESSING THE PLATES.—Rinse off thoroughly with clean water, using a hose, and, if dark or fouled, go over them with a brush or flannel mop, using a weak solution of sulphuric acid or cyanide of potassium, which may be strengthened up to as much as one part of acid to ten of water, if required.

For general purposes use: Caustic soda, 5 ounces; cyanide of potassium, 2 ounces; dissolved in five gallons of water.

When blackened or fouled with black sulphurets use: Carbonate of soda, 8 ounces; sal-ammoniac, 16 ounces; lime, 48 ounces; or to five gallons of salt brine add one-half pint of sulphuric acid.

When blackened or fouled with oxide of manganese, sulphate of copper or zinc, take: Muriatic acid, 1 pound; distilled water, 5 gallons.

After having cleaned the plates and used one of the above solutions, take from the jar a small quantity of mercury and place it in a small bottle. Then stretch a piece of muslin over the mouth of the bottle and sprinkle the plate with the mercury; rub it smooth with a flannel mop in clean water. In starting new plates do not clean up too often; allow the amalgam to pile up, applying the quicksilver until it is well built up; but do not allow the amalgam to

harden and scale on the plates, as it should he kept just soft enough so it will not run, and when ruhhed up with the finger have a similar feeling to putty. As the amalgam accumulates, do not allow it to collect in bunches, hut take a brush and go over the plates from side to side; the fine ridges formed will be an aid in the collecting of the gold.

To remove amalgam, use a thick piece of ruhher or leather. Do not use a metal scraper. Do not clean too close, as the gold will not he lost, or the silver either, and you avoid the danger of scraping off the silverplating and giving verdigris an opportunity to form on the copper, which is so detrimental to the plates. If the amalgam is hard and does not remove easily, dip the plate in warm water.

Better results have been attained hy having plates with a wide surface and a very slight fall; for with a narrow surface and a heavy fall, the fine or float gold (in a thick hody of water) can not come in contact with the surface and is carried off.

Notes on the Metallurgy of Copper of Montana.*

Written by H. O. HOFMAN.

In 1901 the United States produced 268,782 long tons of fine copper. Of this total, Montana is credited with 102,621 long tons, or 38.2%.

The leading smelting works are located in Butte, Anaconda and Great Falls. In Butte are the works of the Colorado Smelting & Mining Co., the Colusa smelter of the Montana Copper Co. (closed in 1888), the plant of the Parrot Silver & Copper Co. (closed in 1899), the Bell plant (closed in 1884), the Clark's Colusa (closed in 1888, then come the active works of the Colusa Parrot Mining & Smelting Co. (Butte Reduction Works), the Butte & Boston Consolidated Mining Co., and the Montana Ore Purchasing Co.

In Anaconda are the old and new (Washoe) works of the Anaconda Copper Mining Co.; in Great Falls the establishment of the Boston & Montana Consolidated Copper & Silver Mining Co.

The active works furnished in 1901, approximately, the following amounts:

	Pounds.
Anaconda Copper Mining Co.	113,800,000
Boston & Montana C. C. & S. M. Co.	54,700,000
Montana Ore Purchasing Co.	29,900,000
Butte & Boston Con. M. Co.	22,200,000
Butte Reduction Works	18,000,000
Colorado Smelting & M. Co.	7,500,000
	246,100,000

The discrepancy of 17,000,000 pounds of copper hetween the figures of production is due to the fact that the matte of some works is converted in others, and that both are credited with the copper they turned out.

PAST AND PRESENT PLANTS.—The Colorado Smelting & Mining Co. was started 1879 hy the late Henry Williams. The ore was roasted at first in the long-hearth hand reverberatory furnace, having a hearth 12 by 50 feet, and then smelted in a reverheratory matting furnace with hearth 14 feet 7 inches hy 9 feet, wood heing used as fuel. The original smelting furnaces treated twelve tons of ore in twenty-four hours, producing matte assaying 60% copper and 700 to 800 ounces silver to the ton, which had to he hauled 200 miles to reach the railroad. In 1889 Bruckner cylinders came into use for roasting ores; followed in 1892 hy the R. Pearce single-deck turret furnace. In 1894 Pearce's first douhle-deck turret furnace was added, and in 1901 the first six-deck turret furnace of R. F. Pearce was put in operation. At present (summer, 1902), the roasting department has four single-deck turret furnaces with 6-foot hearths, five douhle-deck turret furnaces (one with a 6-foot and four with a 7-foot hearth), and one six-deck turret furnace with a 7-foot hearth.

The hearths of the reverheratory matting furnace were made 21 hy 12 feet in 1889, increasing the ahove capacity to eighteen tons in twenty-four hours. At present there are three matting reverberatories with hearths 47 hy 20 feet (the first of these larger furnaces having heen erected in 1899). The matte, containing copper 50% to 55%, silver 100 ounces, and gold 1.5 ounces to the ton, is sold.

The Colusa smelter of the Montana Copper Co. started 1880 by A. Wartenweiler, with four long hand reverheratories for roasting (hearths 60 feet hy 11 feet 6 inches) and two reverheratory matting furnaces (hearths 15 feet 9 inches by 10 feet). Smelting begun in 1881; a reverheratory matting furnace treated in twenty-four hours twelve tons of raw and roasted ores, producing 65% copper matte, with a consumption of ten cords of wood. Lump ore was at first heap-roasted, hut, stopped on account of the smoke nuisance, was replaced in 1882 hy stalls. In 1884 there was in operation, hesides the stalls, twelve long-hearth hand reverheratory roasting, six reverheratory matting and one hlast furnace. The latter, 3 feet hy 4 feet 6 inches at the tuyeres and 10 feet high, was run with charcoal. Works sold 1888 to the Boston & Montana Con. Copper & Silver M. Co., and formed the so-called Upper Works. Closed down 1893, when the new Great Falls establishment of the company made them superfluous.

The Parrot Silver & Copper Co., started July, 1881. Ore at first roasted in eleven long hand reverheratories (hearths 60 hy 14 feet) and smelted in six matting reverheratories (hearths 14 feet by 11 feet 6 inches). Weight of smelting charge, two to three tons; ten tons put through a furnace in twenty-four hours. Matte (60% to 67% copper and forty to forty-five ounces silver per ton) at first hrought forward to hlister copper, hut this soon given up on account of the excessive cost, and the fact that matte was more easily marketed than blister copper. Shortly after starting of works, a stall 40 feet long and 9 feet high was hult hy J. T. Reese to roast lump ore. It proved a failure and was replaced by A. J. Schumacher with open stalls, 8 feet deep, 6 feet high and 6 feet wide. In 1891 there were in operation 120 stalls. The hand reverheratory roasting furnaces were supplemented, 1889, hy two small Spence mechanical shelf-roasting furnaces, each treating five tons of concentrates in twenty-four hours, reducing the sulphur to 6% to 7%; these replaced 1892 hy a round, and 1893 by two ohlong Keller-Gaylor-Cole mechanical shelf-hurners.

A Roherts four-hearth mechanical reverheratory roaster, similar to the Wethey furnace, was put in operation 1897. Hearths of matting reverheratories enlarged in 1887 to 16 feet by 12 feet 6 inches. For lack of space they never reached the large sizes of the other furnaces at Butte. The largest furnaces, 1895, had a hearth of 22 feet hy 16 feet. In 1884 a Herreshoff 48-inch water-jacket hlast furnace was erected hy E. D. Peters; in 1885 a 3-foot by 6-foot hlast furnace, with cast-iron water jackets, was added, hut was soon replaced hy A. J. Schumacher with a 3-foot hy 8-foot furnace having steel jackets. In 1884 the converting of copper matte was hegun under the general direction of the inventor of the process, P. Manhes. The practice was to melt 40% to 50% copper matte in a cupola furnace, tap it into converter, blow to white metal and pour, then melt the white metal in cupola and hlow it to blister copper in the converter. In 1885 A. J. Schumacher succeeded in making metallic copper from 40% to 50% matte in one operation of two consecutive stages, and thus laid the foundation of the modern practice of converting.

When the works were closed down, August 20, 1899, the roasting department contained two Keller-Cole-Gaylord furnaces, each having a capacity of fifty tons ore, and one O'Hara furnace, treating fifty tons in twenty-four hours. Smelting was carried on in three under-grate hlast reverheratory furnaces with hearths 20 hy 12 feet, treating altogether 135 tons of ore in twenty-four hours, and in two hlast furnaces, 44 inches by 96 inches at the tuyeres, each putting through daily a 120-ton charge. The converting department had six upright converters, 5 feet in diameter and 8 feet 6 inches in total height.

The Bell plant was huilt soon after the erection of the Parrot works, which roasted in long-hearth reverheratories and smelted in blast furnaces. In 1885 it had two hand roasters and two hlast furnaces.

Clark's Colusa was built 1884 by W. A. Clark; sold 1888 to Boston & Montana Co., and formed its lower works; closed 1893 in favor of the new plant at Great Falls. At this plant the first two-hearth, mechanical O'Hara roasting furnace was operated, 1885; the hearths were 50 hy 7 feet. A second O'Hara furnace, erected 1885, had hearths 70 hy 7 feet, and treated thirty tons ore in twenty-four hours. In 1891 ores were roasted in three O'Hara furnaces and one 10-ton Bruckner cylinder. The first smelting furnace, a circular, water-jacket hlast furnace, 36 inches in diameter at the tuyeres and 9 feet high, was replaced 1885 by a larger furnace. In 1887, two 50-ton circular, water-jacket hlast furnaces were put in operation. In 1886, two reverheratory matting furnaces were added to the plant, each treating a twelve-ton charge in twenty-four hours.

The Colusa-Parrot Mining & Smelting Co.'s plant, Butte Reduction Works, started 1885 hy employes of the Parrot smelter. At first ore was roasted in heaps and then smelted (forty-five tons in twenty-four hours) in a 36-inch water-jacket hlast furnace. A long hand reverheratory (hearth 100 by 14 feet), erected 1886, remained in operation until 1888, when it was cut in two, making two furnaces. In the same year the first Bruckner furnace was installed (cylinder 15 hy 7 feet; charge, seven tons). In the fall of 1889, a second cylinder, 20 hy 8 feet. In 1894 the first four-deck Wethey calciner was huilt, replacing one of the 50 by 14-foot hand reverheratory roasters and the 15 by 7-foot Bruckner cylinder. Its work proving satisfactory, a second Wethey furnace was erected. The 50 by 14-foot hand roaster was replaced hy a larger furnace, 75 by 5 feet, to he used mainly for roasting slimes. In 1898 the third, and in 1900 the fourth Wethey furnace was installed, replacing the remaining hand roasters and Bruckner cylinder. Smelting capacity of the plant increased, 1886, hy erection of a 96 hy 42-inch Orford hrick furnace. The original 36-inch furnace was put out of blast and replaced in 1889 hy a furnace 38 inches diameter at tuyeres. In 1897 a sectional hlast furnace of the United Verde hot air type, 84 hy 42 inches at tuyeres, replaced the two older furnaces. In 1900 a second rectangular furnace, 112 hy 42 inches at tuyeres, was put in blast, and in 1901 the 84 hy 42-inch furnace was enlarged to 112 by 42 inches.

First reverheratory matting furnace (hearth 15 hy 9 feet) erected 1887; the second (hearth 18 hy 11 feet), treating from twelve to fifteen tons per twenty-four hours, erected 1888. Then customary to wet down the roasted ore and shovel into the matting furnace through the side doors. In 1889 hoppers placed over the furnaces and roasted ore charged hot through the roof. This increased smelting capacity from eighteen to twenty-one tons in twenty-four hours. In 1896 one large reverberatory matting furnace (hearth 35 hy 16 feet, capacity forty-five to fifty tons ore in twenty-four hours) replaced the two smaller furnaces. A second (hearth 45 hy 16 feet, capacity fifty-five to seventy tons) was huilt in 1897; and in 1900 a third (hearth 50 hy 20 feet, capacity 85 to 100 tons). This last did so well that the 1896 furnace was rebuilt on the lines of the furnace of 1900. Present plant: Four Wethey four-deck calciners, two water-jacketed hlast furnaces (112 hy 42 inches at tuyeres) and three reverheratory matting furnaces (hearths 45 by 16, 50 hy 20, and 50 hy 20 feet).

The Butte & Boston Con. M. Co. works started 1885 with four Bruckner cylinders (8 by 18 feet), two reverheratory matting furnaces (hearths 22 by 17 feet, treating five-ton charges), and two hlast furnaces, the larger heing 96 hy 36 inches at the tuyeres and 11 feet high. In 1889 two O'Hara roasting furnaces were added; later four Allen-Brown-O'Hara furnaces; and, these giving satisfaction, the original O'Hara's were remodeled to the Allen-Brown-O'Hara type, and the Bruckner cylinders thrown out. In 1892, when the plant hurned, eight Allen-Brown-O'Hara furnaces were in operation. The plant was rehuilt, the Allen-Brown-O'Hara furnaces repaired, hut not the Bruckner. A new blast furnace, 96 hy 36 inches and 16 feet high, was erected to take the place of the old small cupola. The furnace was originally provided with a hell and hopper feed, which proved too expensive. In 1901 the width of the new furnace was increased to 40 inches and the height reduced to 11 feet. Up to 1893 the hlast furnaces smelted little but roasted concentrates. Matting reverberatory furnaces remodeled and increased in size 1895. Converter plant started 1900. Present plant: Eight Allen-Brown-O'Hara roasting furnaces (hearths 90 hy 9 feet), four matting reverheratories (hearths 50 by 20 feet, the first furnaces of this size having heen huilt in 1899–90), one hlast furnace 96 hy 44 inches at tuyeres and 9 feet high, and three horizontal converters with harrels 10 feet 6 inches by 7 feet.

(TO BE CONTINUED.)

*Trans. Am. Inst. Min. Engs. (Condensed).

Archæan and Algonkian.

The Archæan is the oldest known geological formation. It is characterized hy the entire ahsence of clastic rocks, such as quartzite and sandstone, and consists wholly of granitic, schistose and gneissoid rocks, and is essentially the same wherever found. One of these kinds of rock may occupy large areas, hut when a variety of rocks occur in a single area their geological relations are usually very complex. They are completely metamorphosed, the mineral constituents much contorted and hroken, indicating that the rocks of the Archæan have been suhjected to repeated metamorphosis and powerful dynamic movements. The actual derivation of the Archæan is still somewhat douhtful. They may he metamorphosed sediments, which would require the conception of still older rocks, the degradation of which has furnished the material for the later sediments. It is thought hy some authorities that these rocks represent igneous masses intruded into older sediments, the whole of which, both sedimentaries and intrusive masses have heen extensively metamorphosed, or they may he considered as wholly igneous and representing either a portion of the original crust of the earth, or else originally crystallized material which now reached the surface in consequence of inward crystallization and suhsequent erosion. The Archæan rocks are unlimited in downward extent, hut are limited ahove by the Algonkian. The determination of Archæan areas is usually made on lithologioal grounds. In different parts of North America are one or more series of clastic, that is, fragmental rocks, between the Archæan and the hase of the Camhrian. Noted regions in which these rocks occur are in Canada, in the Lake Superior region, in Newfoundland, New Brunswick, the Black Hills of South Dakota, in Missouri, in Texas, in the Rocky mountains, in Arizona, in California, in the Grand Canyon of the Colorado river, in British Columhia, in the Adirondacks, and elsewhere. These rocks are all classed as Algonkian. In some regions it is comparatively easy to recognize the Algonkian, particularly where there is non-conformahility of strata, hut as often it is difficult to thus differentiate the Algonkian from the Archæan on one side and the lower Cambrian on the other. The Archæan, Algonkian and Cambrian formations are noted carriers of ores, in which gold, silver and copper and iron deposits are the most extensive and valuahle.

Mining in Broken Hill, New South Wales.*

NUMBER III —CONCLUDED.

Written by EDWIN K. BEAUMONT.

Another modification of the square set system as adopted in the Central mine is known as the "block system" (see Figs. 10 and 11). The lode for its entire length through M. L. No. 9 has been surveyed into parallel blocks each 50 feet wide—i. e., ten sets, each 5 feet wide. Each alternate division is a block and the next a stope. The whole level is gradually developed by a drive along the foot wall and by crosscuts to the hanging wall, thereby determining the width of the lode along its entire length, and the stopes are then carried from the foot wall to the hanging wall on the sill floor, and the space filled with square sets, leaving every facility for forming the necessary gangways, chutes, etc. These are then filled in with mullock and the stope starts on its course upwards, being exactly 50 feet wide the entire width of the lode at that point, thus leaving a pillar of ore 50 feet wide on each side of it from wall to wall, which will carry all pressure during the mining of this stope. A run of square sets is put in each side of the stope as it goes upwards, forming a gangway and ladderway, the sides of which are lathed or paddocked off, thereby confining the mullock filling in the center of the stope. The ore is broken by machine drills driven by compressed air, and in the same lifts and proportions as in the before mentioned open stope system. The ore falling on the mullock filling in the center of the stope is popped and spawled into suitable size for handling and trucking to the shaft for haulage to the surface. One great difference in this system from the others is that the winzes—6x5 feet—are always sunk 100 feet apart at the side of each alternate stope, being half in the stope and half in the adjoining block, thereby saving a second winze when the block is being taken out at any future time. The ore from the adjoining stopes having been all extracted, and the space filled with the mullock, this winze will then be available and serve the same purpose for the remaining block. The same advantages of ventilation, mullocking and stoping all apply to these stopes, as in the foregoing open cut and sloping stope systems, and they are mullocked up in the same manner, excepting that the chutes for conveying the ore from the working faces to the sill floor are placed in the runs of sets, placed on the sides of the stopes for that purpose, and the chutes can be placed at any suitable intervals for the workings.

The advantages and disadvantages of these several systems are: The whole of the ore body is, or at least eventually can be, extracted, and after extraction of lode material comparatively few, if any, large voids or openings are left, which also leaves the surface areas for works, mills, machinery, etc., almost free from risk of subsidence. The great advantage evident from the presence of mullock filling—in lieu of a forest of timber—is the immunity from risk of fire. The miner is always in reach of the "back," i. e., from 3 feet to 9 feet, and can readily sound and examine the back of the workings, and thereby make sure they are safe; this ensures a great freedom from accident caused by masses of ore falling on men while at work immediately under them, though, unfortunately, recent experiences have shown that, as far as human knowledge or judgment can avail, a place may be sounded and examined by miners with a lifetime experience and reported as safe, when a few hours afterwards the back falls in and reveals a fault or crack which the sounding did not make known, serious or fatal accidents consequently resulting; but even then this cannot in any way be compared to the great risk incurred by men when re-erecting square sets that have been knocked down by a heavy shot, when sometimes a charge will bring away more ground than anticipated, for then a dozen or more sets will come down, and the men will have to work under, probably, a dangerous back in re-erecting the sets or staging before they can actually examine it and assure themselves of its safety. Another advantage is the saving in the expense of timber. Of course, against this must be placed the cost of quarrying the mullock filling on the surface and conveying it to the stopes, which would, however, be required in any case in filling the square sets in the other systems. The great advantage of good air is important, as the mullock fills in all spaces except the winzes and stope itself where it is being worked, thus ensuring always at the working face a current of air, which also carries off the smoke after firing and adds to the miners' health and comfort, removing much that in former days made the miner's life a hazardous and unhealthy one.

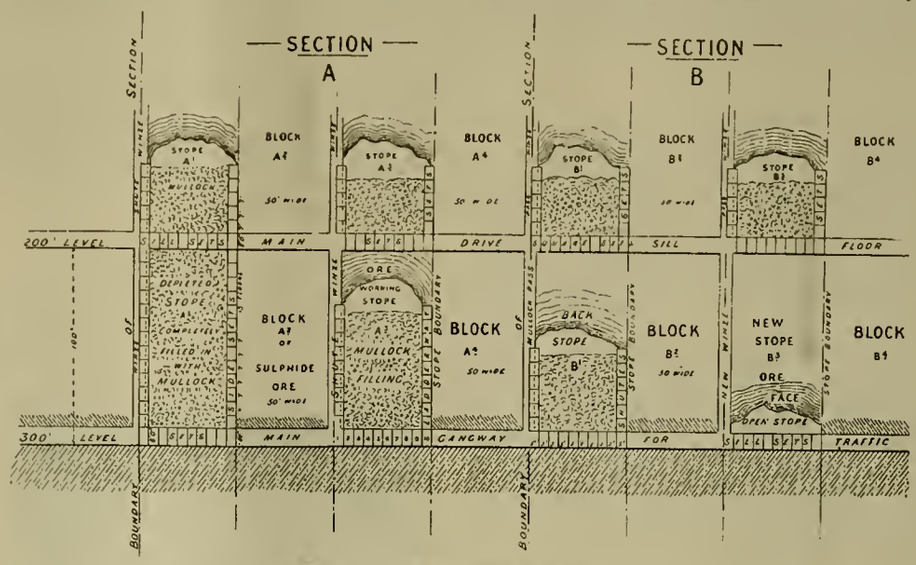


Fig. 10.—The Block System of Stoping.

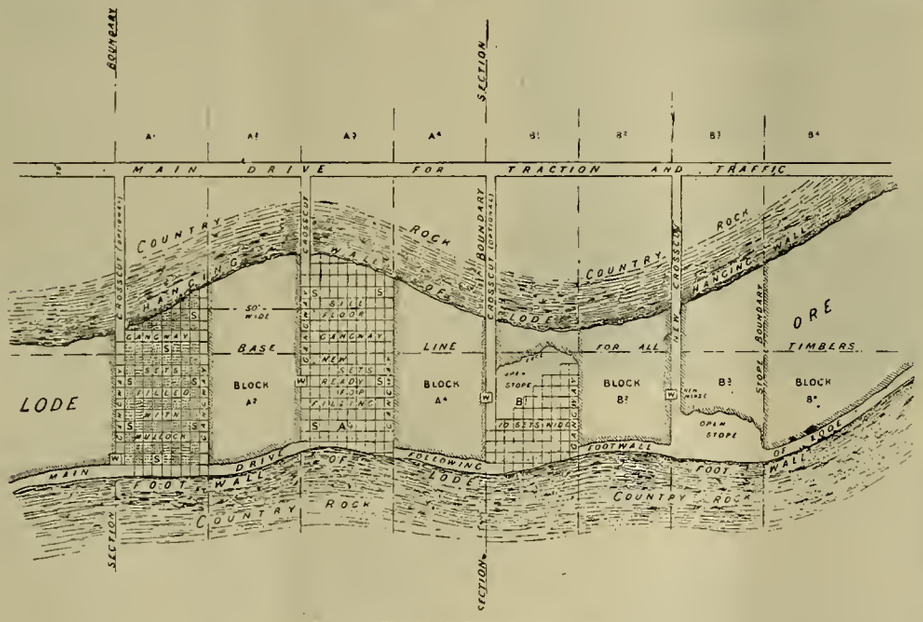


Fig. 11.—The Block System of Stoping.

CONCLUSION OF UNDERGROUND STOPING.—There is one other important method employed, and by which a large amount of oxidized ore has been removed. I refer to the open-cut system and surface extraction. In reference to the open-cut system I am indebted to J. J. Shaw, engineer in charge and manager for Baxter & Saddler's contracts in working their open excavations, for his courtesy in supplying me with the necessary data, drawings, etc.

OPEN EXCAVATIONS.—The large surface excavations are one of the chief sights of Broken Hill, and though descriptions may give a slight idea of their extent, I think they must be seen to be understood or appreciated. Imagine an open cavern, three-quarters of a mile long, traversing the whole of the Broken Hill Proprietary Co.'s blocks 11, 12 and 13, each of which is 20 chains along the line of lode and 20 chains wide. The widths of these cuttings vary from 120 feet in block 11 (in what is known as Smith's cut) to about 350 feet wide across Baxter & Saddler's cutting in block 12. There is also a great width of 300 feet opposite McGregor's shaft in the center of Block 11. The cuts are down about 250 feet, and they are recovering a large amount of timber that was used underground in the square set system of stoping in the old 200 level workings, the ore from which was then hauled up the various shafts before the open cuts reached their present depths. The great mass of over-burden, mullock, country rock, etc., that has been removed in the extraction of the ore, can be imagined by the

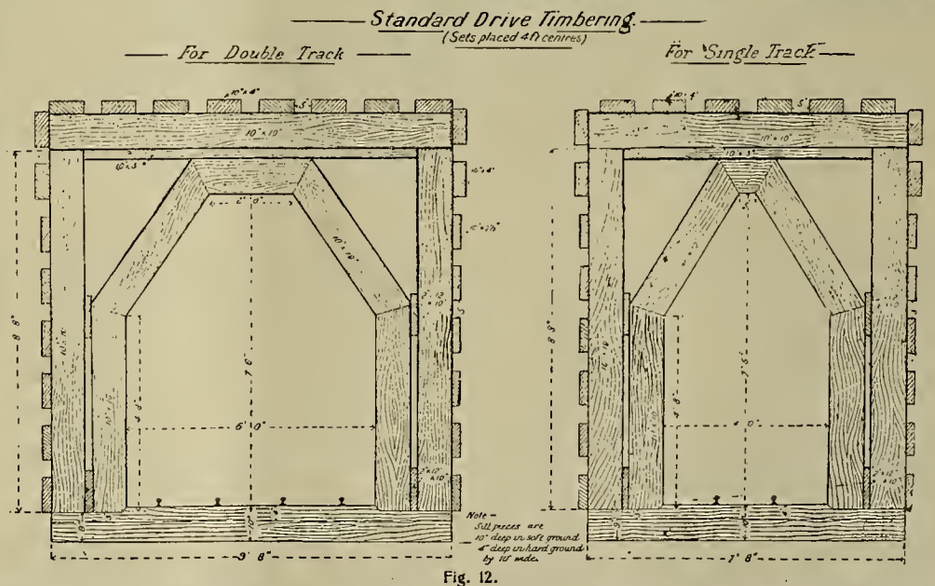


Fig. 12.

heaps on hoth sides of the line of lode, reaching (near the outer portions) a height of 60 feet or more (the angles of repose heing hetween 30° and 40°). The areas covered hy the hase of these heaps (following the area described hy the toe of the various dumps) will almost equal the area of the adjoining hases of the lode; in fact, supplementary leases have heen taken up on which the mullock heaps and dehris have heen deposited.

INCLINE TRAMWAYS.—One of the most interesting features of the works is the system of "incline tramways," hy which the waste is removed from the cuts. The grade is 2 feet to 1 foot approximately; they are always douhle lines, and two end-tipping trucks, called "dohhins," are used, heing hauled hy a ¾-inch wire rope attached to a hauling engine or winch having a loose drum and 9-inch cylinders, approximately 15 H. P. The empty dohhin runs down the incline, while the full one is heing drawn up, thus aiding the traction of the loaded one. On arrival at the surface, near the engine room, the full dohhin is stopped hy placing a "sprag" on the wheel (this is a piece of hardwood about 18 inches or 2 feet long and 4 inches in diameter); the hauling rope is detached, and a horse hitched to the dohhin, which is then drawn along a surface line of 3 feet 6 inches gauge, and heing an end-tipping truck is run to the end of the hank, where a "cradle" or tipping trough of old sleepers is formed; the sudden impact of the front wheels in this cradle causes the dohhin to discharge its load over the end of the dump; of course, as the dump grows the cradle or tipping trough is removed to the outer edge, the invert heing generally about 6 inches helow the level of the line.

HORSES.—Horses are used in running out these dohhins. The driver runs alongside and on nearing the end of the dump pulls a strap fastened near the hreeching, which releases the fastening attaching the horse to the dohhin. The horse immediately runs off the line and allows the dohhin to pass him, and then trots up hehind and turns round, ready to he re-hitched to the empty dohhin to draw it hack to the cutting again, often needing nothing more than a word from the driver. Unfortunately the animals working in the hottom of the cuts, where the oxidized ore is mined and dust frequently blows ahout, sometimes get leaded, and then become the same type of wreck that the men do when they suffer from the same malady, which, since the stopping of the smelters on the Barrier, I am pleased to say, is not such a menace, or nearly so prevalent as in the early days. This, I think, is largely due to the greater cleanliness of the workmen and the increased facilities given hy all the mining companies—for each mine has its own changing house, where the men can indulge in a hot or cold plunge or shower hath. Yet it is remarkahle how many miners go home daily covered with black sulphide dust, looking more like ahorigines than white men.

FLYING FOX.—The next most important method of extraction and that hy which the greater part of the ore from the open cuts is raised to the surface is the "flying fox," which is the name given to a large skip which is hauled up and conveyed along an aerial ropeway, and thence discharged into large ore bins at the sides of the railway lines on the surface, from which it is conveyed to the mill or to the smelters. A mast is erected on each side of the cut and a cahle stretched over an iron saddle near the top. The cable is anchored securely on either side, while on the surface is located the hauling engines, of the same type as used on the incline, having a loose pulley and reversing gear. An attachment called a bicycle runs along the main cable across the cut, having on it four pulleys. The upper two travel along the cable, the lower two heing used in hoisting the skip vertically from the cut, and the same rope—called the "traveling rope"—then draws the hicycle, and, of course, with it the skip along the cable. When it is over the bin on the surface a self-acting catch holds it steady, while it is lowered and discharges its load into the hin. The skip is again hoisted and is run out along the cahle and again lowered into the cutting. In the meantime a second skip has been filled and it is attached and hoisted and discharged as before.

The skips are ahout 1 foot 4 inches deep, 4 feet wide and 5 feet long, and hold about 1 cuhic yard. They are suspended hy four chains, one at each corner, the hack two heing fixed to the skip, while the front ones are fastened hy hooks, which are undone to release the load. These skips are used for many purposes besides hauling ore, for I have seen a workman with a hroken leg hauled to the surface and deposited safely, thus saving a steep climh up the hanks. The sides of the cutting are designed with a slope of a half to one and three-quarters to one, and would meet at a depth of ahout 250 feet, but owing to the frequent slips of the sides they are at present very irregular. Some very heavy firing is done in these cuttings, which shakes the ground for a great distance, hut great masses of the rock are removed.

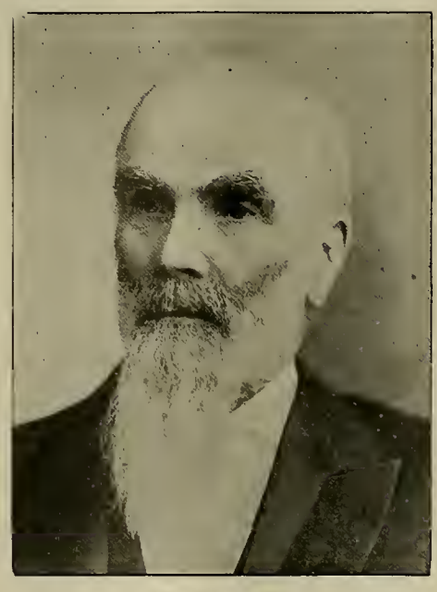
ORE BODY.—The ore hody in the center of the cut is ahout 25 feet to 50 feet in width. The open cutting in Baxter & Saddler's contract, block 12, and also in Smith's cutting, hlock 11, are now working immediately ahove the fire area, and frequently pieces of hurnt timher and slagged rock are found. These cuts were of great use in coping with fires underground hy pouring large quantities of water down the shafts right ahove the fire area.

DRIVE SETS.—There is one other feature to which I will draw your attention, viz., the sets as used in the douhle track drives, where horses are used underground. The application of these will he evident from the drawing (Fig. 12). They are specially designed to withstand heavy vertical and lateral pressure, and are placed at intervals according to the nature of the hack or country they have to hold, hut generally ahout 4 feet to 5 feet center to center.

It may he of interest to know that the horses used in underground traction are stahled underground and seem to thrive well, for they are all in good condition and take kindly to their work. The stahles are lighted with electric light.

Passing of a Noted Man.

In last week's issue appeared a hrief notice of the death of Thos. Chalmers in Chicago, Ill., on July 13th. The man whose portrait appears herewith retired from active husiness in 1893. He was one of the founders of the firm of Fraser & Chalmers, who com-



Thos. Stuart Chalmers.

menced husiness in 1872 in Chicago, succeeding the Eagle Works Manufacturing Co., after P. W. Gates, president of that company, had decided to liquidate after the great fire of 1871. Fraser & Chalmers commenced operations with sixty men on property 60x145 feet, and two years ago when they were ahsorbed hy the Allis-Chalmers Co. they were working 1500 men in Chicago and 1000 men at shops they had huilt in England, at Frith, Kent.

Thomas Chalmers was a skilled mechanic of the old school, who, having served an apprenticeship of seven years in Scotland, received the balance of his education, both technical and commercial, hy contact with the world and learning its requirements. His life is a history, when one considers that he came to Chicago when it had a population of 4000 people; that he lived there sixty years; that he was in touch with the development of the Middle West and the great North-west, and had to do personally with so many large institutions where power or machinery has been required from the heginning to the present day in the development of this great country.

Thomas Stuart Chalmers was horn June 14, 1816, at Dronley, near Dundee, Scotland. His father, William Chalmers, was a manufacturer of linen. At that time it was all done hy hand weaving. People in those days never went 20 miles away from where they were horn. There were no railroads or conveyances of any kind in Scotland—none there or here either—no steam loom weaving—everything done by hand weaving. William Chalmers, father of Thomas, did it all in his place. People for 20 or 30 miles around delivered the webs to him at Dronley. He went to school until he was 14 years of age, then went to learn his trade—that of a machinist—at Brown & Allen, Dundee, manufacturers of spinning machinery. At that time steam-spinning machinery was heginning to be manufactured.

Mr. Chalmers served seven years as an apprentice and was paid half a crown (equal to 56 cents American coin) a week from the heginning, and was raised a shilling per week every year, making 2s 6d for the first year; 3s 6d for the second; 4s 6d for the third; 5s 6d for the fourth; 6s 6d for the fifth; 7s 6d for the sixth; 8s 6d for the seventh—equal to ahout $2.12 per week at the end of the seven years—which was considered fair pay. At the end of the seven years Chalmers went off as a journeyman machinist to a place called Fyfe in Fyfeshire, Scotland, ahout 15 or 20 miles from Dundee. There were no railroads, so he had to walk it and alone. He worked in that shop for three years (Brown & Co.) as an erecting machinist, putting up power spinning and carding machines in the different mills throughout Scotland, reaching these various mills hy stage. They were within a radius of prohably 20 to 25 miles. He got 18s per week at first and was afterwards raised to 20s—£1 a week—or ahout $5 per week. He had to pay 5s per week for hoard and lodging. There was no way really to spend the money outside, so the halance was practically saved. There was very little dissipation in those days. There were no visiting showmen nor circus nor traveling theatricals, hut lots of gypsys around the country who simply told fortunes. Tinkers made tinware and made horn spoons out of cattle's horns.

Once every year there was a country fair and cattle show and people came from the country all around. There were no prizes given nor offered. That was the time that people were engaged for the year, and that time they made engagements for lahor. The engagement was that they could neither discharge a man nor could he leave. If a man wanted to leave at the end of the year he could go to this fair and get another agreement for another year somewhere else and the hond was good. He could not he discharged nor could he leave, and if he did leave nobody would employ him; if a man tried to discharge him he could not do it unless he had good cause for it.

He went to Chicago in 1843 and went to work at the corner of Randolph St. and Fifth Ave., working there six weeks at $6 per week for a man named Nickerson. He had a small machine shop, all horse power machinery. He was to get $1 a day, hut never received anything, the time he worked there heing lost. Nickerson could not get any money for what he had done. He could not collect it. Chalmers did all kinds of repairing work there and put heating apparatus in the old Dearhorn school, on Madison St., hetween State and Dearhorn. He then went back to Lockport, Ill., and worked on his farm until the fall. He then went to Chicago again in the fall of 1844, walking hack and forth each time. He tried to get on hoard one of the steamers running from Buffalo to Chicago, daily line. He wanted to see if he could not work his passage down to Buffalo where he could get work at his trade, hut could not do it. When he came hack to Chicago in the fall he came alone and walked. He then went to work for P. W. Gates, who had a hlacksmith shop located then on what is the viaduct at Randolph St., hut was then West Water St. He was a young man and a hlacksmith and was working with his father-in-law, Hiram Scoville. They were hoth hlacksmiths, Chalmers heing the only machinist there. They were the only three in the shop, doing farm repair work and making wagons, plows and everything that came along. Chalmers was associated with Gates a great many years—until 1871; then, hecoming dissatisfied, he took a place as chief engineer on the Lady of the Lake. He stayed on the hoat a whole season up till Septemher, which was run hetween Chicago and Buffalo. It took twelve days to make the round trip—six days each way. She carried passengers. He received $40 per month and hoard. That was the first money he had seen.

The hriefest sketch of Mr. Chalmers' career would he a history of the industrial life of Chicago, in which for nearly sixty years he hore so honorahle a part.

United States Geological Survey in the Oil Fields of California.

The United States Geological Survey, within the last eighteen months, has heen making a preliminary examination of the productive oil fields of California, with a view, first, to acquiring a knowledge of the general conditions of occurrence of petroleum in the State, and, second, to applying the laws that may be deduced from such researches to other portions of the Coast Range. The director of the Survey has long recognized the paucity of knowledge relating to Coast Range geology, and in view of the fact that several of the formations of this region are oil-bearing he is now directing especial efforts to unraveling the intricate problems with which mining engineers, oil men and others have to do in the prosecution of their professional and industrial work. A considerahle numher of topographic maps, covering the agricultural regions of southern California, have already heen published—these with special reference to the water supply. Latterly other sheets of a similar nature, but covering more particularly the oil fields, hoth productive and prospective, have heen prepared and are now in the hands of the engraver. Still others are under survey in the field. Eventually it is proposed to cover the entire area of the Coast Range, the field work to he carried on as rapidly as the resources of the Survey will permit. The Survey has in press, for immediate publication as Bulletin No. 215, a catalogue and index supplemental to the catalogue and index published in 1901. The present catalogue hegins where the former ends; but there will he found in this index some entries—additional and corrective—which refer to papers covered hy Bulletin No. 177. The two bulletins constitute a general catalogue and index of the publications of the Geological Survey from its organization in 1879 to the present time.

Modern Practice in Hydro-Electric Plants.

Written for the MINING AND SCIENTIFIC PRESS.

One of the most important installations on the Pacific coast, when completed, will be that of the Columbia Improvement Co. of Tacoma, Wash., now under course of construction. The operative point of this installation is located on the Puyallup river, midway between Tacoma and Seattle. The initial water supply comes from the glaciers and snow peaks of Mount Ranier, forming the Puyallup river. The water is led from the river by a flume, and, taking advantage of a bend in the river, is carried 10 miles across country to a bluff, from which point it discharges into the river again, after passing through the wheels. The head available is 850 feet, and the water discharges onto the wheels through four separate pipes, each 48 inches diameter by 1650 feet in length, varying in thickness, according to the pressure, from ¼ inch at the top to ¾ inch at the bottom of the line. There are four main electrical units, consisting of 3500 K. W., 225 R. P. M. General Electric generators. Each generator is driven by Pelton wheels, direct connected. There are two wheels to each unit, the generator shaft being extended on either side and the wheels mounted on the overhang. The wheels proper consist of cast steel annealed centers, to which are bolted cast steel buckets, making the total wheel diameter 10 feet. The buckets are designed to take a 7-inch stream, and are 24 inches across the face, each bucket weighing 250 pounds. The total weight of each complete wheel and center is approximately 13,000 pounds.

Owing to the high head and extraordinary amount of power involved (each unit with its overload capacity is capable of developing 7500 H. P.), the finest mechanical construction is necessary. The interior surface of each bucket is carefully ground out to true hydraulic curves by means of special apparatus, and the buckets are independently weighed and balanced, there being less than ¼ pound difference in weight in any of them. The center is machined all over, and, when the buckets are secured, the complete wheel is adjusted to a perfect running balance of 225 R. P. M. The shaft, which carries the rotor and the two wheels, is of nickel steel, being 20 inches in diameter where rotor is carried, 16 inches at bearings and 14 inches where wheels overhang.

The bearings, two in number for each unit, are of exceptionally heavy construction; they are of the ring-oiling generator type, mounted on cast iron floor frames for setting in masonry foundation. Although of liberal proportions, the bearings are called upon to sustain an enormous pressure under high journal speed, and they are designed with every known safeguard.

In addition to the oil rings of usual type, the bearings are water jacketed with an auxiliary water pump and have independent oil pumps to insure oil under pressure being supplied to the journals at all times. As an additional precaution against overheating, each bearing is equipped with an electric thermostat and alarm, which indicates any rise in temperature above a certain point.

Water is supplied to each wheel through a combination pin and deflecting nozzle, enabling the most economic use of water at all stages of load.

The nozzles are controlled by special-type Lombard governors, designed for this particular work.

The main gate valve of each wheel is of the Pelton single-disc type, with outside yoke and screw and rising spindle, the body being of cast steel, annealed and bronze mounted. The valve stem is of nickel steel, and there are oil-packed steel roller bearings to take the thrust in all directions. This arrangement makes the gates readily operative, even under the extreme pressure. The wheels are inclosed in heavy, sheet steel housings, ribbed and reinforced to prevent vibration and noise.

In addition to the four main units, there are two exciter units of 200 H. P. capacity each, of the same general type as the main units. Thus, the total capacity of this plant will be in excess of 30,000 electrical horse power, which it is proposed to transmit to Seattle and Tacoma, each distant about 35 miles, for use in the various industrial enterprises thereabouts.

The scheme is the creation of Stone & Webster, an engineering firm of Boston, Mass., the electrical apparatus being furnished by the General Electric Co. and the hydraulic equipment by the Pelton Water Wheel Co. of San Francisco, Cal.

Sinking a Shaft in Quicksand by the Freezing Process.

Sinking of a shaft in quicksand at the Laura and Vereeninging Colliery, in Limburg province, Holland, has been accomplished. The shaft is 270 feet deep to the coal measures and 15 feet inside diameter. It is described by the Iron and Coal Trade Review as follows:

At first a temporary shaft, with a diameter of about 30 feet, was sunk to a depth of 28 feet, and was provided with a provisional timbering consisting of planks and rings of channel iron. From the bottom of this shaft twenty-four boreholes were made, intended for the reception of the freezing tubes. These holes were sunk on the periphery of a circle with a diameter of 24 feet, so that the freezing tubes were at a distance of about 36 inches from each other. They are of a diameter of 4 or 4½ inches, and accommodate the small descending pipes, which only measure 1¼ inches across. The latter communicate by means of valves with a distributing ring, and the former with a return ring, introduced in order to be able to regulate the flow of the freezing solution. In the middle of each freezing tube there is inserted an elastic union which admits of its expansion and contraction with the fluctuations of the temperature. The freezing liquor, which consists of a solution of chloride of magnesium, leaves the refrigerators at a temperature of 20° C. and passes into the distributing ring, then down the small descending pipe as far as the bottom of the freezing tube, in order to ascend through the annular space between the pipe and the tube, until it reaches the return ring, from which it is conveyed by a pipe back again to the refrigerators, where the temperature is once more lowered. By means of the various valves any one of the freezing tubes can be cut out of the system. This operation is rendered necessary when one of them becomes stopped up or leaks.

For the production of the cold there was a double compressor, of which the piston diameters were 5 inches and 7½ inches, and the stroke 18 inches. This machine was driven by a steam engine through the medium of a belt. The carbonic acid was drawn in at a pressure of 220 pounds per square inch and compressed to from 1000 to 1200 pounds per square inch. The compressed and consequently heated gas was next sent through a cooler, where it lost some of its heat, and then was passed into the two condensers in which it was liquefied, and finally the carbonic acid was conveyed through a third condenser to the refrigerators. Before entering the worms of this apparatus, it passed through an expansion valve, which suddenly brought the pressure from 1100 pounds down to about 200 pounds, causing a most intense absorption of heat, or, in other words, the production of intense cold. The refrigerator is a cylindrical vessel with a diameter of 56 inches and a height of 110 inches which is filled with the freezing mixture, consisting of a solution of magnesium chloride 30% strong. The spiral worm tube with the carbonic acid winds inside this vessel and causes the temperature of the solution to sink to 20° C., at which it is pumped into the distributing ring and from thence flows down the freezing tube.

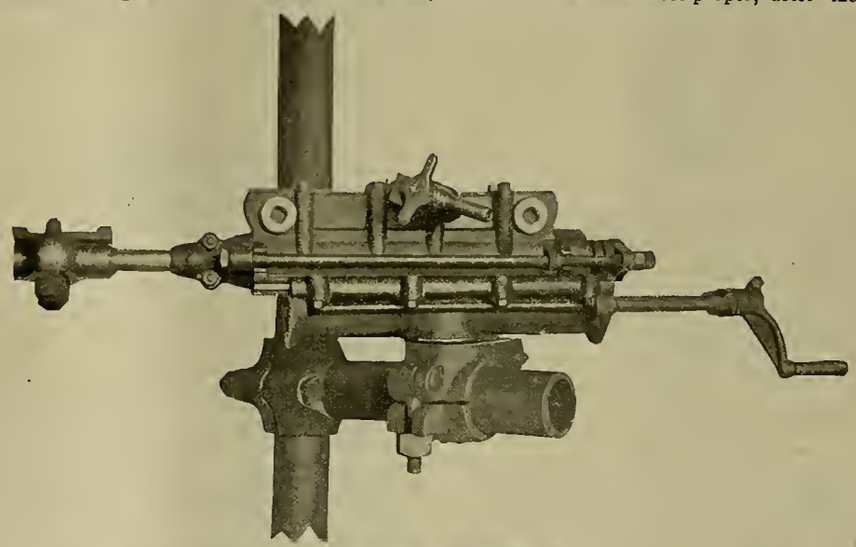
The boreholes were carefully tested to see that they were vertical, for any considerable deviation from the vertical would leave an unfrozen space in the wall of ice. Rotary borers were used and three months' time were required to put the twenty-four holes down. It took eight weeks to freeze a wall of ice 20 inches thick, and at the end of twelve weeks the ice wall was deemed thick enough to begin excavation. The frozen material was excavated with chisels and hammers, a soft unfrozen core considerably facilitating the work. This sinking of 242 feet consumed seventy-five working days, or at the rate of 68 inches per working day. In widening out the shaft in the coal-bearing strata a collapse occurred on the south side, filling the shaft with 40 feet of sand and water. Water is then pumped into the shaft, filling it completely. Twelve more boreholes were driven into the shaft close to the sides, and six more holes on the south side of the shaft and 18 feet from its center. This area was frozen and the work of excavation again begun, and 8½ months after the accident had occurred the bottom of the shaft was again reached.

The Torpedo Drill.

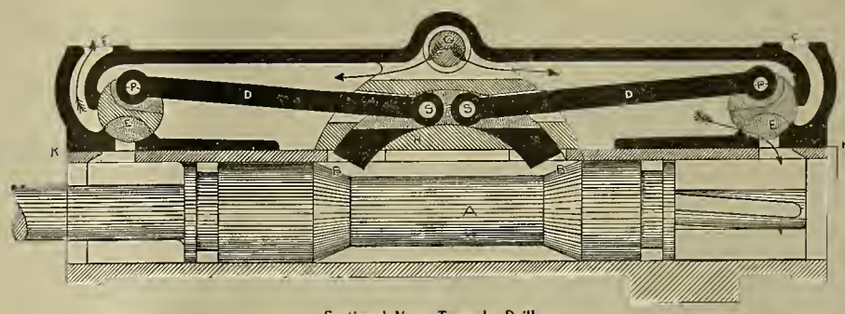
The Torpedo drill is stated by its manufacturer to be the result of development through experiment and experience during the progress of regular mining operations at the North Star mines, Grass Valley, Nevada county, Cal., A. DeW. Foote superintendent, who is represented to have invented the Corliss valve system as applied to rock drills. The Torpedo drill is designed to so act that the full pressure delivered by the hose will be received by the pistor.

By reference to the cut (Fig. 1) the construction and the operation of this drill may be readily understood. A is the piston, which impinges on a circular rocker operating within the Torpedo valve chest, which is bolted to the cylinder on the line KK. The circular rocker is held in position by the bronze guide H, which is readily removed. Attached to the rocker by the pins SS are two valve rods DD, which are attached to the circular valves EE by the pins PP. These circular valves EE are Corliss valves, which fit within steel bushings. These bushings are shrunk into the valve chest proper, after the valve ports have been carefully milled to a template, with intent to make the valve openings accurate. It will be seen that the inclined surfaces BB on the piston, coming in contact with the ends of the rocker, slide the rocker in its seat, and cause the valve to open and close. In this drill the ports are $\frac{7}{16}$ of an inch wide by 1½ inch long. The movement of the rocker is simple and is always in the direction of the motion of the piston. The air is admitted into the valve chest at the opening G, and when the valve is open it passes through the ports, which are about ½ inch deep, into the drill at either end. The exhaust is at the ports F and F on each end of the drill. The valve rods D are made of tool steel, are light, strong and durable. The valve motion is accomplished with but little power. The Corliss valve short-port system, it is claimed, permits the full pressure to reach the piston. A special feature claimed about this valve motion is that it will cause the drill to run at full speed on any stroke from 2 inches to the full stroke of 5 inches.

It is manufactured by the Rix Compressed Air & Drill Co., No. 396 Mission street, San Francisco, Cal., where one of these drills is kept on the testing block and can be seen in operation. The weight of the machine is 120 pounds, length of stroke 5 inches, and diameter of cylinder 2¼ inches.



The Torpedo Drill, Set on Column Arm



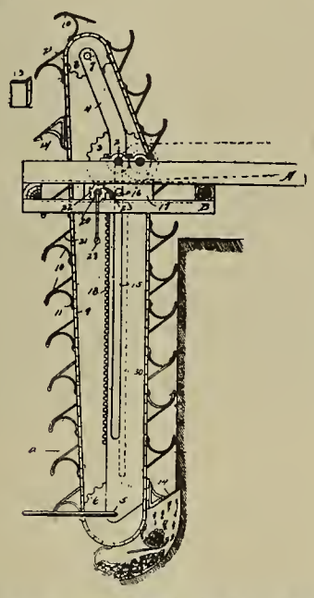
Sectional View Torpedo Drill.

Mining and Metallurgical Patents.

PATENTS ISSUED JULY 21, 1903.

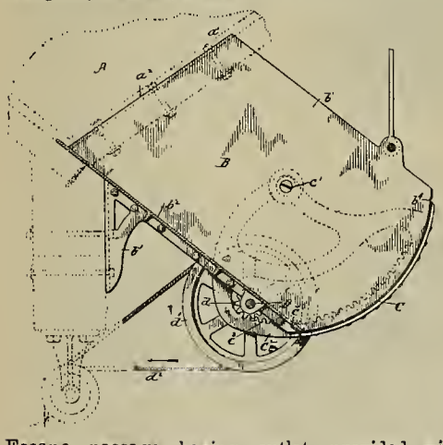
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

EXCAVATOR.—No. 733,422; P. J. Raymond, Detroit, Mich.



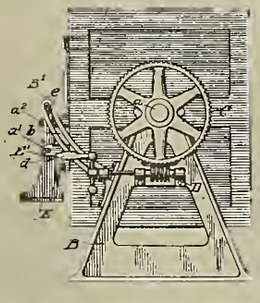
In excavator of kind employing sprocket wheels and chains, bucket secured to chain at advance portion and provided with rearwardly extending brace adapted to contact chain, when bucket is upon straight portion of chain.

GATE FOR COAL OR OTHER POCKETS.—No. 733,623; J. Campbell, Newton, Mass.



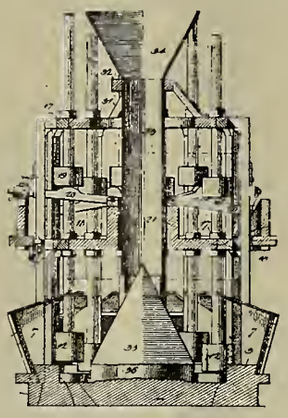
Escape passage having outlet provided with curved side edges, gate for opening and closing same movable in curved path along curved edges or borders and having curved closing plate or bottom and joint sealing abutment at rear end of closing plate or bottom to close against side of wall of passage adjacent to rear lower edge.

FURNACE FOR MELTING METALS.—No. 733,931; J. J. Anderson, South Haven, Mich.



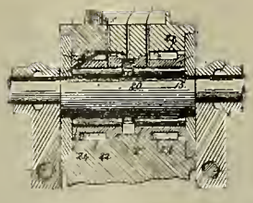
Metal melting furnace comprising closed chamber imperforate at top and bottom and provided with laterally projecting trunnions closed at inner furnace connected ends, supporting frame provided with journals which receive trunnions and support closed chamber, burners G projecting laterally into furnace above body of metal therein, but below top of chamber, air and oil pipes leading to burners and connections for supplying pipes.

STAMP MILL.—No. 733,933; R. J. Baker, El Paso, Texas.



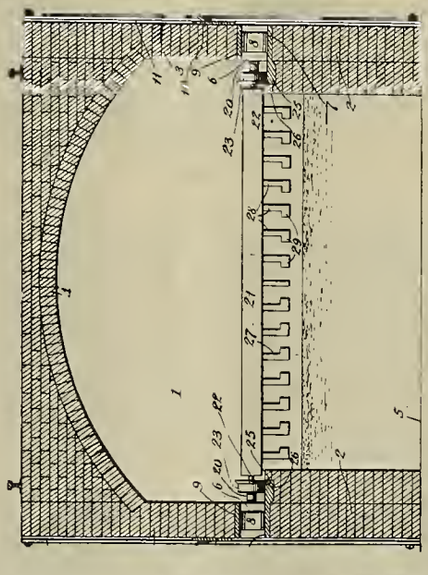
In stamp mill frame including annular upright, plurality levers pivoted radially to upright, cam-shaped projections upon upper sides of levers, vertically movable stamping stems having tappets engaging and adapted to be gradually rotated by cam-shaped projections of levers, rollers upon outer ends of levers, suitably supported annular gear wheel having cams adapted to engage rollers.

CRUSHER.—No. 734,332; T. E. Hurley, Butte, Mont.



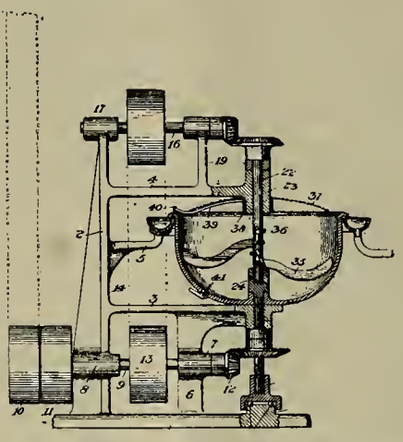
In crusher, frame, fixed jaw, swinging jaw, eccentric shaft having bearings in frame, pitman operated by eccentric shaft and connected with swinging jaw, bushings arranged in pitman head and surrounding eccentric shaft, removable plates on sides of head engaging outer ends of bushings, inner ends of bushings being spaced apart, rollers arranged between bushings and eccentric shaft and spaced apart at inner ends, outer ends of rollers engaging removable plates, collar rigidly secured to shaft at space between bushings and arranged between inner ends of rollers to prevent end movement of rollers, collar having peripheral notches, oil cup on upper side of head, central duct leading from oil cup to space between inner ends of bushings and ducts at opposite sides of central duct and extending through bushings to rollers.

ORE ROASTING FURNACE.—No. 734,104; E. Swain and C. Wood, Iola, Kans.



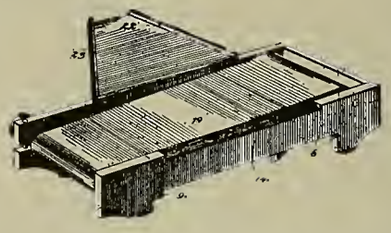
Combination in ore roasting furnace of side walls comprising lower sections provided at top with cap plates extending longitudinally thereof and covering outer portion of top of each lower wall section, cap plates being thickened at inner edges to form tracks and grooves being provided in lower wall sections adjacent to inner edges of plates and upper wall sections spaced from lower wall sections to form continuous longitudinal air inlet openings.

GOLD SEPARATOR.—No. 733,973; D. C. Knowlton, New York, N. Y.



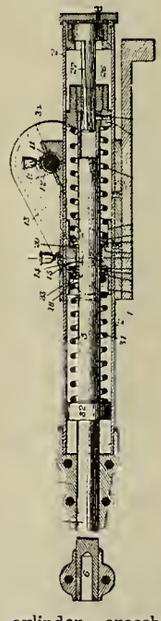
In gold separator, combination with supporting frame, parallel horizontal shafts supported in bearings of frame, two vertically aligned shafts supported in bearings of frame and geared to horizontal shafts to be revolved in opposite directions, tank centrally mounted upon lower vertical shaft, and plurality of blades each having compound curvature and adjustably secured to upper vertical shaft to project directly therefrom toward tank walls at variable angles.

ORE WASHER.—No. 733,944; C. Carlson, Joplin, Mo.



In ore separator combination with suitable frame, of table mounted thereiu with longitudinal edges abutting against sides of frame, table being uniformly inclined both longitudinally and transversely, and adapted to travel continuously in direction of longitudinal inclination to discharge separated material, means for delivering material transversely to table at higher side, and means for discharging impurities transversely from table at lower side, whereby material in passage transversely across table will be separated into strata of varying degrees of purity and is delivered in separated condition at lower longitudinal end of table.

ROCK DRILL.—No. 734,364; P. Reinhalter, Philadelphia, Pa.



In rock drill, cylinder, crosshead therein having oppositely located extensions, drill rod passing loosely through crosshead, means carried by crosshead and projecting through slots in casing for reciprocating crosshead, abutments upon opposite portions of drill rod, ball-bearing devices carried upon opposite portions of crosshead and received within extensions, springs interposed between abutments and ball-bearing devices, and means for reciprocating crosshead.

Mining Summary.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

Work is under way on the 900-foot flume and wing dam for the Juaipa M. Co., near Juneau. The object in building the flume is to turn the course of the creek. A 10-ton derrick will also be built, with mast 90 feet in height and telescoping boom with reach of 90 feet.

Lake Arkell, the new district recently discovered in Alaska, is said to be rich, and hundreds of people are going there. The new strike is on the tributaries of Alsek river, 20 miles from Champagne landing and 30 miles above and north of Mush creek. The distance from White Horse is 120 miles. The creeks are 20 miles from the Yukon river.

In the Chistuchina district the season is late, with much snow yet on the ground. Numerous snowslides have occurred and claim operators are clearing the ground by sluicing the snow through the boxes. It was snowing heavily June 3rd.

No definite information can yet be given concerning the probable richness of the Nizina district. There was yet much frost in the ground at last advices, even in that which has been uncovered, and, notwithstanding the early indications to the contrary, the season is a late one. Practically nothing in the way of sluicing has been done. Most of the gold so far taken out has been taken from crevices and bedrock where easily exposed. No one has done sufficient sluicing to estimate what it will run to the shovel per day.

Dr. J. T. Frizell of Portland, Or., says that on Unimak island, one of the Aleutian chain from which he recently arrived, there are thousands of tons of carbonate of iron.

ARIZONA.

COCHISE COUNTY.

The old Gunsight property, near the Modern mine, is bonded to California men. The ore runs high in copper, silver and lead-shipping ore. There is a shaft 300 feet deep on the property.

Assistant Superintendent French of the Copper Queen at Bisbee says that a small hoist will be put in at the Gardner shaft.

During the middle of June the management of the Higgins Dev. Co., near Bisbee, has located a shaft, built 2500 feet of mountain road, installed a 10x14-inch hoist, an air compressor and drills, and sunk a shaft 140 feet and side drifts commenced.

GILA COUNTY.

The Stevens Co. is working on its property at Garfield. The pump has not been working well, and sinking the winze has been discontinued.

The Sierra de Oro Co. at Clifton, under the mansgement of Crawford & Potter, have begun development. The company will install a power plant, an air compressor and drills.

The Clifton-Morenci district has recovered from the recent strike, and is producing the usual tonnage. The A. C. Co. will put in air drills at their Longfellow mines and the Shannon Co. are installing an electrical drilling plant for driving the Carter tunnel to a connection with workings from the other side of the mountain.

The Dominion Co. is working nearly full capacity.

MARICOPA COUNTY.

(Special Correspondence).—Phœnix will shortly have a mining exchange.

It is reported that Los Angeles, Cal., parties have an option on the tailings at the old Vulture mill-site near Wickenburg. It is claimed that these tailings were cyanided in a very primitive manner and that they will yield good values by improved cyanide processes.

Donofrio & Eddy expect to let a contract for sinking a shaft 100 feet on one of their claims, 8 miles west of Frog Tanks. The ores carry gold, silver, lead and copper.

G. Hamlin of the Relief mine, 15 miles north of Peoria, says development work is progressing favorably.

The Illinois Copper Co., near Wickenburg, expect to resume work as soon as it becomes cooler.

The Pike's Peak G. & C. M. Co. are working their property, 12 miles west of Frog Tanks.

Phœnix, July 27.

The Haxworth C. Co.'s group of twenty-five claims at Agua Caliente is reported sold to Chicago and Milwaukee men for $100,000.

MOHAVE COUNTY.

(Special Correspondence).—The Dempsey & O'Dea gold mines at Pilgrim Camp, 9 miles west of Chloride, are bonded to a company of Eastern and Los Angeles, Cal., men for $200,000.

The drift on the 500 level of the Tennessee mine is in 700 feet. Between the 300 and 500 much good milling ore was taken out. Ore in small quantities is yet being found and development is going ahead.

Waddey & Richardson, who contracted to sink the shaft on the Sunrise mine from 140 feet to 240 feet, have nearly finished the work and a good-sized vein of ore is coming in.

The Samoa and Fourth of March mines are producing four carloads of ore monthly. More men are to be put on the former.

It is reported that the Elkhart shaft, down 500 feet, is to be sunk deeper.

The Polar Star mine of Dupont & Hawks is down on the vein 65 feet, showing 90-ounce silver ore, with 1 to 1½ ounce gold. The work of development is suspended until a hoist can be put in.

J. Kay has struck native copper in his claims at Mineral Park.

The Queen Bee mine is working again, after a suspension caused by the Territorial eight-hour law. Twelve men are employed in sinking below 350 feet and driving the drift at the 300.

The Aztec Turquoise Co. have men prospecting for turquoise on their claims and later will have considerable work done.

A milling plant is to be built on the gold claims recently bought by E. R. Holden & Co. of New York, 4 miles west of Kingman. Water for the mill has been secured.

The Mohave G. M. Co. is working more men on their property at Leland and the tunnel on the north side of the hill is being run at the rate of 40 feet a week. The Colorado Iron Works have completed a 40-stamp mill 9 miles below the mines on the Colorado river.

The Gold Roads mine at Acme is outputting ore for its new 300-ton milling and cyaniding plant. Ore is broken by contract for $2 25 per ton.

At Stockton Hill good progress is being made in the sinking of the shaft on the De la Fountaine mine, which is to go down 150 feet below water level before drifting.

Chloride, July 27.

YAVAPAI COUNTY.

(Special Correspondence).—The Hillside mine, 50 miles west of Prescott, is being developed to greater depth under the direction of J. Lawler of Prescott, who, with E. G. Wells, owns the property. Some new ore of good grade has been recently found on the north end of the property on the Seven Stars claim. It is the intention to sink winzes at distances of about 200 feet along the entire length of the vein developed (2500 feet). These winzes will be sunk from 150 to 200 feet in depth by means of a small gas engine. A crosscut tunnel will also be driven in at the south end of the property, at a level lower than the lowest tunnel heretofore run. The mine is equipped with mill and cyanide plant.

Prescott, July 27.

The 40-stamp mill at Octave, in Weaver district, is handling 4000 tons of ore per month, says Superintendent A. E. Hurley. The ore is free milling quartz, running $9 per ton. The mine is developed to a depth of 1200 feet and is equipped with two hoists, a 30-drill compressor and cyanide plant. The property is owned by Pennsylvania men.

G. W. Hull expects to install an electric power plant and electric drills at the Cleopatra mine, near Jerome.

Work will be resumed on the Monte Cristo mine on Groom creek in Hassayampa district, 5 miles south of Prescott. Manager Blauvelt will begin unwatering and developing it.

E. L. Sharpneck will put in a steam stamp on the Blake group, in the same district.

It is reported that Douglas, Lacey & Co. will resume work on the Home Run mine, Hassayampa district.

The Octave mine, in Weaver district, is producing 4000 tons of ore per month, which is treated at the 40-stamp mill. The ore runs from $9 to $13 gold. It is developed to a depth of 1200 feet with twelve levels. There are two hoists, a 30-drill compressor and a cyanide plant. A. E. Hurley and J. R. Leonard are managers.

The new 6-stamp mill and cyanide plant of the Iron King mine, near Val Verde, is in operation. It has a capacity of fifty tons daily. The mines have over 3000 feet of development work, which has all been done within a year. Prospecting is to be continued with diamond drill. B. Blanchard is superintendent.

Upon the application of fifteen different mining companies operating in this county and one private individual, Judge R. E. Sloan has granted a temporary injunction against the Yavapai District Union of the Western Federation of Miners, the McCabe, Walker and Groom Creek mining unions, H. Burns and E. P. Starr, walking delegates, restraining them from in any manner interfering with the peaceful operations of the respective companies named. The defendants are cited to show cause why the injunction should not be made permanent. The injunction is the result of the alleged interference of the union men with the working of some of the properties.

CALIFORNIA.

AMADOR COUNTY.

The Amador Queen mine, near Jackson, is being worked by leasers, who are hunting for pockets. It has produced high-grade arsenical ore.

Crosscutting is in progress at the Oneida, near Jackson, from a drift at the 2200-foot level to cut the ledge 100 feet to the east.

The Shenandoah mine, near Plymouth, on 1000-foot level, run 200 feet on a ledge 130 feet from shaft. This ledge is 25 feet wide. The American E. P. Co is erecting lines through the Plymouth district. When this is accomplished, the Shenandoah will consider the building of a mill.

At the Kennedy mine, near Jackson, the new hoisting machinery is in position. The gallows-frame is being put up. The frame will be over 100 feet in height, and it will be 103 feet from the collar of the shaft to the center of the sheaves. The mill is running steadily, forty stamps dropping in the new mill.

J. C. Williams of Nevada county, vice-president of the Western Federation of Miners, has been in this county several days on business concerning that organization. It is said the object of his visit is to bring the engineers and others identified with the local union of the American Federation of Labor to affiliate with the Western Federation. It is necessary, the latter claims, to hold its position, that all those working in mines in this section should become members, even though they keep up other unions as well. The present center of agitation is Amador City. Superintendents of the Bunker Hill and Fremont mines have been consulted and they fear that trouble is liable to reoccur. Notices have been posted for some time requesting those employed about Amador City mines to become members of the Western Federation. The time limit has been extended to August 10. Notices are posted around Jackson calling a special meeting for organizing engineers, millmen and mechanics as a union under the jurisdiction of the Western Federation. A meeting will be held August 1st.

BUTTE COUNTY.

The Spring Valley hydraulic mine near Cherokee is reported sold to T. L. Vinton of Cherokee.

It is expected that the pumps at the Lecompton mine, near Nevada City, will take ten days to unwater the mine.

The North Bloomfield ditch is to be repaired this fall by building new flumes and replacing old ones and running a 500-foot tunnel through a point where a slide occurred. W. G. Shand is superintendent for Bourne & Co.

Timbers are being cut and roads opened preparatory to starting work at the Jim mine, in God's Country, Eureka township.

The Goldbank quartz mill in Forbestown is to resume work after an idleness of several months.

A 4-stamp mill and 1250-foot pipe line is being built at the Southern Cross mine on the North Fork of the Feather river, near Forbestown. T. Goyne is superintendent.

CALAVERAS COUNTY.

(Special Correspondence).—A run of five and three-quarter days in a 5-stamp mill at the mine of the Maltman G. M. Co. at Angels last week returned $743.97 gold, an average of about $9 per ton. F. Maltman is president and superintendent. The company is about to add ten stamps to the mill.

The Angels Quartz M. Co. of Angels will add twenty stamps to the mill and increase the concentrating plant by addition of new machinery. J. V. Coleman is owner.

At the Kenross mine, at Whiskey Slide, 8 miles from Mokelumne Hill, Superintendent J. T. Thompson says he has thirty men at work, and he expects the stamp mill to be ready for operation next month.

The 10-stamp quartz mill at the Easyz Bird quartz mine of the Emma M. Co., near Mokelumne Hill, started crushing last week. The works are lighted by electricity generated on the grounds.

NEVADA COUNTY.

On the 1600-foot level north of the Champion mine, near Nevada City, a ledge of sulphureted ore has been found in new ground. On the 700-foot level north another ore shoot has been opened, for which work has been in progress for many months, and which was known in upper levels as the Soggs shoot. The shaft of the Champion Co. on the Merrifield now has a depth of 1740 feet. From the 1300-foot level to the bottom it is 16 feet wide, 6 feet high, and has three compartments, one of which is used for the pump column. Above the thirteenth level it has two compartments.

The engine and 10 stamp mill of the Last Chance quartz mine on Diamond creek is being overhauled. A new boiler is also being put in; Bray Bros., bonders.

A 50 ton cyanide plant is to be installed at the Pine Hill mine, Nevada City.

The Brunswick mine is being wired for electric power, which will be installed to run the pumps. The wires are taken through the 700-foot air shaft, at the bottom of which the motor will be established. This will generate power for operating the pumps, which will arrive shortly, when active operations will be resumed.

A 5-stamp mill will be built on the Huron quartz mine, near Omega. W. H. Bray has charge of the work of development.

At the American Hill mine of the Sierra Nevada M. & D. Co., R. Simmons manager, a hoisting works is being erected and a shaft sunk.

The Last Chance mine in Washington township, bonded some time ago by Bray Bros. of Wheatland, will begin work soon. The machinery and 10-stamp mill on the property are being overhauled.

A 20-stamp mill is being built at the California mine on Gaston Ridge, near Washington, L. R. Poundstone superintendent. The mill was bought from the Gold Bank M. Co. at Forhestown.

A strike is reported in the property owned by W. Norton of Nevada City. The mine is in Willow valley, near Nevada City. The leasers, W. Young and R. W. Martin, began work a few days ago, and after putting in their first shot uncovered a ledge rich in gold and heavy with sulphurets. Young & Martin have a two years' lease on the property.

SANTA BARBARA COUNTY.

The Union Oil Co. struck a gushor on July 27.

SHASTA COUNTY.

The converters at the Keswick smelter, closed down since July 2, have been started up again. Two furnaces are now in operation and the third will be running inside of ten days.

The Crown Deep mine in Lower Springs district is to be reopened. The mine is owned by W. P. Miller of Golden Gate, Alameda county. New York men have a bond on the Crown Deep. J. Hume of Redding is superintendent. The ore will be shipped to the smelter of the Mountain C. Co. at Keswick.

SIERRA COUNTY.

The Ruby mine, at Forest City, is reported looking well. For fifteen years this property was worked as a gravel mine, but later a quartz ledge was found which has since been developed with encouraging results. The ore carries free gold and is paying. N. Sanford is foreman of the Ruby mine.

At the Oriental mine in Sierra county, on the north side of the Yuba river, the tunnel is in 2700 feet. It is intended to drive to 3300 feet.

SISKIYOU COUNTY.

A. C. Brokaw of Quartz Valley is working the Golden Eagle mine and mill on Indian creek.

A ditch is to be built from Scott river to Hamburg Bar, Klamath river, for working the hydraulic claims at latter place. It will be 14 miles long and carry 6 inches of water. The ditch will take water from Scott river above Scott Bar. The construction of the ditch will employ 150 men.

TRINITY COUNTY.

Five stamps in the Brown Bear mill are dropping on ore from the Lambeth & Grayson dump, and five stamps are crushing ore from the Lappin mine, under bond to J. J. Chambers of Redding.

Fifty men are employed at the Dorleska mine, Dorleska. H. Z. Osborne is manager.

TUOLUMNE COUNTY.

W. C. Cullers and A. W. Rozier, owners of the Hard Times mine, near Arrastraville, have granted the owners of the Little Beauty mine the right to tunnel through their ground and also to use same as dumping ground.——B M. Hohenshall of Stockton has bought the Yellow Rock quartz mine, near the Newcomer mill, on Knight creek, near Columbia; also, an undivided one-half interest in and to the Fraction quartz mine, on Knight creek, between the Occidental and Sunset claims.

W. C. Stanley has bonded the Handover and Hard Times mines at Arrastraville, near Soulsbyville.

The mill at the Soulsby mine, at Soulshyville, is running and forty men are at work, says Manager W. Sharwood.——A. Harris is putting up a mill on the Vine Spring mine, near Columbia.——The Don-

dero gravel mine at Yankee Hill, near Columbia, has been shut down for the season.

The Harvard M. Co., near Jamestown, in sinking the No. 1 vertical shaft from the 700 level, struck a 15-foot gouge. The shaft was timbered with double sets, one set of timbers being placed 3 feet outside of the regular shaft set, to allow space for easing the timbers. The gouge lies on the serpentine foot wall, which is so soft that it requires to be timbered in the same manner as the gouge. It was estimated that the shaft would continue in this formation for 600 feet, and that each 100 feet would require six men easing timber. Sinking has been discontinued and crosscutting for the vein commenced at the 800 level. It is reported that the shaft will be carried down on an incline on the vein from the point where the ore crosses the shaft, says the Mother Lode Magnet.

YUBA COUNTY.

The Beeney farm of 600 acres, 7 miles east of Marysville and south of the Yuba river, is reported sold at $75 per acre to R. E. Cranston for Michigan men. A drill is in use prospecting the land. The Cranston syndicate owns 1700 acres.

COLORADO.

(Special Correspondence).—Colorado is no nearer a settlement of her labor troubles than when they first started. In fact, they appear to be growing more serious. The men at the Eilers plant, Pueblo, have notified the Trust that they will go on strike July 26, which would close three of the Trust's plants—two in Denver and one in Pueblo. The Trust has notified its patrons to ship no more ore, as they are unable to handle same. The closing of these plants may mean the building of independent smelters—something Colorado needs. The closing of the smelters will also mean the closing of some of the mines throughout the State, as the mines are dependent upon the smelters to market their ore.

Colorado is favored with a special session of the Legislature. The Governor has asked for an appropriation bill to be passed. One was "passed" at the regular session but declared illegal. It is thought the Governor will call a second extra session to pass an eight-hour bill. Should such a law go into effect it would undoubtedly compel many of the unprofitable mines to close down. In many of the camps the miners are only working eight hours and mill men twelve hours.

Denver, July 25.

BOULDER COUNTY.

Work at the Ben C. Lowell group of mines at Magnolia, operated by C. H. Cheney and W. H. Hirshfield is going ahead. The ore shows free and rusty gold, as well as tellurides, and in the breast of the main drift a vein of ruby silver is reported struck. Development work is being done in the 325-foot level, stoping and drifting. They propose to build a mill this fall, as the ore can be treated by cyanide. Machine drills driven by steam are used in drifting.

At Sugar Loaf the Livingston is in operation. The mill has been overhauled and shipping will be resumed, says Superintendent W. Niles. —— The Great Western M. & M. Co. are getting ready to build their mill. Shipments continue.—— The Recluse mine is shut down.

The Eagle Rock Co., near the Cochrane mill, W. Capp of Denver manager, is driving a crosscut tunnel in Sugar mountain, in 800 feet.

CLEAR CREEK COUNTY.

Additional rolls and other machinery are being put in at the dry process mill at '94 tunnel at Alice, 12 miles from Idaho Springs, says G. W. Possell, manager of the company. The remodeled plant will have a capacity of fifty tons per day and is expected to be in operation in September.

The Josephine group on Spanish Bar, near Idaho Springs, has been sold to the Josephine Con. G. M. & M. Co. The group consists of three claims and the company intend to develop them by sinking the Josephine shaft, which is down 290 feet, to additional depth of 400 feet.

It is reported J. E. Bowden of Idaho Springs has sold the Josephine mine to the Josephine Con. M. & M. Co. for $155,000. The company intends to erect a hoisting plant and mill.

An explosion at the Sun & Moon mine, near Idaho Springs, wrecked the transformer house July 28th, set fire to the oil in the transformers and threatened the destruction of the main shaft house. It is supposed to have been the work of strikers, as this was one of the first mines affected hy the recent strike. There were no explosives kept anywhere near the transformer house.

The Elkins M. & M. Co., operating the Terrible properties at Silver Plume, has engaged J. T. Nicholson and W. Morrison of Idaho Springs to superintend the installment of machinery in their mill, which will have a capacity of 300 tons, to be increased to 500 tons later. B. C. Catren is manager.

A. Anderson, G. Carlson and M. W. Tanner of Idaho Springs have a lease and bond on the Beacon of the West property, near the Waltham, in Russell district. The shaft is down 250 feet. The lessees will clean out the shaft to the bottom, retimber where necessary, and expect to put in a hoisting plant and erect shaft house and continue sinking.

The Cripple Creek Gold Temple Co., operating a lease through the main shaft of the Gold Sovereign Co., have put in machinery, including an air compressor. A new 10x10 gallows-frame, 40 feet high, has been put over the shaft and further improvements planned. The leasing company have finished cutting the eighth level station at 600 feet. With this new level extended they will have an additional 75 feet of stoping ground, which will result in increasing the tonnage 150 to 200 tons monthly. Their low-grade ore averages $40 to the ton, first-class $150.

DOLORES COUNTY.

(Special Correspondence).—At the Emma mill, at Dunton, the company is making tests and expect to put in a cyanide plant. The mill has a capacity of forty tons per day and will be enlarged. R. Keller has charge of the property.

The Dunton Con. Mines Co. has been organized to operate the America group, near Dunton.

Dunton, July 27.

FREMONT COUNTY.

The Canon City smelter has resumed treating about 1500 to 2000 tons of ore monthly from Leadville.

GILPIN COUNTY.

Work is going ahead on the concentrating plant for the Nevada Con. G. M. & M. Co. on King flats, west of Nevada, near Central City, and it is expected to be in operation next week.——The Augusta G. M. Co. resumed operations last week on its tunnel running south from Chase gulch into Winnebago hill.

The Mont D'Oro G. M. Co. has been organized by E. C. Sherman and T. R. Cudahy of Central City to operate the New Century (the Tippecanoe) group of claims, in Quartz Valley district and near the Tucker. They are sinking a shaft and will put in a steam hoisting plant.

HINSDALE COUNTY.

The Tobasco M. Co. has leased the engines and boilers of the Black Wonder mill at Sherman, near Lake City, and is moving the electric generator to the mill, that work may progress at mine and mill until repairs to the pipe line recently damaged are completed.

LAKE COUNTY.

Harris & Miller have men reopening the Criterion and Cleaner mines, near Leadville. The mill is being remodeled with intention of putting in a cyanide process. —— The Red Cross Co., in Buckskin gulch, has resumed development work, says Superintendent G. W. Shelton, part owner.

The O. K. shaft of the Progressive M. Co., on Fryer hill, Leadville, has been opened and shipments of twenty-five tons a day are going to the smelter.

The necessary repair work on the New Monarch shaft is completed and shortly the sinking of the shaft to 1300 feet will be commenced.

The Fitzhugh property has been leased to R. B. Estey and T. D. Kyle of Leadville.

J. & G. Campion have leased the Wells & Moyer placer, on Rock hill, California gulch, and will sink a new shaft 500 feet from the old shaft on the Sequin claim.

The 900-foot drift between the Coronado and the Midas has been completed and the work has been started.

The Cloud City mine at Leadville is shipping iron ore daily to the steel works in Pueblo. The shaft is down 504 feet and a drift is being run from the bottom. There is an upraise in the drift and a good body of ore has been found. Manager Jones says the company will sink a new shaft and make other needed improvements.

The California Gulch M. Co. of Leadville has decided to release the property for two years at a fixed royalty.

J. F. Campion, manager and part owner of the Ibex or Little Johnny mine at Leadville, and G. F. Campion have a lease on the Nisi Prius M. Co.'s sixty acres, comprising the Wells and Moyer placers on Rock hill. Campion is also owner of the Sequin lode, which is included in the consolidation. A shaft will be sunk on the Wells and Moyer to catch the extension of the Rock and Dome ore shoot, and will be located 600 feet south of the Sequin shaft. Heavy machinery will be put in.

MINERAL COUNTY.

Plans are being drawn for the steam plant to be added to the Humphreys mill, near Creede, to furnish additional power during the winter when the water is frozen in the creek, says Manager G. Davis.

The Humphreys mill at Creede is handling 6000 tons of crude ore per month, making a saving of 95% and producing a high-grade lead concentrate, also a 60% zinc product.

OURAY COUNTY.

(Special Correspondence).—The American G. M. Co. is handling 40 to 45 tons of ore per day in its 20-stamp mill, using only fifteen of the stamps.

F. M. Jackson is overhauling the Micky Breen mill, which has been idle for years. A new concentrator is being put in. The company is known as the Tempest-Apex M. Co. They will build a tramway from the Tempest mine to the mill. About 7000 feet of development work has been done on the Tempest. The Apex has produced considerable high-grade ore.

Ouray, July 27.

PARK COUNTY.

The Alma placer, consolidated with the Snow Storm placer, is half way between Alma and Fairplay, and is owned by the Snow Storm Hydraulic Co. It comprises 5000 acres of placer ground. J. Fortune is general manager. This placer is situated in the basin of the Platte river at Alma. The gravel is 50 feet in depth. There are 3½ miles of ditches, supplied with water from the Platte, and over 4000 feet of sluices. It is worked by giants, 900 feet of piping and derricks. This placer has been worked over thirty-five years. Since consolidation with the Snow Storm placer miles of ditches have been added and widened. All buildings and workings are lighted with electric lights.

The Cincinnati placer at Fairplay will start up again. Last year many placer locations were made in Mosquito, Buck and Beaver Creek gulches and preparatory work is going on. The Lowe placer, 6 miles south of Fairplay, is working with full force. W. Bemrose is working his placer in Hoosier gulch, which he located in 1860.

SAN JUAN COUNTY.

(Special Correspondence).—Gladstone is on Cement creek, 9 miles from Silverton, on the Silverton & Gladstone Railroad. Here is located the Gold King mill, which has been in use for a number of years, with several additions, as more room was required. The company intends doubling the capacity of the mill. The mine is on Bonita hill and is worked through shafts and tunnels. They have 2½ miles of underground workings. The main tunnel is in 2500 feet and connects with a shaft 700 feet deep, with two compartments. The ore is hoisted by electric hoist to the tunnel level, 250 feet below the surface, and run out to the mill. They are handling 200 tons of ore per day. The ore is quartz and iron, sometimes with good copper values. It averages $15 to $20 per ton. W. Z. Kinney has charge of the company's affairs at Gladstone.

The Mammoth Tunnel group of thirty-two claims, owned by the Stony Pass M. Co., is reached by the Silverton & Gladstone Railway. The tunnel is 7½x8½ feet in the clear, with double track. This company owns eight claims on Stony Pass, Green mountain, 6 miles from Silverton, and will build a mill on the property. A. A. Brown is in charge.

The Yankee tunnel, owned by the Boston & Silverton M. & R. Co., is in 1800 feet and the Lamont tunnel 710 feet. The company owns forty claims. They have a mill and will run as soon as enough ore is blocked out to keep the mill employed. C. W. Swett of Boston, Mass., is president and A. A. Lamont manager.

Gladstone, July 27.

(Special Correspondence).—The Brooklyn M. Co., in the Red Mountain district, is working its properties. Seven hundred feet of development has been done and they are operating a 5-stamp mill and milling fifteen tons per day, also shipping two cars of ore per week to the smelter. F. Manion is superintendent.

Chattanooga, July 27.

A streak of tungsten ore has been struck in the Tom Moore tunnel, near Silverton, at depth of 300 feet.

The Gold Queen Mines Co. has sold the Silent Friend and Mattie B. groups of fifteen claims in Minnie gulch to S. Shaw of Denver.

SAN MIGUEL COUNTY.

(Special Correspondence). — The Alta Mines Co., on Silver mountain, near Ophir Loop, have been doing experimental work the past two years and have about 1 mile of tunnel work on their claims. They have a 20-stamp mill on the property, using vanners and bumping tables, and are now installing a slime table. A. C. Koch is manager.

The Ophir Con. G. M. Co. are operating their 50-stamp mill, handling 175 to 180 tons per day. They will drive a tunnel which will cut the vein 900 feet lower than the present tunnel. L. G. Homfeld is superintendent of the mill and H. S. Buckley assistant manager of the company.

About ninety tons of ore are being put through the 30-stamp mill of the Butterfly-Terrible G. M. Co. They are making about nine cars of concentrates per month. The main tunnel is in 3000 feet. A 1500-foot aerial tramway transports the ore to the mill. The mill is operated by water power, but the company intends installing a steam plant to run the mill during the winter, and also heat the plant by steam. J. McMahon has charge of the property.

Ames, July 21.

(Special Correspondence).—The Yellow Mountain M. Co. are handling twenty-five tons of ore per day with their 10-stamp mill. The capacity of the mill will be doubled. This company is the owner of the old Caribou mine. At present working on the Caribou vein. The main tunnel is in 2000 feet. They have three claims—Caribou, Montezuma and Capitan. W. Davidson, superintendent, states they expect to double their working force. They are now employing twenty-five men.

J. Real has a lease on the 40-stamp mill of the Suffolk G. M. Co., handling sixty tons per day. The mine of this company is under lease. The company is interested in the Badger tunnel, through which, when completed, it is expected to reach all of the fifteen claims of the company.

G. R. Dolf, manager of the Milwaukee-Ophir M. Co., states they have completed an upraise of 480 feet between the Deadwood tunnel level and the old Nevada workings and will build a mill. The Nevada has been idle since 1884 owing to water in the mine. This has now been overcome. The property lies east of the Caribou, on Yellow mountain.

G. B. Pickett has charge of the Carhonero mine, doing development work. The upper level is in 600 feet on the vein and the lower crosscut 500 feet. Ore is carbonate and galena, with silver and gold. They are shipping ore by the carload.

Ophir, July 21.

(Special Correspondence).—R. W. Davis, Jr., manager of the Menona M. & M. Co., is operating the old Columbia 30-stamp mill and shipping ten to fifteen cars of concentrates per month, getting from $8000 to $10,000 gold on the plates. He states they have enough ore blocked out to run the mill three years.

The Tomboy G. M. Co. are shipping 700 tons of concentrates per month. A portion of the old mill is idle, hut the sixty stamps in the new mill are dropping steadily. D. A. Herron is superintendent.

The Silverton M. Co. has a tunnel in 2500 feet in Sultan mountain and will continue it several thousand feet farther. Twenty-three hundred feet from the mouth they have a 110-foot shaft. At the shaft they have a 50 H. P. electric hoist. Work at level No. 8 is being done by contract. They have recently found a good body of ore. The company is repairing the mill and will put in an engine, boilers and generator. J. C. O'Neill is general manager and R. J. McCartney superintendent.

The Hercules Con. G. M. Co., T. Kane manager, will start up shortly. It is the intention to double the capacity of the mill. This company has 3½ miles of underground workings. The property is on Sultan mountain.

Smuggler, July 26.

The annual report of the Butterfly-Terrible G. M. Co., operating at Ophir, issued under date of July 10, shows 717 feet of tunneling driven, 178 feet being in the main tunnel and 539 feet on the east drift. An upraise has been made to connect tunnels Nos. 1 and 3, which is 320 feet in height. Since finishing the upraise a stope 350 feet by 20 feet has been cut and 300 feet of timhering done in the east drift. There are four ore shoots on the east side of the upraise and three on the west. During the producing period, between May 1, 1902, and June 26, 1903, there was shipped to the United States mint 1126.26 ounces of bullion, containing gold values of $16,772.78, and silver values of $137.64. In addition there was shipped concentrates worth $2925.21. C. Bullock of Denver is president.

M. Robbins, foreman of the Smuggler-Union mines, and E. Field have leased the seventy-six claims and all dumps below the Smuggler dump in Marshall basin, owned by the Smuggler-Union M. Co., and are building a 10-stamp mill.

The Smuggler-Union M. Co. is sinking the Mendota shaft 600 feet to the ninth or Bullion tunnel level.

A plant for driving compressed air drills is being installed at the Liberty Bell crosscut tunnel, near Telluride, and the property will be equipped with air drills.

TELLER COUNTY.

(Special Correspondence).—The Cripple Creek drainage tunnel is within 300 feet of completion and should be finished fully two weeks ahead of contract time. Its ef-

fect on the mines is already noticeable.

Cripple Creek, July 27.

The Bonnie Neil plant on Raven hill, Cripple Creek, resumed last week under Lessee Sidell.

G. Jordan has bought the cyanide mill and machinery on the Ironclad claim on Bull hill, Cripple Creek, and is moving it to the Summit mill at Gillett, where Jordan has a lease on the tailings of the Summit mill. The Ironclad cyanide mill has six tanks and this number will be increased.

Rice & Stone of the Stratton estate propose to build a 100-ton cyanide mill, to be erected on Ironclad hill, Cripple Creek, near the offices of the Stratton estate The mill will treat the low-grade ore which it is expected will be mined from the leases on Ironclad, Globe, Womack and Bull hills.

T. McManus of Victor has secured a $20,000 bond and two-year lease on the Glenwood, Oro Cash and the Doonan claim, near Victor, on Howell mountain.

The C. O. D. at Cripple Creek has been considered a worked out mine. T. B. Burbridge sank the shaft to 1000 feet, near the present water level. In drifting underneath the old ore shoot he broke into 4 feet of $80 ore, showing gray copper.

Out of twenty-three deep shafts in Cripple Creek district which had ore at all, nineteen have gnod ore in the bottom levels and most of these bottom levels are near the present drainage level, says G. J. Bancroft. Many of the shafts had lean ground for two or three levels. The number of strikes near the present water level is noticeable. An unusual number of strikes have been made at this horizon, which also marks the limit of the evidences of oxidation. Possibly the water stood at about this elevation at some time in the past.

Work is to be resumed on the Newell tunnel under Beacon hill, near Cripple Creek. Manager W. C. Newell proposes to start work 2200 feet from the portals of the tunnel and cut the Prince Albert, Beacon and Eureka claims. The Newell tunnell has been closed down for a number of months. The resumption of work in this tunnel will benefit several properties in that vicinity.

J. W. King is building a cyanide plant on the Sioux Falls property on Spring creek, near Cripple Creek.

IDAHO.

BOISE COUNTY.

At the Hard Scrabble mine, at Bernard's, owned by J. and W. H. Daly, E. H. Ross and O. McCallister of Meridian, they have men on development work, and have built a wagon road from the mine connecting with the State wagon road at Cape Horn, a distance of 12 miles.

The Twin Sisters mill near Quartzburg has been closed down, it is said, because it does not save the values closely enough. Silver predominates, but the ore carries $5 in gold. H. McConnell of Boise is president.

BLAINE COUNTY.

A 10-stamp mill is being hauled out to the Rosetta district, on the Little Smoky, C. C. Rauthrauff superintendent.

ELMORE COUNTY.

The Elmore mine at Rocky Bar will be reopened by a company of Pittsburg, Pa., men. I. E. Rockwell is manager and M. Leech is superintendent.

IDAHO COUNTY.

(Special Correspondence).—The Moose Creek Placer M. Co. is incorporated at Grangeville, C. P. Richardson, president and manager. The company proposes to enlarge and extend the ditches on the property, install enlarged hydraulic plant and either derrick plant or cableway for boulder handling.

The Buckeye M. Co.'s property at Newsome has just made a cleanup from the season's run of about 100,000 cubic yards. No figures have been given out by the management as to values in the ground. The ground lies advantageously for cheap and rapid hydraulicking. The banks reach a height in present pit of 120 feet. R. L. Phillips, formerly superintendent at Moose Creek placers and American Eagle (quartz), is superintendent. About fifteen men have been employed.

Newsome, July 25.

Work has been started on the Dewey Extension group near Ronsevelt, Thunder Mountain district, by Spokane men, including M. Wolfe and J. Meyers. R. Strang says the season's rush to Thunder Mountain has begun and a number of men are outfitting at Stites for the trip.

Manager F. Macey of the Iron Springs M. Co. on Rapid river, near Warren, says a hoisting plant is being put in to sink a double-compartment shaft. A sawmill is also being set up to cut lumber for the buildings.

MICHIGAN.

HOUGHTON COUNTY.

Commencing Aug. 1, the capacity of Red Jacket shaft at the Calumet & Hecla mine at Calumet will be 1500 tons of rock daily. If the Calumet & Hecla propose an increase in its output, it will be from this source in preference to the shafts on the Osceola lode, which in the past have shown lower values. It is understood all of the company's inclined shafts are to be provided with 7½-ton capacity skips. One of these has already been put in at No. 7 Hecla, the daily output from this source being 700 tons.

The work of installing the hoist for No. 4 shaft at the Baltic mine of the Copper Range Con. Co., north of Painesdale, is about completed and is expected to begin permanent service next week. —— The compounding of the heads at the Champion mill is reported showing a reduction of 30% in the coal consumption.

It is expected the fourth head at the Trimountain mill, at Edgemere, will be ready for operation Aug. 1, when the Trimountain will stop rock shipments to the Arcadian mill.

The improvements under way at the Red Jacket shaft of the Calumet & Hecla during the past year are about completed. The last of the mine bins is finished. Ten days will be required to make the necessary alterations in the shaft and rock house, and during this period the shaft will not supply any mill rock. The nine-ton skips, which are to supersede the cages, are in readiness, by use of which the hoisting capacity of the shaft will be doubled. The mine outputs nearly 6000 tons daily. Bins have been provided at each alternate level, commencing at the 57th at either side of the shaft, and their capacity of nine tons is equal to that of the new skips to be used. The skips are box-shaped, and in the matter of their hoisting and lowering there will be no deviation from the present method. The advantages anticipated are a saving in time of loading and discharging and the hoisting of heavier loads. The engines can hoist a ten-ton load at the rate of 3600 feet per minute, and, allowing for reduced speed at the top and bottom of the shaft, round trip to extreme depth can be made in five minutes.

It is reported that the Michigan will be shipping rock to the Mass mill in October. The shaft rock house at the A shaft of the Michigan has been enclosed and sheathed. A smaller structure on the B shaft is started and will be completed within sixty days. The hoist for the A shaft is on the ground and the 40-drill compressor will be delivered by October.

C. H. Taylor, consulting engineer in charge of the hydraulic plant being constructed at the Victoria, says the automatic compressing plant will be of 4000 H. P.

MISSOURI

JASPER COUNTY.

Material for a 300-ton mill is being delivered at the Independence mine on the Guinn land, north of Webb City. A blanket sheet of ore was developed on this lease and the incline shaft was sunk to 235 feet. M. B Conkey is the manager.

The Obert M. Co. has completed a 100-ton mill at Duenweg.

A company composed of C. T. Bunce, S. Ennes, H. M. Metcalf, O. M. Odell and A. Haughton of Joplin has leased the Murphy land at Zincite, a noted producer, but which for several years has been idle and flooded. They will put in a pumping plant.

Only two weeks of this year show a larger zinc shipment than that of last week. The shipment was larger than the output, which was close to 5000 tons, but the shipment was over 5500 tons. The highest price reported paid for zinc was $40 per ton, which price has ruled for weeks, and the basis ranged from $35 to $37.50 per ton of 60% zinc. Lead continued firm at $52 per ton. A year ago zinc sold at $42 per ton and lead at $48 per ton.

MONTANA.

BEAVERHEAD COUNTY.

Work has been resumed in the smelter of the Indian Queen mine in the Birch Creek district.

BROADWATER COUNTY.

Roseberg & Sutton of Helena have leased and bonded the Stray Horse mine, near Winston. Work has been commenced on a concentrator.

F. W. Rossberg, formerly superintendent of the Peck concentrator at East Helena, has a lease and hond on the Stray Horse mine near Winston. He will superintend development at the Stray Horse. There are 4000 tons of milling ore on the dump. A shaft will he sunk on the vein in the lower tunnel, which is in 1500 feet. The mine is opened hy three tunnels, but for the present work will he confined to the lower tunnel. Excavation for a 40-ton concentrator has been finished.

LEWIS AND CLARK COUNTY.

The Mission Peak M. Co., near Helena, which has been running its stamp mill for two years, will add a cyanide plant.

MISSOULA COUNTY.

The Tarbnx M. Co., of Saltese, has the shaft down 400 feet. A crosscut is to be driven 75 feet and the vein drifted. A cage and pumps are being installed.

SILVER BOW COUNTY.

J. O'Leary, secretary and treasurer of the Hidden Lake M. Co. of Butte, says a 100-ton concentrator will be built at that property. The company has nineteen quartz and placer claims, millsites and two water rights on Warm Springs creek.

Nine mines of the Amalgamated Copper Co. in Butte and the Anaconda smelter are to open August 20th. Nearly 5000 men will return to work. The shut-down was caused by making connection between the furnaces and the great flue and stack recently completed.

NEVADA.

ESMERALDA COUNTY.

The mines of the Con. Esmeralda M. Co., 12 miles from Hawthorne, is to have a 40-stamp mill. The plant was originally erected at Jordan, 16 miles from Bodie, a number of years ago, but not used. It includes power drills, air compressor, rock breakers and complete hoist.

It is reported C. H. Elliott of Salt Lake, Utah, has bonded the Chiatovich mine at Silver Peak for $75,000. The property is equipped with machinery and is in operation.

LINCOLN COUNTY.

The Baltimore and Radical claims have been sold to B. F. Lewis and J. H. Gurmann. They adjoin the property of the Parallel G. M. Co., near Searchlight, on the northwest.

An air compressor and new machine drills will be installed by the Ione M. Co., near Searchlight. Two shafts will be sunk, a whip being used preliminary to a hoist; F. A. Spare, manager.

NYE COUNTY.

Reduction works for the Tonopah M. Co. are being considered, to be built this summer at Tonopah.

Superintendent McCarthy, of the North Star mine at Tonopah, reports that the shaft is now down 905 feet and stringers of ore coming in.

The Boston Tonopah shaft is down 300 feet. It is the intention to crosscut at 500 feet; G. S. Nixon, president.

A flow of water has been encountered on the 300 level of the Rescue mine in Tonopah. It is pumped to the surface and sold for various purposes.

The Enterprise M. Co. reports a discovery of tin at their mine at Lone Mountain, 4 miles south of Barrel Springs.

STOREY COUNTY.

Electricity is to be substituted for steam in operating power drills at the Overman mine, Virginia City.

WHITE PINE COUNTY.

The Wild West M. Co. is putting in machinery, offices, ore bins and making other improvements on its property in Egan canyon, near Cherry creek.

NEW MEXICO.

GRANT COUNTY.

W. McAllister has arranged with Edward Steele, of Dallas, Texas, to erect a 60-ton concentrator for the low-grade ores of the Aztec mine in Pinos Altos mountains, near Silver City. The ores contain gold and silver sulphides. The new concentrator will consist of rolls, screens, jigs and concentrating tables.

SANTA FE COUNTY.

The Gold Bullion M. Co. has been incorporated at Santa Fe by R. S. Baldwin, S. Jaros and F. M. Choate of New York. The company will operate in southern Santa Fe county.

OREGON.

BAKER COUNTY.

The Dixie group on Granite Boulder creek, near Sumpter, is to have a milling plant of twenty tons capacity. F. Ray is manager.

The new 5-stamp mill on the I. X. L., F. T. Kelly, manager, has started up. There is sufficient ore blocked out to keep the mill running several months.

Arrangements are being made to install an air compressor and power drills on the Victor, in the Cracker Creek district. This property was taken over recently hy A. G. Hanauer, of Spokane, and is under the management of the Geiser-Hendryx Investment Co., H. T. Hendryx of Sumpter, manager.

The Gold Hill property, near Durkee, operated hy the Burnt River G. M. Co., was sold to Nicholas Bros. of Portland, Or., for $250,000, of which $25,000 was paid down. The mine has a 10-stamp mill, with rock crusher and four concentrators.

The Quebec mine, in Blue Mountain district, has started up under direction of R. Adams.

A 100-ton mill is to be built at the Golden Wizard, near Sumpter, as soon as ore has been tested. J. M. McPhee is superintendent.

The Single Standard Co., on Paddy creek, tributary to Eagle, near Baker City, Or., will erect a 20-stamp mill on the property, says E. S. Tice of Baker City.

L. O. Miller of Sumpter says the Golden Wizard Co. will build a concentrating plant.

The Listen Lake Co., operating in the McNamee district, has finished an air blast and is grading for a hoist to be put in within a short time.

Mack's Luck G. M. Co., operating in Deer Creek district, is opening up its property.

JOSEPHINE COUNTY.

W. H. Hampton is constructing a tubular hydraulic elevator at Deep Gravel placer.

SOUTH DAKOTA.

CUSTER COUNTY.

The Sunbeam M. Co, near Custer, have a shaft on the vein down 220 feet. The ore is bluish gray quartz, carrying free gold. The company has installed a hoisting plant, consisting of boilers, hoisting engine, an air compressor, pumps, blacksmith shop, sawmill, etc. It is the intention to build a stamp mill, the lumber for which has been sawed.

The Bullion Co, near Keystone, will erect an 80-stamp mill as soon as practicable.

LAWRENCE COUNTY.

J. Conzette, of the Ruby G. M. Co, is erecting a small cyanide plant for experimental purposes preparatory to the permanent plant to be built near Lead City.

The Horseshoe Co. of Deadwood has made a new departure in locating its new mill at the mines on Bald mountain, says the Lead Call. thus saving on transportation of ore. The new plant is expected to drop one-half of its stamps on August first. The building is 424x168 feet, containing 120 stamps, engine, boilers and tanks. Forty feet west, and connected by a covered tramway, is the crusher building, equipped with two No. 5 Gates rock crushers, engine and two boilers of 100 H. P. each, and a bin capacity for 3000 tons. The crushed ore passes from the crushers to a conveynr, which delivers the ore into the mill bins. Coal is delivered by the same process to the boilers in the center of the mill building. The mill bins hold 7000 tons. The tanks are steel and the eight are 40 feet in diameter and 5 feet deep. On the floor below are sixteen tanks 10x20 feet. Lower are eight gold solution tanks 10x15 feet. Still lower are eight sump tanks 12x24 feet and four storage tanks 14x30 feet. The mill is in two sections of sixty stamps. In the center is the engine and boiler of 150 H. P each. The mill is near the Mogul mine and will be supplied with water from the Mogul workings. The Horseshoe Co. will convert the Kildonan mill at Pluma into a wet crushing mill, removing the rolls and substituting sixty stamps, giving it a capacity of 250 tons daily.

PENNINGTON COUNTY.

The tramway from the Ida Florence shaft to the Bismarck mill, near Hill City, is being built, and it is expected to have the stamps dropping next month.

UTAH.

BEAVER COUNTY.

The lead furnace of the Majestic smelter near Milford will be blown in by August 15th, says Manager W. A. Farish, and will treat 100 tons of Harrington-Hickory silver-lead ore per day. For the present the ore will be transported to the smelter by teams, a train or railroad to be put in later—the distance being 4½ miles. The starting of the lead furnace will be followed soon after by the blowing in of the 250-ton copper furnace.

JUAB COUNTY.

Constructing Engineer J. M. Callow and Superintendent Legg of the Uncle Sam Con. M. Co. have called for bids for the construction of the building and supplying machinery for a concentrating mill near Eureka.

The West Tintic M. Co. has been organized at Salt Lake City by A. C. Lee, D. F. Walker, Jr., and H. W. Walker. The company owns a group of four claims in West Tintic district, near Eureka.

R. G. Legg, manager of the Uncle Sam at Eureka, says the company is giving final consideration to the matter of a mill.

The shaft of the Black Jack M. Co., at Mammoth, is down 1100 feet, with 300 more to go to reach the drift from the Lower Mammoth. The Black Jack is putting out iron ore for the furnaces of

the Amsrican S. & R. Co. in Jordan vallsy.

The managemsnt of the Lower Mammoth of Tintic, at Eureka, has mads connection with sach of its main fissurss on the 1200-foot level, with a maximum depth of 1500 feet below the surfacs.

MILLARD COUNTY.

Of the propossd enlargemsnt of the Highland Boy smelter, owned by the Utah Con. M. Co., Mansgsr Channing states that ground will bs broken for the buildings and contracts for the equipment let in August.

SALT LAKE COUNTY.

Connections in ths installation of the new flue at the Highland Boy smelter havs been completed, says Managsr Channing, and 516 tons daily are bsing smeltsd. Twelve roasting furnacss and two largs rsverberatory furnaces are to be added.

S. Bambsrger has deeded the Fortune mine near Bingham to the Bambsrgsr Exploration Co., and also bought ths Evergreen lods, a claim within the lines of the Fortuns group, for $3000. Work is temporarily shut down at ths Fortuns, says the Bullstin.

The St. Jos mine at Bingham has been closed down for an indefinite period, says Manager Hasbrouch, dus to a deal psnding for control of the mine.

The output of the Yampa mins at Bingham, under ths 30,000-ton contract with ths Bingham Con. smelter, is averaging two carloads daily, to bs increassd as soon as connection with ths Copper Belt railway is effected. No stoping has been dons, the ore all coming from dsvelopments.

Ths rscsnt striks reported on ths 1500 levsl of ths Brooklyn claim, of the Bingham Con. M Co, is proving richer than first reportsd. Managsr McVichie is reportsd as saying, in this connection, that the Bingham propsrties ars approaching that stags where increased facilities for smelting and output will become necessary. Ths tunnel is bsing driven and ths water has drawn off, so that it will bs possibls soon to carry on mining in the various shafts.

SUMMIT COUNTY.

Ths Ontario, Park City, is to have a new concentrator of fifty tons capacity. It is to bs located at No. 3 shaft. It will bs run by electricity, says Managsr Root.

At the Silver King Con., ths company intends building a boilsr houss, 35x50, for three sets of boilers. Ons sst of 85 H. P. boilers will bs put in as soon as the building is ready for them. A new gallows frame is to bs erected. A station has been cut on ths 500 lsvel for a duplex compound pump which will havs a capacity of 600 gallons per minute. A new 12x 16 sngins good for 2000 fset will be put in also.

WASHINGTON.

FERRY COUNTY.

At Mount Elsmeham, the Nighthawk tunnsl is crosscutting the vein 65 feet from the hanging wall in soft, granulated quartz and has not struck the footwall.

The Ruby mine, on Mount Chapaca, is employing eight men. Ors is bsing shippsd to ths Everett smeltsr. The Ruby is 12 miles northwest of Loomis.

The Horn Silvsr mine, on Palmer mountain, nsar the Similkamesn river, has a 5-foot vein of silver-bsaring ore. Eight men are employsd; O. P. Tufty superintsndent.

OKANOGAN COUNTY.

J. Boyd is in New York arranging for the installation of a 3000 H. P. electrical plant, and an air compressor, to be placsd at the mine of the Palmsr Mountain tunnsl at Loomis.

Ors from a blind ledge on the lower workings at the Opal mins, near Chesaw, gives high values in gold. Ths ore is 4 fset wide and is running with the tunnel, in 200 fset, and has a vsrtical depth of 90 feet. One hundred feet ahead of the face surface work shows a large body of ors. Treasurer F. L. Woodbridge, of the Opal Co. of Nswark, Ohio, says that a rsduction plant will be placsd on the propsrty.

PIERCE COUNTY.

A contract by which the Southern Pacific Railroad Co. will take the entire output of the Carbon Hill coal mines, is reported closed. The mine is near Tacoma, and its output is 20,000 tons a month. Hitherto a portion of the coal mined has bsen sold to steamship lines.

STEVENS COUNTY.

The Old Dominion 60-ton concentrator at Colville, which has been idle for six years, has been repaired, and operations started. The ore bodies on the Old Dominion have been uncovered. W. F. Kyle, lessse of the property, had twenty-two men during spring and early summer timbering the underground works in various parts of the mine and starting new developments. The latest and most important dsvslopment is ths opsning of 3 feet of chlorids ore in the old Ella shaft.

Work has begun on the Blackthorn claims, in ths Msteor camp, on the Colville reservation. Foreman Matthews rsports the lsdgs widsning. The tunnel was started at the bottom of the canyon and is running in on ths ledge.

Managsr Olmstead of the Stray Dog group is in New York making arrangements for extsnsive dsvslopment work, $15,000 having alrsady been expended on ths property, and it is said that the ledgs contains 26 inches of high-grade ore.

A California company is preparing to run a 3000-foot tunnel from Stray Dog canyon. Survsyors are surveying the site.

The Nonparsil Co. is at work on a 1000-foot tunnel to tap the lsdge at 700 fsst dspth.

FOREIGN.

AUSTRALIA.

NEW SOUTH WALES.

Ths tailings dump of the Wentworth mines at Lucknow are reportsd sold for $50,000.

Ths Nswstead Tin M. Co., at Elsmore, it is reported, has struck a rich tin lode 6 fest in width, ore assaying 25% tin. At Newstead, the tin dsposits are ovsrlaid by basalt from 150 to 200 fest thick, and this has to be sunk through bsfore ths tin-bearing granite is reachsd, and frequently considerable water is found in the shafts.

It is reportsd that ths Amalgamatsd Coppsr Co. has bought the Cobar coppsr mines in New South Wales. The price is stated to bs, with ths adjoining lsases, £1,500,000.

The Central mine, at Broken Hill, is to sink a new shaft (inclined) in the foot wall, all other shafts heretofore bsing in the ore body or started in the hanging wall country. Owing, however, to the extensive undsrground operations, ths ground on the hanging wall has sttled and is constantly shifting slightly, thus rendsring shafts there insecure and expensive to maintain. Ths nsw shaft will be frse from the sffects of "creeps" and othsr disturbances. Ths vsnturs is looked forward to with soms intsrsst, as it is the first shaft to bs thus locatsd in that district, though shafts so locatsd are common elsswhsrs.

QUEENSLAND.

Ths Queensland gold rsturns for ths month of June wsrs as follows:

Mine.	Tons Crushsd.	Yield in Ounces.
Charters Towers	25,400	41,000
Croydon	3,900	4,200
Gympie	15,000	14,000
Mount Morgan	22,500	9,900
Ravsnswood	1,900	4,100
Other fields	5,100	4,500
Alluvial	....	1,000
Total		78,700

Total yisld for six months, ouncs. 438,900

WEST AUSTRALIA.

The Kalgurli Gold Co., at Kalgoorlie, July 3, report: During June treated 3815 tons for a return of 3625 ounces (£14,047) of gold, with expsnditures for month as follows: Working expsnses, £6055; dsvelopmsnt, £655; capital expenditure, £474.

The Murrin Copper Co. report their production for month of June at: Twsnty-three days' smslting ore gave matte containing 120 tons of fine coppsr. It is sxpectsd ths nsw works will be in opsration by Aug. 1.

Shanks Bros. & Gesrke report from ths Victory lsase at Mount Clifford, north snd of Leonora district, having taken 618 ounces from twsnty-sight tons. The avsrags was twenty-two ouncss. This was taksn up in January. A leadsr was found on the outcrop. After doilying for a month, the gold was found on the lower ground, ths three msn getting fifty ouncss of aliuvial gold. The lease was then worked for alluvial, 300 ounces bsing secured by a dozsn msn. The thres msn thsn sank a water shaft 80 feet, and then drove 20 feet towards ths reef and sank to 100 feet, water level. At that depth stone going six ounces was found. There are other shafts, one 50 feet and the other 40 feet, down. It was from these that the latest returns were crushed at the Clifford battery. No stoping has been done.

The Mt. Magnet district of the Murchison Goldfield had up to the end of May last treated 216,561 tons of ore for a yield of 210,667 ounces; average, .97 ounce.

Following is the cost of operating at the Vale of Coolgardie during May: Stamps at work, 10; days running, 28; stone crushed, 1015 tons; duty psr stamp per 24 hours, 3 6 tons; bullion obtained, 336 ozs. 16 dwt. 23 grs.; aversge per ton, 6 dwt. 14 grs. Expenses—Mining per ton, 14s. 3d.; milling per ton, 8s. 3d.; development, per ton milled, 20s. Cyaniding — Tailings treated, 1066 tons; bullion obtained, 78 ozs. 6 dwt. 12 grs.; average, 1 dwt. 11 grs. Expenses—Cyaniding per ton, 4s. 3d. Total for month, 414 ozs. 2 dwt. 11 grs; average, 8 dwt. 5 grs. Total yield to dats, 55,390 tons for 35,266 ozs. 1 dwt. 4 grs.; general average, 12 dwt. 21 grs.

The South Kalgurli mins has bssn clossd, throwing 200 men out of smployment. The mine has besn stsadily working at a loss. Ths intsntion is stated to bs to raise additional capital to provids an enlargsd equipmsnt, in order that the mins may bs opsrated on a larger and more economical scale; J. Iiss, manager, Kalgurli.

BRITISH COLUMBIA.

ATLIN DISTRICT.

A company compossd of B. C. Warnick, P. Russ, S. Presssr, A. Buchanan and A. L. Solenburg of Pennsylvania, with H. W. Knight of Overbook, Or., are putting in a gold dredging plant at Atlin. The timbsrs for this drsdger wsrs obtained in Vancouvsr.

BOUNDARY DISTRICT.

The Boundary district has shippsd over 300,000 tons of ore this ysar, and the tonnage ssnt to the smeltsrs ths past month is the greatsst for sevsral months, being above 15,000 tons.

The Oro Denoro has joined the shipping list, ths ore going to the Sunsst smelter.

The Morning Glory shippsd thres cars of ore last wesk.

At Fairview, sevsnty msn ars employed in the Stsmwindsr mine, mill and cyanids works. The mill runs twsnty-five to thirty-fivs stamps, according to ors output.

Work has bsen startsd on the Trilby in Skylark camp, recsntly bonded by Gaunce & Wickwire of Grssnwood, McDonell brothsrs of Anaconda, and A. J. Coursen of Ssattle.

Work on the North Fork wagon road to Franklin camp is bsing rushed.

Eight furnacss ars in blast in the thrss Boundary smsltsrs, trsating 3000 tons of ore daily.

On the Quesn of Shsba claim at Dsadwood, G. Andrews is taking out fine looking ors. He is now down 25 feet in an incline on ore between lime and porphyry. L. A. Smith of Anaconda and G. Andrews own the property.

Tsn cars of ors havs bssn shipped from the dump of the Morrison mine, Deadwood. It is expsctsd that 1000 tons will be shipped.

Five more stamps will shortly bs addsd to ths mill of ths Waterloo mins, Camp McKinney.

It is expectsd thsre will be six furnacss in operation at the Granby smelter at Grand Forks by Ssptsmbsr 1, says H. N. Galer, assistant manager of the Granby Co.

At the Wakefield mine work is going ahead in both mins and mill. The concentrator is bsing remodeled under Superintendsnt G. King of Spokane, Wash., and whsn completed will handle 150 tons of ore psr day.

CARIBOO DISTRICT.

The Rambler-Cariboo mins, near McGuigan, will put in a compressor 2 miles from the mins, at which point by fluming two cresks an ample water supply can be obtainsd.

EAST KOOTENAY DISTRICT.

The Crow's Nsst Coal Co. has dscidsd to build its new offics in Fsrnie. On the last pay day at Crow's Nsst mines, a total of $130,021.05 was paid out at the thrss camps, an increase of $14,817.25 over any previous monthly payroll.

Ten of ths nsw coks ovens are ready for uss at Morrissy.

W. Blakemore of Nslson reports the iron propertiss, in which hs is interested, at the hsad of Crawford creek, in East Kootenay, carry a good grads of spscular iron. A 6-foot lsad has bssn opsnsd up and developmsnt work is being done. Ths group is 5 miles from Kootenay lake, with which connsction could be made by an aerial tramway. The coal fsilds of East Kootenay are also within easy rsach.

KAMLOOPS DISTRICT.

One hundrsd thousand dollars is to bs furnishsd by the Ashanti Lands, Ltd., an English concern, to install a plant to treat the ore of the Iron Mask at Kamloops.

Two new furnaces are being installed at Granby smelter, making a total battery of six. The connections with flue-dust chamber and blowers are to be made in a few days, when the plant will be closed down for a week.

LARDEAU DISTRICT.

The Eva stamp mill is nearing completion and the towers of the tram line are being erected.

The free gold vein on the Stockholm mine has been traced 1000 feet.

Messrs. Brock and Boyd of the Dominion Geological Survey are making a geological survey of the Lardeau district, of which a map will be issued by the department. The survey will take in the mineral belt from Fish crsek to Kootenay lake, including the country around Camborne, Trout lake and Ferguson.

ROSSLAND DISTRICT.

At the White Bear mins, nsar Rossland, the directors will expsnd $40,000 in buildings and plant, including a concentrator, and $10,000 to $15,000 in devslopment. A 20-drill compressor plant is undsr way. A 250 H. P. hoist has also bsen ordersd and the hsadworks to contain ths nsw hoist will bs shortly started.

J. Cronin, manager of the St. Eugsne Con. M. Co., operating at Moyis, B. C., will put in more power and add an engine to run the mills and will also put in zinc concsntrators.

At the Spitzse mins, nsar Rossland, the compressor and hoisting machinery are in opsration and underground work again under way. Two shifts ars carrying the main shaft down from the 100-foot station.

SLOCAN DISTRICT.

The minss in Slocan and Ainsworth districts are sither starting work or incrsasing thsir forcss, due to the lead bonus.

W. Hunter is working the Comstock. Ten inchss of ore has bsen expossd on the surface bstwssn No. 4 and No. 5 tunnsls.

The concentrator at the Wakefield is being remodelsd and will have a capacity of 150 tons psr day.

A strike is reportsd on the Black Hawk, of the Mansfield, at the head of the South Fork. Ths vsin is 6 fset wide, carrying a 10 to 14-inch paystreak.

The first shipment of three cars of zinc ore from the Lucky Jim, under ths manags msnt of Mr. Jonss, has bsen mads. This is one of the sarliest discovsrsd Slocan propsrtiss.

The iron deposits at the hsad of Crawford crssk, owned by B. White and J. Dsvlin, are to be worksd, as ths bonus granted on iron and steel by the Dominion governmsnt will enable thsm to work at a profit. The ore is spscular iron.

Managsr J. F. Collom of the Arlington mins at Slocan lake has made application to ths gold commissionsr for 400 inches of watsr to bs taksn from Springer crssk, this being preliminary to the sstablishmsnt of a mill for ths trsatment of Arlington ores.

At the Wakefisld mine ths concsntrator is bsing rsmodeled undsr ths supsrvision of G. King of Spokane.

Ths Rossland World says the Northwsstsrn has its stamp mill ersctsd and the Oyster-Critsrion and Eva are sach building 10-stamp mills.

COREA.

American msthods are said to have revolutionizsd the mining industry in Corsa. The Oriental M. Co, at Wunssn in northsrn Corea, nsar the Manchurian bordsr, 300 miles north of Chemulpo, havs bsen putting in an extended mining and milling plant. Americans ars said to have the best concessions in ths kingdom, and havs dons more work than any othsr foreign country in dsvsloping the minsral rssourcss of Corea. J. T. Forth of San Francisco, Cal., has installsd for ths Orisntal Co. one 40-stamp and ons 80-stamp mill, ons of these at Mayburg mine and ths other at Taraco. The English will start up a 30-stamp mill on their concssion next wssk.

KLONDIKE.

O. F. Brenner, manager of the Klondike-Dstroit Co., opsrating the Williams concession on Hunker cresk, has two stsam shovels on the road to Dawson, and intends to bring ssvsn or eight if the two first prove a suocsss. G. L. Taylor, the Indian river and Bonanza opsrator, has installsd a stsam shovsl.

The Yukon Council has decided to allow the minsrs a prior lien on 50% of ths sntire output of the Klondike mines. A supplier of wood is given equal right with a laborsr on the mins proper in ths prior lien on 50% of the output. A olause to the effect that labor may havs a lien on 50% of the product, unless an agrssment is signsd to the contrary, was stricken out. A laborer has ths right to a lisn on all the product of the mine when there are no prior mortgages or other prior incumbrancss, but up to 50% of the product he has priority over all manner of incumbrances.

MEXICO.

CHIHUAHUA.

J. Follensby and W. Kraft have bought the Nueva Chihuahua mine, near Chihuahua, for $50,000, Mexican, cash. The property comprises forty-four pertenencias.

DURANGO.

(Special Correspondence).—Regular operations continue in the mines and the smelter of the Fernando M. Co., in the San Fernando mountains near San Fernando. In the smelter are three calciners (two reverberatories and one mechanical—the column and arms of which are water-cooled instead of air-cooled) and two re-

verberatory smelting furnaces. The principal values in the ore are in gold, with copper and silver. After concentration, the sulphides are calcined and smelted up to 50% to 55% matte, which carries 30 to 35 ounces gold and 200 to 300 ounces silver. In the mine the lowest workings are through No. 5 tunnel. Preparations are being made to sink from this level, for which an electric hoist is on the ground. Electric power is generated by turbines operating under a 20-foot head. H. H. Taft is manager.

San Fernando, July 19.

JALISCO.

The Las Moras M. Co., G. E. McCormick, president, has over 3000 feet of development on its property at Ameca. The ores are low-grade copper, great quantities being shown by development. It is the intention to put up a large concentrating plant.

The Jose Moreno mine, 2 miles south of Guanajuato, is reported sold for $325,000. R. Morrison is manager.

SONORA.

(Special Correspondence).—The Yaqui S. & R. Co.'s plant, situated in the foothills of the Sierra Madres, on the west bank of the Yaqui river, 80 miles east of Minas Prietas, was visited by a tornado on the evening of July 11, which did great damage to unfinished buildings and construction rigging. Part of the roof of the large silver refinery was destroyed. Cables parted in the riggings, relieving the main supports, and but for prompt action of the employes the damage would have been much greater. For many months the company have had freight wagons hauling hundreds of tons of machinery, material, merchandise and supplies from the railroad, 80 miles away. All of the season's supplies have arrived, also most of the machinery. The plant when running will have a blast furnace capacity of 125 metric tons daily, while the refinery will take care of the bullion products of 300 tons of ore. The plant is so arranged that the smelting capacity can be increased by adding more stacks. The plant is modern in every detail and especially designed to smelt, reconcentrate and refine the products of silver-lead and copper ores and their by-products. All furnaces of whatever character are steel water-jacketed and provided with blast. Even the furnaces for melting bullion have the brickwork inclosed within steel water jackets, to protect the operator from excessive heat. The smelting plant will be equipped with machine shop, electric light, two-story sampler and an ice plant. In addition to the regular brine freezing tank, the plant will be provided with a water tank containing refrigerating coils to maintain the temperature of the water at nearly the freezing point to supply the employes. As a result of establishing a large smelting and refining plant so far from the railway, in the heart of the extensive anthracite coal and natural coke fields of La Barranca and Pilares, and adjacent to many mines, aggregating great quantities of all kinds and characters of ores, and where graphite, clay, pure iron ores and limestone can be had in unlimited quantities, a great ore market can be built up. At the present time it costs on an average about $50 per ton, United States gold, for freight and treatment charges on ores shipped out of the country, but with an ore market established in the heart of the mineral belt the conditions will be changed in favor of the miner. The transportation expenses on the ores to market have, as a rule, retarded development work, with the exception of work on the bonanza mines, where the ore was high grade.

Toledo, Sonora, July 16.

The Gold Treasure mine, 9 miles southwest of Naco, in San Jose mountains, has been sold to the Arizona M. & D. Co. of Oklahoma City, O. T., which owns the Gladstone & Big Medicine property in Colorado. A 20-stamp mill will be put up. The mine is within 6 miles of the railroad and has an available supply of wood and water.

It is stated that the Nahuila group of San Javier is bonded for $65,000 gold, and the Belene of San Javier for $75,000. The former is the property of the Guterrez M. Co. and the latter of Flores Bros.

The Congress of the State has approved the executive contract with the Bufa M. & S. Co., for the establishment of a reduction plant in the Sahuaripa district.

C. F. Wren, of the Alsacia D. Co., is at the mines near Cananea making arrangements for development work. He says a smelter will be built. The mines are in the Ajo mountains, 35 miles southeast of Cananea, and carry silver, lead and copper.

At Toledo the boilers for the Yaqui S. & R. Co. have arrived. The making of fire brick has begun, says the Nogales Oasis.

The Sonora Dev. Co., E. S. W. Drought manager, at Nacozari, has its 10-stamp mill, 5 miles from that place, almost completed.

The new 40-stamp mill of the Zublate M. Co. is completed.

ZACATECAS.

The mines of the Asientos district, Aguascalientes, produce about 400 tons of ore per day, the value ranging from $30 to $55 per ton. One of the mines, the No Pensado, has yielded in two years, it is said, $250,000 net profit.

PERSONAL.

J. B. FARISH has returned to Denver, Colo., from Mexico.

F. L. BOSQUI is examining cyanide propositions in Okanogan county, Wash.

J. HUME is superintendent of the Crown Desp mine near Redding, Shasta county, Cal.

GEO. L. CARR is in charge of the Yellow Rosa mine, at Dorleska, Trinity county, Cal.

G. SNYDER is in charge of the Balaklala copper mine of Shasta county, Cal., vice W. W. Adams.

FORMER COV. PECK, of Wisconsin, is inspecting mining interests in the Pearl district, Idaho.

N. SANFORD is superintendent of the Ruby mine at Forest City, Cal., vice R. Evans, resigned.

D. M. GRAY of the Canyon City, Colo., smelter, is in Leadville, Colo., buying ore for his company.

H. M. STANLEY is superintendent of the Sierra mine near Groveland, Tuolumne county, Cal.

H. C. ERMANN of the Compromise M. Co. has returned to Hermosillo, Mexico, from Nogales, Ariz.

S. DAVIS of Redding, Cal., is superintendent of the Old Spanish G. M. Co., in Shasta county, Cal.

W. W. ADAMS has resigned as manager of the Balaklala copper mines at Kennett, Shasta county, Cal.

CHAS B. WORES has returned to Los Angeles, Cal., from an examination of Nevada mining property.

W. H. PLUMMER has returned to Spokane, Wash., from the Le Roy group, near Elk City, Idaho.

R. ADAMS is superintendent of the Quebec mine in the Blue Mountain district, Baker county, Or.

O. REUTER of Chicago, Ill., is in the Black Hills of South Dakota, investigating the mining industry.

H. FULTON is superintendent of the Pittsburg Tunnel M. Co in the Thunder Mountain district, Idaho.

GEO. S. NIXON, president of the Boston-Tonopah M. Co., of Tonopah, Nevada, is in the East on business.

J. BOYD of the Palmer Mountain Tunnel Co., near Loomis, Wash., is in New York on mining business.

H. W. TURNER, E. M., has returned to San Francisco, Cal., from inspection of mines in Trinity county, Cal.

C. W. PURINGTON, who has been examining properties near Lake City, Colo., has returned to Denver, Colo.

H. T. HENDRYX has returned to the Victor mine, near Sumpter, Or., from a business trip to Spokane, Wash.

W. J. HOWARD of New York is in the Blue Mountain district, Baker county, Or., to examine mining properties.

GEORGE C. GILL, president of the Shannon Copper Co., has left Clifton, Ariz., for his home at Holyoke, Mass.

R. C. LEGG, manager of the Uncle Sam mine, at Eureka, Tintic district, Utah, has returned to the mine from Wyoming.

C. M. COLEMAN is general manager of the Keystone placer mine on the San Miguel river, San Miguel county, Colo.

L. H. CARVER, E. M., of San Francisco, Cal., has returned from Plumas county, Cal., where he has been inspecting mines.

F. L. WOODBRIDGE, treasurer of the Opal mine, near Chesaw, Wash., has returned to Newark, Ohio, from the mines.

JOHN LAWLER, owner of the Hillside mine, in western Yavapai county, Arizona, has returned to Prescott from the mine.

HENRY A. SALZER AND A. PLATZ of La Crosse, Wisconsin, have left the Gold Coin M. Co.'s properties at Black Lake, Idaho.

GEO. E. LAWTON is superintendent of the Houghton Development Co., operating the Solomon Springs group, near Bisbee.

G. MAULESS, an ore buyer for the American S. & R. Co., has returned to El Paso, Texas, from an extended trip in Mexico.

W. J. DOOLY, manager of the Johnny mine in the Stateline district, Utah, has gone to Bishop, Cal., to examine mining property.

R. K. CAMERON of Chicago, representing the Allis-Chalmers Co., is investigating the Poplar Creek gold fields, above Kaslo, B. C.

MANAGER OLMSTEAD of the Stray Dog mines on the Colville reservation, near Colville, Wash., is in New York on mining business.

J. JEWELL is in charge of the Kansas City Gold Reef M. Co.'s properties on Monumental creek, in Thunder Mountain district, Idaho.

ROSS E. BROWNE, E. M., has returned to San Francisco, Cal., from Placer county, Cal., where he has been on professional business.

F. RAY, manager of the Dixie group of mines, near Sumpter, Or., is in San Francisco, Cal., for the purpose of buying milling machinery for the mines.

R. EVANS, formerly superintendent of the Ruby mine, near Forest City, Sierra county, Cal., is now superintendent of the Taper mine, Plumas county, Cal.

A. G. LARSON, E. M., of Rossland, B. C., has been engaged to examine the Homestake properties, south of Rossland, with a view to their further development.

B. GOODWIN, C. F. HUMPHREY, J. MEYERS AND C. CHRISTIANSEN, officers of the Murchie Con. M. Co., were in Nevada City, Cal., last week, inspecting the mine.

J. P. EVANS is in charge of the construction of the smelter at the Eva May mine, owned by the Montana Mineral Land D. Co., Basin, Jefferson county, Mont.

J. T. FORTH has returned from the mines of Corea to San Francisco, Cal. He has been in Corea the past three years installing machinery for the Oriental M. Co.

G. SNYDER, of Salt Lake City, Utah, is manager of the Balaklala copper mines of the Balaklala Con. C. Co., at Kennett, Shasta county, Cal., vice W. W. Adams resigned.

H. C. MORGAN of Cuba, N. Y., president of the Columbia Menona mines in the Savage Basin, near Telluride, Colo., and A. M. Wellman of Friendship, N. Y., are at Telluride.

C. H. SPINKS of Berkeley, Cal., has been appointed superintendent of the Mertell M. Co., which is installing a plant near Livermore, Cal., to develop magnesite deposits there.

G. W. MEYERS, representing the Chrome Steel Works of Brooklyn, has returned to San Francisco, Cal., from Calaveras county, and leaves for a trip East on business next week.

GEO. B. LEE, superintendent of the new smelter recently completed at Douglas, Ariz., by Phelps, Dodge & Co. of New York, is at Grand Forks, B. C., investigating smelting methods at Granby.

W. L. MCLAUGHLIN is general manager, E. Marion superintendent of mines, C. C. Griggs superintendent of mill, and J. Hartgering master mechanic, of the Horseshoe M. Co. of Deadwood, S. D.

H. H. ANDREWS is to have charge of the construction work for the Oregon Electric P. Co., erecting the power plant on Eagle creek, east of Baker City, Or. A. B. Frame is manager for this company.

A. S. DWIGHT, E. M., has returned to Cananea, Mexico, from Rio Tinto, Spain, where he went to investigate mining and metallurgical methods in vogue there. Mr. Dwight is metallurgist for the Green Copper Co. of Cananea.

C. H. WHITE, E. M., instructor in mining and metallurgy at Harvard University, Cambridge, Mass., is conducting the geology class through the principal camps of Colorado. They will remain in Colorado until August 8, when they will return to Denver and thence East.

Commercial Paragraphs.

THE California office of the Colorado Iron Works Co., Denver, Colo., is 510–511 O. T. Johnson Bldg., corner Broadway and Fourth Sts., Los Angeles, Cal.

Catalogues Received.

"Assayers' and Chemists' Supplies" is the title of a 312-page catalogue 7x10 inches, from the Denver Fire Clay Co. of Denver, Colo., the ninth edition, with new features, classified, illustrated and accompanied by detailed explanation. Anything and everything used by the assayer or chemist is designed to be duly represented, the book being a finely printed compendium of information on many points of interest to any one connected with mining or metallurgy. Part I is devoted to illustrated description of chemists' and assayers' laboratory supplies; Part II to special chemical apparatus for analytical work; Part III, outfits for assayers and prospectors, school sets of chemical apparatus, collections of minerals, models and charts, scientific books; Part IV, fire brick, tile and fire clay material; Part V, chemicals and pure reagents; Part VI, physical apparatus. There is, besides, considerable general information.

Obituary.

DR. WILBUR CLINTON KNIGHT, professor of geology and mining engineering in the University of Wyoming, and curator of the State Museum, died July 29th, of peritonitis, at Laramie, Wyo. He was born at Rochelle, Ill., December 13, 1858, and was graduated from the University of Nebraska.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR WEEK ENDING JULY 21, 1903.

734,212.—METAL SIGN—Ayers & Coffee, Modesto, Cal.

733,936.—TENSION DEVICE—J. Barrett, Tombstone, Ariz.

734,327.—SULPHUR BURNER.—H. Blumenberg, Jr., Daggett, Cal.

733,940.—VEHICLE SPRING—F. Bosch, Crescent City, Cal.

734,039.—BOTTLE—L. Brand, Los Angeles, Cal.

734,400—CASH DRAWER—H. H. Cheshorough, Seattle, Wash.

734,408.—WRENCH—H. G. Dunston, Santa Monica, Cal.

734,056.—RAILWAY RAIL JOINT—J. W. Gay, Sodaville, Or.

734 342—NAPKIN HOLDER—L. R. Le Lande, S. F.

734,076—PIANO TRUCK—A. Loeh, Portland, Or

733,983.—CAN BODY MACHINE—A. Lotz, S F.

734,237—GAS ENGINE—J. D. McFarland, Jr., S. F

734,238—DEPURATOR—A. W. Ottignon, Seattle Wash.

733,996.—WINDOW SHADE—M. E. Reilly, Tacoma, Wash.

733,999.—PLOW—Richards & Gitman, Tacoma, Wash.

734,243.—FLAT IRON STAND—Mary Schuhbert, Los Angeles, Cal.

734,284.—FRUIT BRUSHER—F. Stehler, Riverside, Cal.

734,145—PRESSURE APPARATUS—F. Swinney, Tucson, Ariz.

734,021.—CAR—Warner & Gilman, Tacoma, Wash.

734,110—LUMBER DRIER—G. X. Wendling S. F.

734,385.—WATER GATE—L. Winans, Hood River, Or.

Notice of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

GAS ENGINES.—No. 734,237. July 21, 1903. J. D. McFarland, Jr., San Francisco, Cal. One-half assigned to John Bruckman, of same place. This invention relates to improvements in explosive engines in which the cylinders are mounted radially with relation to an axis and in which their piston rods are connected to a shaft eccentric to this axis. One object of the invention is to obviate the leakage of gas and loss of power usual in the engines in which the inlet and exhaust valves are located contiguous to the crank shaft and wherein the admission and exhaust take place at the inner end of the cylinders. Another object is to confine the attachment of the piston rods to the crank shaft within the narrowest possible limits and to provide for take up when these bearing parts have become worn. These improvements are applicable either to an oscillating or revolving cylinder engine.

METAL SIGNS.—No. 734,212. July 21, 1903. E. L. Ayers and Wm. F. Coffee, of Modesto, Cal. Ayers assigned interest to Coffee. The object of this invention is to provide an indestructible sign suited particularly for use in indicating localities, directions and distances along highways. A further object is to provide a form which will hold a plurality of sets of directions indicating as many different places, distances, etc., and which will admit of one set or any letter or part thereof being removed or replaced at any time without having to dismantle the entire sign. A sign board of this character is not liable to injury or defacement by vandals and is practically indestructible.

Latest Market Reports.

SAN FRANCISCO, July 31, 1903.

METALS.

SILVER.—Per oz., Troy: London, 25 3/8d (standard ounce, 925 fine); New York, bar silver, 54½c, refined (1000 fine); San Francisco, 54½c; Mexican dollars, 42½c San Francisco, 42½c New York.

Silver shows no appreciable change since last week, though somewhat higher during the week than the above quotation.

COPPER. — New York: Standard, $13.25; Lake, 1 to 3 casks, $13.00@13.25; Electrolytic, 1 to 3 casks, $13.62½@13.75; Casting, 1 to 3 casks, $12.75; San Francisco: $13.00. Mill copper plates, $17.00; bars, 18@24c. London: £57 7s spot per ton.

Copper shows a still further, though slight, decline. There is no new or unusual feature in the copper market.

Following are the figures of the German consumption of foreign copper for the months January-May, 1903, compared with the same period of 1902 and 1901, in tons:

	1903.	1902.	1901.
Imports	36,223	33,971	27,344
Exports	4,739	3,748	3,783
Consumption	31,484	30,223	23,561

LEAD.—New York, $4.25; Salt Lake City, $3.50; St. Louis, $4.00; San Francisco $4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 5½, sheet 6, bar 5½c; pig, $4.75. London: £11 5s per long ton=2.75c per lb.

SPELTER. — New York, $5.87½; St. Louis, $4.85; London, £20 2s 6d per ton; San Francisco, ton lots, 6½c; 100-lb lots, 7c.

ANTIMONY.—New York, Cookson's, 9½c; Hallett's, 8½c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

TIN.—New York, pig, $27.25@27.50; San Francisco, ton lots, 29½c; 500 lbs., 30c; 200 lbs., 30½c; less, 31c; bar tin, ℔ lb, 32½c @35c. London, £125 5s spot.

PLATINUM.—San Francisco, crude, $18.00 ℔ oz.; New York, ingot, $19.00 per Troy oz Platinum ware, 75@80c per gram.

QUICKSILVER.—New York, $44.50@46.00; large lots; London, £8 15s; San Francisco, local, $44.50 ℔ flask of 76½ lbs.; Denver, $49.50. Export, $43.50.

BABBITT METAL.— San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 34c.

SOLDER. — Half-and-half, 100-lb. lots 19½c; San Francisco, Plumbers', 100-lb lots, 16c.

NICKEL.—New York, 50@60c ℔ lb.; ton lots, 45@48c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, $19.50 @19.85; gray forge, $18 60; San Francisco, bar, 3c ℔ lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $28.00@29.00; open hearth billets, $29 00; San Francisco, bar, 7c to 12c per lb.

LUMBER.—(Retail): Pine, ordinary sizes, $20.00@22 00; extra sizes higher; redwood, $22.00@23.00; lath, 4 feet, $4.25 @4.50; pickets, $19.50; shingles, $2.35 for No. 1 and $2.00 for No. 2; shakes, $13.50 for split and $14.50 for sawed; rustic, $26.00 @32.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, $3.25; Cut, $3.35; 10d to 16d, Wire, $3.35; Cut, $3.35; 8d, Wire, $3.40; Cut, $3.40; 6d and 7d, Wire, $3.50; Cut, $3.50; 4d and 5d, Wire, $3 60; Cut, $3.60; 3d, Wire, $3.75; Cut, $3.75; 2d, Wire, $4.00; Cut, $4.00. Special rates for carload lots.

LIME.—Santa Cruz, $2.25; Roche Harbor, $2.25 per bbl.

CEMENT. — Germania, $2.50 @ 2.75; Hewmoor, $2.90; Trowell, $2.90; Portland, $2.50@2.75 per bbl.

GENERAL SUPPLIES.

POWDER.—F. o. b. San Francisco: No 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10½c ℔ set; 14 oz., 40s., 9½c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 24@25c ℔ lb.; carloads, 23@24½c; in tins, 35c; soda ash, $2.00 ℔ 100 lbs.; hyposulphite of soda, 2½@2¾c ℔ lb.; caustic soda, in drums, 3@3½c ℔ lb; Cal. s. soda, bbls., $1.25@1.50 ℔ 100 lbs.; sks., $1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb tins; borax concentrated, 7@8c ℔ lb.; roll sulphur, 4@6c; powdered sulphur, 2@3c; flour sulphur, French, 2@3c; alum, $2.00@2.25; California refined, 2@2½c; sulphide of iron, 9c ℔ lb; copper sulphate, 5@7c; chloride of lime, spot, $2 50@2.75. sulphuric acid, in carboys, 66% B, 2½c ℔ lb.; nitric acid, in carboys, 8c ℔ lb.

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6c; less than 500 lbs., per lb., 6½c; in 25-lb. tin pails, ½c per lb. above keg price; in 1 and 5 lb. tin cans, 100 lbs. per case, ½c per lb. above keg price. Dry Lead—In bbls., 1 ton and over, 6c; do. in kegs, 6½c.

RED LEAD.—500 lbs. and over at one purchase, per lb., 6c; less than 500 lbs., 6½c.

LITHARGE.—Pure, in 25-lb. bags, 8 @9c per lb.

BONE ASH.—Extra No. 1, 5@6c per lb. No. 1, 4@5c.

BORAX.—Concentrated, 7@9c per lb powdered, 9@12c; fused, 25@30c.

BORAX.—Crystal, 7c; calcined, 25c.

MANGANESE.—Pure, ℔ lb., 60c.

SODIUM.—Metal, ℔ lb., $1.00.

MOLYBDENUM.—$2 per lb.

CHROMIUM.—(90% and over) per lb., $1.00.

BISMUTH.—Subnitrate, per lb., $1.60.

MERCURY.—Bichloride, ℔ lb., 90c.

PHOSPHORUS. — (American) ℔ lb., 75c.

SILVER.—Chloride, ℔ oz., 90c@$1.00; nitrate, 55c.

ALUMINUM.—No. 1, 99%, small lots, 37c ℔ lb.; 100 lbs., 35c; 1000 lbs., 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

URANIUM.—Oxide, ℔ lb., $3.50.

ZINC.—Metallic, chemically pure, ℔ lb, 50c; dust, ℔ lb., 10c; sulphate, ℔ lb., .04c.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

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ASSAYER AND CYANIDE MILLMAN DESIRES position. References. Address "Assayer," care of Mining and Scientific Press.

CHEMIST AND ASSAYER DESIRES POSITION in mine or refinery. No objection to foreign countries. Address V.J.H., this office.

EXPERT DIAMOND DRILL FOREMAN AND Setter of twenty years' experience in various parts of the world. At present employed, but desires change and a permanent position in the West. Can bring one or two operators as desired. Address "Diamond," this office.

FIRST-CLASS MINING AND LAND SURveyor, Draughtsman, etc., desires position. Address H. W. K., Box 74, Long Beach, Wash.

MINE SUPERINTENDENT WANTS POSITION with a substantial company that has a mill on property. A qualified mining engineer who can run a mine or mill, cyanide plant, assaying and surveying. Address "Mining," this office.

MINING ENGINEER AND METALLURGIST, at present general manager of a large mining concern in Mexico, desires to change his position. Would need four months' notice. Address F.B.A.S., care of this office.

WANTED — POSITION BY EXPERIENCED Millman; 18 years' experience in operating jigs, Frue vanners and Wilfley tables. Best references furnished. Address F. L., care of this office.

TO COPPER MEN.

An experienced copper metallurgist would arrange to change from present engagement upon suitable representations

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In replying please give as fully as consistent details of location, salary, proposed terms of contract, etc., which will be treated as strictly confidential.

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References exchanged. Address "R", this office.

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FOR SALE--Established Custom Assay Office in Yreka, County Seat of Siskiyou.

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BOX 309, TONOPAH, NEVADA.

LILLOOET, FRASER RIVER & CARIBOO GOLD FIELDS, LIMITED.
In Liquidation.
List of Properties to Be Sold by Private Tender, Pursuant to the Directions of the Liquidators.

Trout Lake Mining Division.

ALPHA GROUP (better known as "Broadview Group"), comprising 9 Crown-granted mineral claims, or fractional claims, situated on Great Northern mountain, above Ferguson, B. C., together with two blocks of land, namely: Lot 1144, situated just west of Ferguson townsite, and lot 2419, situated about 2 miles northeasterly from Ferguson on the North Fork of Lardeau river, at the foot of Great Northern mountain.

LANDS situated on Galena Bay Upper Arrow Lake. Three blocks of land comprising, in all, about 650 acres.

Rossland Camp.

The "CITY OF SPOKANE" and "NORTH STAR" mineral claims, together with the buildings and equipment thereon.

Boundary District.

The "NETA" mineral claim, Crown-granted, situated in what is known as "Brown's Camp," and the "QUEEN OF SPADES" mineral claim, Crown-granted, situated in what is known as "Central Camp."

Illecillewaet Mining Division

The LANARK GROUP, comprising 15 Crown-granted mineral claims, or fractional claims, situated on the main line of the Canadian Pacific railway, near Illecillewaet, B. C.

Parties desiring to put in a tender for any one or more of the above mentioned properties should have their engineer on the ground, and examination made, without delay.

Further particulars and conditions of sale and forms of tender (which are to be sent in not later than August 15th, 1903,) may be obtained gratis of the Liquidators, College Hill Chambers, College Hill, London, E. C., and J. V. Armstrong, Revelstoke, British Columbia.

Dated June 15th, 1903. July 31.

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Whole No. 2246.—VOLUME LXXXVII. Number 6. SAN FRANCISCO, CAL., SATURDAY, AUGUST 8, 1903. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

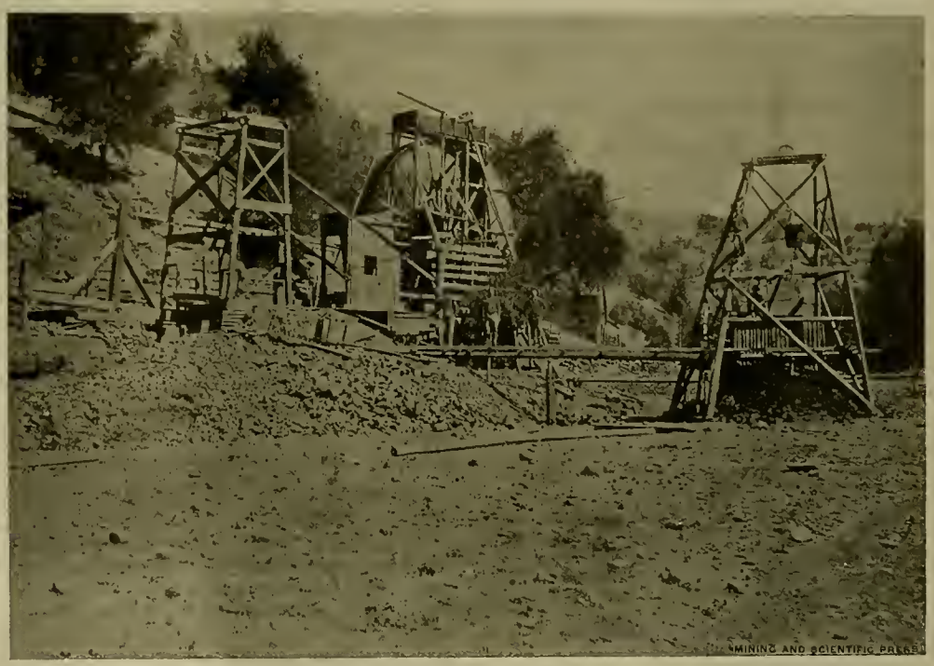
The Ingenious Prospector.

The average prospector is a man of original ideas, and often very good ones. If they do not always bear the stamp which characterizes the work of the trained engineer, the prospector's mechanical schemes usually are, at least, thoroughly practical and show the possession of a good fund of that very desirable capital, good sense. He is a man who can generally adapt himself to varied and often adverse circumstances and conditions. About the only thing that is "too much for him" when funds are low is a volume of water with which he cannot successfully contend with limited resources, but it is often a matter of surprise to see the amount of water he can take care of with makeshift arrangements. The "jackhead" pump is a favorite with him, and he can build one if needs be, provided he can secure the necessary materials and tools. If he cannot do this, he bails vigorously as long as he can make headway in sinking, but not infrequently he is obliged to give up the unequal contest by reason of lack of means to secure better machinery. He constructs his head frame of peeled round poles, if he cannot afford to buy sawed lumber. The structure may not be a "thing of beauty," but it is substantial and usually answers every requirement. Unable to buy boiler and engine, he builds a water wheel with his own hands and turns to his use and benefit the natural power of a neighboring stream or ditch. To the crank of the overshot wheel he attaches his "jackhead." The wheel may also be utilized to hoist rock from the shaft, or even to run a mill.

In the early days of California mining overshot wheels were to be seen throughout the mining region, and some of these were of great size—as large as 60 feet diameter—though usually 28 to 32 feet. These developed a greater or less amount of power, according to diameter and width of the breast. They are still in evidence in numerous isolated places, mining arrastras, pumps, mills and hoists.

For ventilation he employs all sorts of devices—home-made fans, water blasts and air sails, or drives an upraise to secure natural ventilation. He is "onto all the tricks of the trade" and knows how to apply them. The result is not always success—that is, financial success—but he makes headway, and no one can deny that he makes a mechanical success, and he does it with a minimum of capital other than practical ideas and willing, skillful hands.

The accompanying illustration shows clearly the equipment of a mine with a home-made outfit. The head frames are constructed of round, peeled pine poles. A little lumber has been used in building the ore bin, flume and wheel, but none has been wasted. The "direct-acting" jackhead may be seen at the left shaft, the rod near the top of the triangular structure (the bob) running back to the wheel crank. The water that runs the wheel is piped across the valley and is carried up to the top box through the pipe shown in the illustration. The shafts are provided with surface aprons to insure the safety of men below when the bucket is being dumped, and everything is arranged in workmanlike manner. The entire plant shows ingenuity and practical sense, and is a fair illustration of what may be done by a man having these with limited ready cash. This is only a single example of the ingenuity, perseverance and ability of the prospector to combat adverse conditions, and the mining industry owes much to him.



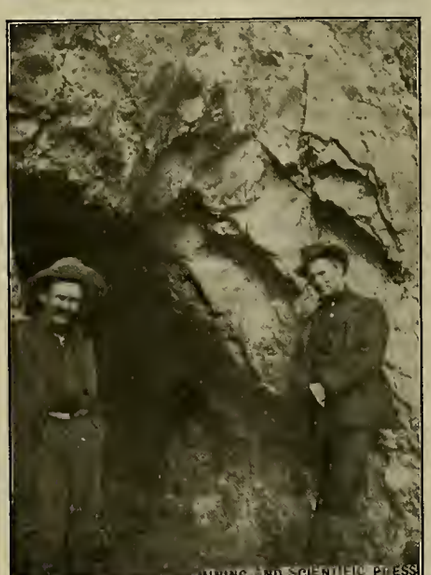
Typical Prospectors' Head Frames and Outfit.



Ten-Stamp Mill at La Cumbre, Packed in by Mules.



Upper Tunnels of Los Angeles Mine, Cebollitos, Mexico.



La Leona Vein at Rincon de Alisos, Chihuahua, Mexico.



Mining Town of La Cumbre; Waste Dump Clemencia Mine.

(See page 83.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION.

United States, Mexico and Canada.....$3 00
All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

BRANCH OFFICES:

NEW YORK CITY, 720 Park Row Bldg. BOSTON, 42 Worcester Square.
CHICAGO, 1115 Monadnock Block. DENVER, 606 Mack Block.

J. F. HALLORAN..... Publisher

San Francisco, August 8, 1903.

TABLE OF CONTENTS.

ILLUSTRATIONS: Page.
Typical Prospectors' Head Frames and Outfit....77
Ten-Stamp Mill at La Cumbre, Packed in by Mules....77
Upper Tunnels of Los Angeles Mine, Cebollitos, Mexico....77
La Leona Vein at Rincon de Alisos, Chihuahua, Mexico....77
Mining Town of La Cumbre; Waste Dump Clemencia Mine....77
Percentages of Copper, Silver, Iron, Sulphur, Etc....80
The Hambric Separator at Zella Slimes Plant....83
One of the Pieces of Experimental Apparatus....84
Locke Automatic Shut-off Valve....85
Mining and Metallurgical Patents....87

EDITORIAL:
The Ingenious Prospector....77
Result of Violence....78
Mine Sampling....78

MINING SUMMARY....88-89-90-91

LATEST MARKET REPORTS....92

MISCELLANEOUS:
Concentrates....79
Desulphurizing Slimes by Heap Roasting....80
Submarine Ore Mines....80
Relative Elimination of Impurities in Bessemerizing Copper Matte....80
Iron and Steel Imports....81
A Motor-Driven Mine Hoist....81
Some Observations on Alaska and the Northwest Territory....81
Chlorine Smelting, With Electrolysis....82
Spitzkasten and Sp'tzlutten....83
Direct Steam Ore Stamps....83
The Guadaloupe y Calvo District, Chihuahua, Mexico....83
Tangential Water Wheel Efficiencies....84
Locke Automatic Shut-off Valve....85
Real Values in Mine Management....85
Notes on the Metallurgy of Copper of Montana....86
Mining and Metallurgical Patents....87
Personal....92
Commercial Paragraphs....92
Books Received....92
Catalogues Received....92
New Patents....92

Result of Violence.

The miners who were ordered out of Idaho Springs, Colo., by a committee of citizens for alleged participation in the blowing up of the transformer house of the Sun and Moon mine, near that city, have appealed to Governor Peabody for military protection; but the Governor has replied that the expelled miners must seek redress in the courts of Clear Creek county, as he has no jurisdiction. A recent meeting of the "Citizens' Alliance" of Idaho Springs has fully endorsed the action of the "Citizens' Protective League" in driving out the union miners who are accused of having been implicated in the destruction of the mining plant of the Sun and Moon Mining Company. The men composing the Alliance are the leading merchants and citizens of that town, as well as mining operators and owners, and they have thus plainly evidenced their disapproval of any act of violence on the part of the striking Miners' Union in its attempt to gain a desired point in its strike. While it is unlikely that were a vote to be taken by any miners' union on a proposition to injure any mine officer, or to destroy any mine plant, such action would be favored by the union men, yet they are collectively held morally responsible for the independent acts of the lawless members of their organization, and if they care for and desire to win the sympathy and moral support of the community in which they live, they must watch vigilantly to prevent any such demonstration as that at Idaho Springs, for such acts are obnoxious not only to the fair-minded people of the section where these atrocities are committed, but to the entire civilized world.

THE attempts made by novices to write mining reports are often amusing. In a report recently issued for a gold mine, the writer artlessly informs stockholders, actual and prospective—particularly the latter—that forty-five tons are being crushed daily, and the mill is described as having one automatic feeder, with two rock breakers. In another paragraph is the statement that a platform is being built, covered with 2-inch plank, on which it is intended to set the hoist and the two rock breakers. These, and similarly absurd statements, clearly show that the management and direction of the business of the mine is in the hands of inexperienced men.

Mine Sampling.

On page 80 of the issue of July 18 of a New York contemporary appears a communication on the subject of mine sampling from an engineer, resident in Washington, D. C., in which occurs the following:

"The valuation of a block of ore being based on assay results, it is well to consider how these results should be used. The common method is to multiply each assay value by the width of ore at the point where the sample was taken, adding up the resulting "foot dollars" and striking an average to be used with the tonnage of each block to give the total value. In still more accurate work two assays are made of each sample, and these are averaged. Another way, and one which has given very reliable results, is to average the values of two adjacent samples and multiply the result of the average of the two widths of the vein; the product is to be used as the value of that particular part of the ore block; the result is quite different from that obtained by the first method, as will be seen below:

Width.....	2	(6)	10	(6.5)	3	(2)	1	(5.5)	10
Value.....	$20	($11)	$2	($10)	$18	($14)	10	($20)	$30

The average is $85, using the first method, and $67.25 using the last."

An analysis of the above shows serious mistakes in statements and deductions. The so-called "averages" are not averages at all. Then, too, it would be a mathematical impossibility to find an average value of $85, or of $67.25, when the highest ore value in the samples taken was but $30. The method of averaging two adjoining values and dividing by the average of two adjoining widths does not produce the same result as when they are taken separately—note figures above in parenthesis. This discrepancy is pointed out by the author of the Washington article, yet it is referred to in his article as "another way, and one which has given reliable results," which is absurd.

It will be observed that the samples given in the article referred to have been averaged by multiplying the several values by their respective widths, and then dividing by the number of samples taken instead of the total number of feet sampled, which accounts for the very high "average."

If mines were sold on samples taken and averaged in this manner, it would not be surprising to find such a mine fall short of the anticipations of the buyers in the mill run, or by smelter returns.

Seldom does this journal notice such things, for we are ordinarily too busily engaged in a more or less successful effort to keep errors out of our own columns to devote any time to the mistakes of others, but when a case so ridiculously misleading as the one above cited comes to notice, it seems necessary to call attention to so flagrant an error, though it is scarcely likely that practical men would fall into a similarly foolish assumption. Common sense is an attribute that the practical miner is supposed to have, but it is equally essential in other walks of life.

It may be appropriate to append a few suggestions on mine sampling and averaging of values.

No branch of the work of the mining engineer requires more careful consideration, painstaking labor and systematic application of method than the sampling of a mine. The man to whose lot the investigation of a mine may fall owes much to his employer, and a great deal to himself, and he cannot afford to take anything "for granted;" but he must prove everything, and prove it beyond a doubt. Whether his commission is to examine for buyer or seller, the proposition is essentially the same. His business is to investigate for facts, and, having secured the facts, to present them to his client in a form devoid of confusing terms—destitute of mathematical jugglery and free from a "system of averages" which do not average. Moreover, the truth—the whole truth—must be told, not partially, but wholly. If good ore exists, the engineer should so state, giving its value, location and amount, as far as is rationally possible to measure and estimate. If there be poor ore, it should be treated with equal fairness. Nothing which has any bearing on the economic operation of the mine should be omitted from the report.

Mines are of such various character that it is impossible to sample all mines in the same manner. The ideal mine to sample by hand is that one which has a vein of moderate width, where the values are distributed with approximate evenness, the ore neither so soft as to crumble nor so hard as to fly like flint under a blow from the hammer; where channels of even depth and width may be cut with a pick, and where all exposed faces are within easy reach. Such is the ideal, but they are rare. The various conditions met in underground workings must be dealt with according to their kind. It is never safe to assume that an old exposure fairly represents the ore immediately back of it, for in a dry mine the exposed face is usually covered with dust, and in a wet one mud is usually plastered all over the back and sides of drifts or other workings, in depth from a film to a half inch or more. This must affect the sample to a greater or less extent, dependent somewhat upon its relation to the size of the sample. In any case the face should be cleaned, either by cutting a preliminary channel or by blasting off the exposure by a series of "pop shots." It is not often necessary to "pop shoot" a face for samples, but a clean face may be obtained in this manner.

A canvas of liberal dimensions is indispensable in hand mine sampling, as it catches all of the sample, if properly placed. When the ore is wet and sticky as it falls upon the canvas, all of the ore broken down for a sample should be placed in a sack and taken outside the mine for reducing the pieces to smaller size and "quartering down." After transferring the sample from the canvas to the sack the canvas should be cleaned as thoroughly as possible by vigorously shaking, or, if necessary, by turning a stream of water upon it. Several sheets of canvas may be necessary. These cost but a few dollars, very much less than the wine that is an accompaniment of many mining deals. Some engineers provide tin boxes in which to place samples. When a large sum of money is involved in the possible transfer of the property a steel safe would probably be better. As hand samples carefully taken seldom weigh less than five pounds and often fifty pounds each, it is obviously inconvenient to provide suitable metallic boxes for each large sample, but as the several samples are secured, sacked and tied up, they should be placed in the care of a responsible man in the employ of the engineer.

When the samples have been taken and the assays made on them there still remains the responsible task of estimating the value of the "ore in sight," and of the "probable ore" and "possible ore." The meaning and application of these several terms have been so frequently discussed herein before, that it seems unnecessary to say more about them here.

Each sample should be given a number (a running number preferred), to avoid confusion, and each sample number should be accompanied by the width of vein or streak sampled, for without these the work of the sampler is of no practical value. The simplest way to arrive at average and aggregate values is to assume that each foot in width sampled represents one ton of ore, as the ton is the basis or unit of all calculations of cost of mining, transportation and milling. By multiplying the width in feet by the assay value of the sample the product may be assumed to represent the value of as many tons of ore as there were feet sampled at that place. Where several sample values are to be averaged it may be done by multiplying the several widths in feet by their respective assay values, adding these several products together and dividing by the number of feet (tons). The following may be taken as an example:

Number.....	101	102	103	104	105
Width.....	2′	1.5′	6′	3′	4′
Value.....	$10	$20	$5	$12	$8

Assuming that No. 101 represents 2 feet of $10 ore we have 2 tons of $10 ore = $20.

No. 102 represents 1½ feet of $20 ore, or 1½ ton at $20 = $30; No. 103, 6 tons at $5 = $30; No. 104, 3 tons at $12 = $36; No. 105, 4 tons at $8 = $32.

Averaging the above there is found to be a total width sampled of 16.5 feet, representing 16.5 tons of ore containing a total value of $148, or an average of $8.97 per ton.

CONCENTRATES.

WHERE corundum is found mixed with impurities, the mineral may be separated from its gangue and accompanying minerals by careful concentration.

CALORIE is the name given the unit of heat measurement. In chemistry the heat unit is the quantity of heat required to raise a gram of water from 0° C. (freezing point F.) to 1° C.

THE mineral sample from Borate, San Bernardino county, Cal., is silicate of alumina and magnesia, with some sodium chloride; no niter or borax. The rock is essentially clay, with a little common salt.

A "GLORY HOLE" is the name given by miners to an open cut where the ore broken passes downward through an upraise to workings below, and from there sent out of the mine either through a tunnel or shaft.

CALIFORNIA MINES are almost entirely at an altitude of less than 7000 feet; Colorado mines are almost entirely above that altitude, mostly between 9000 and 12,000 feet. The Mt. Lincoln mine, Colorado, is over 14,000 feet above the sea.

AS many machine drills may be employed in sinking a shaft as can be conveniently used, but in three-compartment shafts of liberal dimensions not more than four machines can be used to advantage—two bars carrying two machines each.

THE term agglomerate is employed to designate volcanic breccia, as distinguished from other breccias, and from conglomerates, the latter being made up of water worn fragments, while the former (breccias) are composed of angular fragments.

"HALOGEN" is a chemical term. Fluorine, bromine, chlorine and iodine are known as the halogens, or salt producers, as they each form with metals compounds analogous to sea salt (sodium chloride). Each of them unites with hydrogen to form strong acids.

ALL old tailings dumps should be screened before attempting their treatment by cyanide or any other process, as by this means all lumps may be broken up and all foreign materials removed, such as sticks, rocks, roots, leaves, etc., which would have a tendency to clog pipes and valves.

AMPHIBOLE is a general term for rocks of the hornblende type. It is often used as a prefix, as amphibole-gneiss, amphibole-gabbro, etc. Amphibolite-schist refers more particularly to those rocks in which the hornblende (or augite) has been mostly or entirely altered to chloritic scales and fibers.

MANY devices have been tried to take the place of cams of the ordinary type for the purpose of lifting mill stamps. These comprise a variety of ideas—levers, cogs, etc.; but as yet none of these has outlived the period of test, except the direct steam stamp. Possibly some device superior to the cam may be discovered, but it has not yet made its appearance.

ARSENIC occurs in the free state in abundance in some localities, but it is more commonly combined with other substances, as sulphur, iron, etc. Native arsenic has a grayish-white metallic luster, density or gravity of 5.7, is crystalline and very brittle; volatilizes when heated without previous fusion, but is fusible at a dull red heat, under pressure in a sealed tube.

THE cause of the markings resembling the appearance of galvanized iron noticed on the surface of platinum after it has been long exposed to a high temperature is ascribed by some to the action of the carbon from the flame, and by others to the action of acetylene. Experiments go far toward confirming the idea that such changed appearance is due to recrystallization of the metal.

THE principal objection to scale of ordinary thickness is that it may cause the metal of the boiler to become so highly heated that there is danger of bulging or burning or leakage about the joints and tube ends, with resultant corrosion. As to efficiency it seems likely that soot on the fire surfaces may often be more hurtful than scale of ordinary thickness. Soot is a good non-conductor, and because of this it is often used for clothing steam pipes.

THE statute prohibiting contracts in restraint of trade does not refer to that kind of a restraint of interstate commerce which may arise, from reasonable and legal conditions imposed upon the license of a patent by the owner thereof; since a patent is a monopoly recognized by the Constitution, and the owner of a patent has the right to sell it or to keep it, to license others to sell or manufacture it, and he is not bound to use his discovery himself nor to permit others to use it.

IN the Centigrade thermometer 0° is the freezing point, and 100° Centigrade is the boiling point of water, at the sea level. In the Fahrenheit thermometer 32° above 0° is the freezing temperature of water at sea level and 212° above 0° is the boiling point of water. To reduce Centigrade reading to Fahrenheit, divide the Centigrade reading by 5, multiply the quotient by 9, and add 32. Thus 40° Centigrade = $40 \div 5 \times 9 + 32 = 104°$ Fahrenheit.

FOR a fire test of oil, the oil is placed in a small iron dish, with a thermometer bulb immersed in it, and held in an upright position. The heat is applied under the dish by means of a Bunsen burner, until it reaches the point at which the operator expects it to vaporize. Then a lighted taper is passed around the edge of the bowl, and if the vapor that rises from the heated oil flashes, the temperature recorded on the thermometer is the flash point. One can continue to apply the heat until the oil takes fire and then note the temperature again. This is the fire test.

FOUR plumb lines are necessary in lining up a vertical shaft. Two center lines cannot be depended upon to give correct results. The sets may be true at the centers, but "swing in or out" at the ends. It is a good plan to make a shallow cut with a saw in each wall plate at a stated distance from the inside corner or from some other place, and swing the lines from these points, bringing each set below exactly to the line. Where lines are hung directly from the corners, they are likely to touch, and, not swinging freely, lead to incorrect results, which must later be corrected, with loss of time, which means expense.

ELECTRICALLY driven air compressors are employed to run not only machine drills, but also hoisting engines, pumps above and under ground, and to operate other machines. It has been suggested that compressed air may be reheated underground by the use of steam. A small, well covered steam pipe has been found efficient for this purpose. The steam pipe is carried through the reheating receiver by a series of return pipes. As the steam pipe is small, no inconvenience by reason of increased heat in the mine results, while the air can be heated to within a few degrees of the temperature of the steam. The steam may be exhausted into a sump.

THE pipes in the water circulating system of gasoline engines used on automobiles often clog up and refuse to work. This is often caused by using water containing vegetable matter, which deposits a slime. The pipes may be cleared by filling the tank with a strong, hot solution of either Babbitt's potash or common soda. Run the engine for a few minutes to allow the solution to do its work, then draw off the solution and refill with water. Again run the engine until the water becomes hot and then draw off. This should be done every month to keep the pipes clean under the conditions stated.

THE noise caused by the telephone wire fastened to the building can be prevented by the use of a damper. This may be made as a rubber cylinder about 4 inches long, ½ inch diameter and split lengthwise. It is to be placed on the conductor and bound spirally with fine wire to keep it in place. The rubber damper containing the conductor can be placed upon an insulator, or the wire can be tied in the usual way to the insulator, and the damper may be attached by a wire around it to a damper on a neighboring conductor, or to the fixture, chimney or pole. The idea is to prevent the mechanical communication of the vibration of the conductor to the building.

URANINITE, or pitch blende ($U_3 O_8$), is one of the principal sources of uranium, the other being carnotite. It is grayish, greenish, brownish, velvet black; streak brownish black, grayish, olive green, somewhat shiny. It is usually massive and botryoidal in form, but also occurs in grains. The structure is sometimes columnar or curved lamellar; brittle; hardness 5.5; gravity 9 to 9.7 in the crystals, but 6.4 and upwards in the earthy varieties; soluble in nitric and sulphuric acids, though the solubility differs in different varieties, being greater in those kinds containing the rare earths; non-magnetic. It occurs as a primary constituent of some granites, or in veins associated with ores of silver, lead, copper, etc.

THE large production of zinc has grown up in the United States within the past twenty years. In the earlier days of the lead mines of Missouri zinc was an unwelcome mineral. It interfered with the disposal of the lead ores when the two were mixed, and the galena had to be sorted out clean. Even the clear zinc ores were unsalable in the United States, as there were few furnaces in this country where zinc ores could be treated. The zinc ores produced in those days were stacked up on the dumps. It was not worth much over $10 per ton. The Joplin district, in southwest Missouri, is the largest producer of zinc in the United States at present. Colorado is also outputting a large amount of zinc ore, particularly since the advent of the electro-magnetic separator.

THE cost of open-cut work at mines varies greatly in different localities, and may have a wide range in the same mine, depending upon many factors. The essentials for cheap mining by open cuts are large masses of clean ore, not too hard, but not dangerously soft and having a tendency to cave; mill holes in the lower portion of the cut through which the broken rock passes away by gravity; good judgment, born of experience in placing and charging drill holes; experienced and energetic workmen, and good weather. With these mining should be cheaply done. Some open-cut work is expensive for the reason that all the rock broken is shovelled into cars. This is often necessary in beginning operations in a cut, but it does not pay to shovel rock that will run to a chute by gravity; to this end a chute must first be provided.

WHEN water is boiled under a pressure of five atmospheres, or seventy-five pounds pressure, the sensible heat is 306° F., the boiling point at that pressure; but the latent heat has decreased by the same number of heat units that the boiling point increased, so the total is the same in all cases. In the first case we have 212° minus 32° plus 966°, or 1146°, and in the second case, 306° minus 32° plus 872° equal the same, 1146 heat units. In evaporating a pound of water under atmospheric pressure, the temperature remained at 212°, but the volume was increased to 1644 times that of the water in the second case; evaporating under seventy-five pounds pressure, the temperature also remained the same—306° F.—but the volume is only 295 times that of the water it was evaporated from. This is one of the reasons it pays to run an automatic cut-off engine.

A MINER who desires to take a contract to sink a shaft may give a bond to accomplish the work at a stated price within a specified time, but such proceeding is unusual and is rarely required by the owner. A mechanic or architect can figure upon the construction of a building, as the amount of materials necessary is easily and arbitrarily arrived at, and the amount of labor requisite may also be estimated with comparative exactitude, for in such work the conditions are practically constant; but in shaft sinking conditions change or may change with each foot in depth. Rock changes from hard to soft, or vice versa. Water comes in unexpectedly; blasts smash timbers, which must be replaced, and numerous unforeseen contingencies are constantly arising, which makes the giving of a bond for the performance of the work at stated price and within a given time an unbusinesslike proposition. The owner usually finds his safety in withholding a percentage of the price as the work advances until the contract is completed, and this has generally proven satisfactory to all concerned.

IN the case of Gartney vs. Gosling, the Supreme Court of Wyoming, 68 Pac. Rep., 1118, held that a "mining partnership can exist only where several parties cooperate in working the mining property, mere ownership as tenants in common not being sufficient. In a mining partnership pure and simple one partner has no implied authority to borrow money on the credit of the firm, but his implied powers only permit him to bind his co-partners by dealings on credit for the purpose of working the mine, where it appears to be necessary or usual in the management of the business. An agreement where certain parties furnish one of their number with a fixed amount of money, he to go to Alaska and prospect for a mine, and they during his absence to furnish his family with a stipulated monthly allowance for its maintenance, each of the parties to have a certain prescribed interest in whatever was found, could not be construed as binding the others for expenses incurred by the prospecting party for personal supplies after, or even before, the sum originally furnished had been exhausted. But, where a mining contract did not make parties to same liable for supplies furnished one of their number, yet a letter written to him by one of their number authorizing him to buy the supplies, could not have the effect to bind the other parties in the absence of evidence that they knew of or authorized its being written. Such letter would be admissible against the one who wrote it as to supplies bought from a party after such party had seen it, but not supplies bought before it was written."

PALLADIUM is usually found associated with the rare metals rhodium, osmium, ruthenium and iridium. It occurs usually associated with gold and has been found in the placer mines of the Cariboo district, B. C. Some gold ores of Brazil contain from 5% to 10% of metallic palladium, which is obtained by fusing it together with silver and dissolving the granular alloy thus obtained in hot nitric acid, when the gold only remains. By addition of a solution of sodium chloride, the silver is precipitated as chloride, which is removed by filtration. The palladium in the solution is then precipitated by means of mercury cyanide in the form of a yellowish-white, gelatinous substance—palladinous cyanide. This, on heating to fusion, becomes a spongy, metallic palladium. Palladium has the lowest melting point of any of the platinum group of minerals—about 1500° C. It resembles platinum in color and luster and steel in hardness. It is more malleable than platinum and is more readily welded. When polished, it has a steel-like whitish luster and does not tarnish. Tincture of iodine will blacken the surface of palladium, but not of platinum. The metal, on account of its resistance to oxidation under ordinary atmospheric conditions, is used in the manufacture of chronometers and fine watches and also to some extent in the construction of balance beams of fine assay scales. Palladium may be detected, when present, by mixing a solution of sodium thiosulphate with a small amount of ammonia and adding a drop of the solution of the ore supposed to contain palladium, so as to color the liquid pale lemon yellow. Boil and watch for changes in color from wine-brown to black. Diluted with water, it returns to the former color but remains clear.

Desulphurizing Slimes by Heap Roasting.*

Written by E. J. HORWOOD.

It is well known that owing to the intimate mixture of the constituents of our sulphide ore at Broken Hill, New South Wales, a great deal of crushing and grinding is required to detach the particles of galena from the zincblende and gangue of the ore, and in this operation a considerable amount of the material is converted into a slime which consists of minute, but well defined particles of all the constituents of the ore and combinations thereof, the relative proportions of which depend on the dual characteristics of hardness and abundance of the different constituents. An analysis of the slime shows the contents to be as follows:

Galena (PbS)	24.00
Blende (Zn S)	29.40
Pyrites ($Fe S_2$)	3.38
Ferric oxide ($Fe_2 O_3$)	4.17
Ferrous oxide (Fe O) contained in garnets	1.03
Oxide of manganese (Mn O) contained in rhodonite and garnets	6.66
Alumina ($Al_2 O_3$) contained in kaolin and garnets.	5.40
Lime (CaO) contained in garnets, etc	3.40
Silica ($Si O_2$)	22.98
Silver (Ag)	.06
	100.48

Galena, being the softest of these, is found to a arger extent in the slime than in the crude ore; it is also, for the same reason, in the finest state of subdivision, which latter condition is well illustrated by the fact that the last slime to settle in water is invariably much the richer in lead, while the percentages of the harder constituents, zincblende and gangue, show a corresponding reduction in quantity, by reason of their being generally in larger sized particles and consequently settling earlier.

The fairly complete liberation of each of the constituent minerals of the ore that takes place in sliming tends, of course, to help the production of a high-grade concentrate by the use of tables and vanners, and undoubtedly a fair recovery of lead is possible, even with existing machines, in the treatment of fine slimes; but, owing to the great reduction in the capacity of the machines, which takes place when it is attempted to carry the vanning of the finer slimes too far, and the consequently greatly increased area of the machines that would be necessary, the operation, sooner or later, becomes unprofitable.

The extent to which the vanner treatment of slimes should be carried is, of course, less in the case of those mines owning smelters than with those which have to depend on the sale of concentrates as their sole source of profit. In the case of the Proprietary Co., all slime produced in crushing is passed over the machines after due classification. A high recovery of lead in the form of concentrates is neither expected nor obtained, for reasons already explained; but the finest lead-bearing slimes are allowed to unite with the tailings, which are collected from groups of machines, and are then run into pointed boxes, where, with the aid of hydraulic classification, the fine rich slimes are washed out and carried to settling bins and tanks, where the water is stilled and allowed to deposit its slime, and pass over a wide overflow as clear water. The slime thus recovered amounts to over 1200 tons weekly, or about 11%, by weight, of the ore, and assays about 20% lead, 17% zinc and eighteen ounces silver, and represents, in lead value, about 11% of the original lead contents of the crude ore and rather more than that percentage in silver contents. These slimes are thus a by-product of the mills, and their production is unavoidable; but as they are not chargeable with the cost of milling, they are an asset of considerable value, more especially so since it has been demonstrated that they can be desulphurized sufficiently for smelting purposes by a simple operation, and, at the same time, converted into such a physical condition as renders the material well suited for smelting, owing to its ability to resist pressure in the furnaces and to its lumpy nature.

Proceeding now to the operations more closely connected with the subject of this paper, it is necessary to mention that the company has many thousands of tons of this material which the smelters have hitherto been unable to cope with, owing to the roasters being fully occupied with the more valuable concentrates. Moreover, the desulphurization of this class of material in mechanical roasters is objectionable for various reasons, namely, owing to the large amount of dust created with such fine material, resulting injuriously to the men employed, also on account of the reduction in the capacity of the roasters, and consequently increased working cost which accompanies the operation, owing to the lightness of the slime, especially when hot, as compared with concentrates, and the necessity of limiting the thickness of material on the bed of the roasters to a certain small maximum depth. Further, the desulphurization of the slimes is no more complete with the mechanical roasters than in the case of heap roasting, and the combined cost of mechanical roasting and briquetting being 3 shillings per ton in excess of the cost of heap roasting, this method possesses many advantages. These heaps are being dealt with, preparatory to roasting, by picking down the material in lumps of about 5 inches in thickness—a suitable size for heap roasting—while the fine dry smalls, unavoidably produced, are worked up in a pug mill with water, and dealt with in the same way as the wet slime produced from current work, and handled as follows:

The slime, as produced at the mills, is run from bins into railway trucks in a semi-fluid condition, and shortly after being tipped alongside one of the various sidings on the mine, is in a fit condition to be cut with shovels into rough bricks, which dry fairly quickly, and when required for roasting are easily reloaded into railway trucks. As each man can cut about twenty tons of brick per day, the cost is small. Various other methods of lumping the slime were tried, including trucking the semi-fluid material on movable trams, alongside which were set laths, about 9 inches apart, which enabled long slabs to be formed 9 inches wide and 5 inches thick, which were, after drying, picked up in suitable lumps and loaded on platform trucks, thence on railway trucks. Owing to the inferior roasting that takes place with bricks having flat sides, which are very liable to come into close contact in roasting, and to the high labor cost, this method was discontinued. Another method was to allow the slime to partially dry after being emptied from railway trucks, and to break it into lumps by means of picks; but this method entailed an increased amount of smalls being made, besides taking up more siding room, owing to the extra time required for drying, as compared with the method now in use. Ordinary bricking machines could of course be used, but when the cost of handling the slime before and after bricking is counted, the cost would be greater than with the simple method now in use; the material being in too fluid a condition for making into bricks until some time elapses for drying, a double handling would be necessitated before sending to bricking machine. If, however, the slime could be allowed time to dry sufficiently in the trucks, bricking by machinery would probably be preferable. Rather more than 10% of smalls is made in handling the lumps in and out of the railway trucks, and this is, as before mentioned, worked up with water in a pug mill at the sintering works, and used partly for covering the heaps with slime to exclude an excessive amount of air. The balance is thrown out and cut into bricks as already described.

At the heaps, the lumps are at present being thrown from one man to another to reach their destination in the heap, but the sidings have been laid out in duplicate with a view to enabling traveling cranes to be used on the line next the heap, the lumps to be loaded primarily into wooden skips fitting the trucks. It is probable, however, that the lumps will require to be handled out of the skips into their place in the heap, as the brittle nature of the material may be found to render automatic tipping impracticable. A considerable amount of labor would nevertheless accompany the use of cranes, which would likewise be advantageous in loading the sintered material.

In order to reduce the inconvenience arising from fumes, length is very desirable in siding accommodation, so that heap bullding may be carried on at a sufficient distance from the burning kilns. It is for the same reason preferable to build in a large tonnage at one time, lighting the heaps altogether. As the heaps burn about two weeks only, long intervals intervene, during which the fumes are absent.

In the experimental stages of slime roasting, fuel, chiefly wood, was used in quantities up to 5%, and was placed on the ground at the bottom of the heap, where also a number of flues, loosely built of bricks, were placed for the circulation of air. The amount of fuel used has, however, been gradually reduced, until the present practice of placing no fuel whatever in the bottom was arrived at; but instead, less than 1% of wood is now burned in small enlargements of the flues, under the outer portion of the pile, and placed about 12 feet apart at the centers. This is found to be sufficient to start the roasting operation within twenty-four hours of lighting, after which no further fuel is necessary.

(TO BE CONTINUED.

*Abstract Trans. Australian Inst. Min. Engrs.

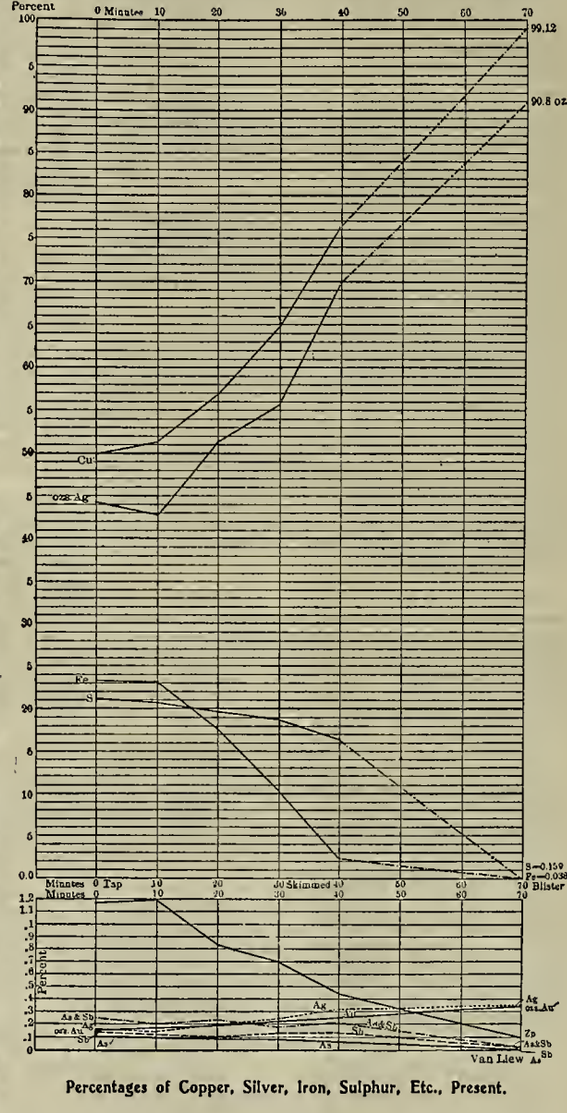
Submarine Ore Mines.

A legal difficulty is approaching on the Mesaba and Vermillion iron ranges, with the State of Minnesota and its lessees on one side and the fee owners of the land around the lakes on the other, says the American Manufacturer. It has been acknowledged as a principle of common law that the riparian ownership of meandered lakes carried with it any rights of the ownership of land under water that could be held for private use, other than the inalienable rights of the public. Acting on this idea, no land under water has ever been leased for mining purposes except by the owners of adjoining lands. But now comes the State Auditor and gives to private applicants mineral leases upon lands under water that are entirely surrounded by fees held by individuals and companies. The State, in other words, claims, by virtue of the Swamp Act, to be owner of all lands under water, up to the shore line, and as such is to dispose of those tracts for any purpose. It may be that millions of value lie in these lands. Some of them are well located on both ore-bearing formations. One lease has already been granted and applications are in for thirty more. Fee owners will contest the leases and will treat anyone who crosses their lands to explore under these lakes as trespassers, so that it will be very difficult, in many cases, to reach the lakes. If the State owns these lands, the royalty is a part of the school and institution funds.

Relative Elimination of Impurities in Bessemerizing Copper Matte.

Written by W. RANDOLPH VAN LIEW.

In determining the relative rate and in finding the point where different impurities contained in copper matte are eliminated during the process of a converter blow, the following results were obtained:



Percentages of Copper, Silver, Iron, Sulphur, Etc., Present.

A converter was selected which was starting on its second charge. The first charge after lining had finished its copper "hot," and consequently no copper was adhering to the sides of the lining. All the copper and granulated slag from the previous charge were dumped, thus removing any possibility of "salting" the matte to be tested.

The converter worked fast and well during the entire test. Periods of ten minutes were selected. The converter was brought from the stack to secure each sample of matte to be analyzed, and only that time counted during which air was being forced through the charge.

At the end of forty minutes' actual blowing the matte was up to "white metal," the point at which the last skimming takes place—that is, matte of ap-

* Trans. Am. Inst. Min. Engs.

proximately 76.4% copper. From here, of course, average samples of the contents of a converter are impossible, since (from this skimming point up to finished copper) the contents of a converter consist of constantly varying proportions of matte and copper, which, when a converter is brought from the stack and the blast pressure turned off, settle according to their specific gravity. When the charge is completed a granulated sample of finished copper is obtained and assayed. Accurate chemical analyses of these equal-period samples of matte and copper gave the following results:

	Cupola Tap.....	10 Minutes.....	20 Minutes.....	30 Minutes.....	40 Minutes Last Skim.....	70 Minutes Blister Copper...
Copper, %.....	49.72	50.20	56.88	64.60	76.37	99.120
Iron, %.....	23.31	23.15	17.85	10.50	2.40	0.038
Sulphur, %....	21.28	20.95	19.74	18.83	16.30	0.159
Zinc, %.....	1.19	1.20	0.84	0.70	0.45	0.090
Arsenic, %....	0.11	0.09	0.08	0.08	0.08	0.0012
Antimony, %..	0.14	0.12	0.10	0.13	0.13	0.006
Silver, oz	44.20	42.90	51.40	55.80	70.00	90.800
Gold, oz.....	0.16	0.14	0.20	0.24	0.32	0.350

The accompanying figure illustrates graphically the history of their elimination. In this figure the abscissa represents the ten-minute periods of blowing, and the ordinates represent percentages of copper, etc., from 0 to 100. The ordinates of the figure at the bottom are the same, but on a larger scale (from 0 to 1.2%), to show better the impurities in the matte carried to the extent of but a few tenths of 1%. The upper diagram shows that the silver almost parallels the enrichment of the matte in copper.

The lines showing the relative elimination of the iron and the sulphur are the most interesting. For the first ten minutes of the blow, and while the matte is heating up, the iron and sulphur lines are parallel. From this point there is a marked change. The sulphur line is very gradual in its drop, showing that but little is being burned in comparison with what is taking place with the iron, whose line takes a sudden drop. The iron decreases during thirty minutes from 23.15% to 2.4% at the skimming point, while at this point there still remains 16.3% of sulphur in the matte. From this point, however, to blister copper it is the sulphur that bears the brunt of elimination, the iron dropping only from 2.4% to 0.0038% at blister copper, while the sulphur decreases from 16.3% to 0.15%.

This is of great interest, as it shows that, up to the skimming point, it is the oxidation of the iron to ferrous oxide, and the union of the ferrous oxide with the silica of the lining, that affords the source of heat to carry on the operations within a converter; while from the skimming point (76.4% copper) to the finished blister copper it is chiefly the burning of the sulphur that gives our heat supply to finish the work started by the oxidation of iron.

The zinc, it will be seen, is scarcely affected during the "heating up" period, while after that its elimination is gradual. The arsenic and antimony, curiously enough, are but slightly affected during the whole of the slag-forming period, or as long as enough iron remains to be slagged off. At the cupola tap of matte into the converter the arsenic was 0.11% and the antimony 0.14%, while at the end of the slag-forming period the arsenic was 0.08% and the antimony 0.13%.

When the iron in the matte had been oxidized and slagged off, and then only, did the arsenic and antimony commence to be oxidized and driven off, until, at the point of blister copper, but 0.0012% of arsenic and 0.006% of antimony remained.

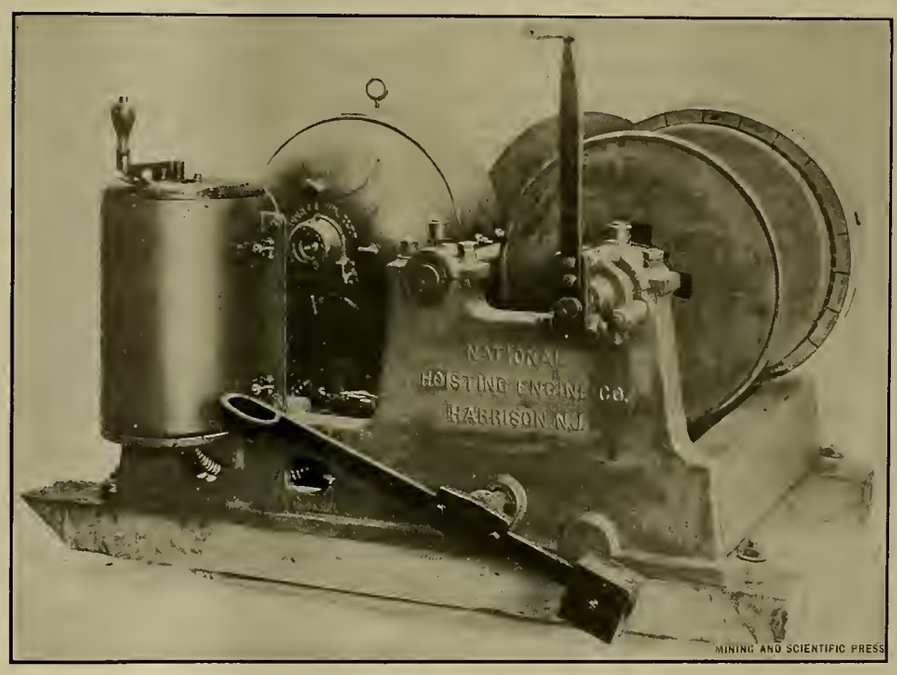
Iron and Steel Imports.

Importations of iron and steel into the United States in the fiscal year 1903 are larger than in any preceding year since 1891, and with that single exception are larger than at any time within the past twenty years. In only seven earlier years in the history of the country have the importations of iron and steel been as large as those of the fiscal year just ended. The total value of iron and steel imported in the fiscal year ended June 30, 1903, as shown by the figures of the Department of Commerce and Labor through its bureau of statistics is $51,617,312, against $27,180,247 in 1902, $17,874,789 in 1901, and $12,100,440 in 1899. Running back through the import record from 1850 down to 1903, the only years in which the value of iron and steel imports exceeded those of 1903 are 1872, when the total was $55,540,188; 1873, $59,308,452; 1880, $53,714,008; 1881, $60,604,477; 1882, $67,976,897; 1883, $58,495,246; and 1891, $53,544,272. These large importations of iron and steel have occurred, it will be seen, in periods of exceptional business activity, but on no former occasion have such large importations been made in the face of so great home productions of iron and steel. In 1891, when the importations were $2,000,000 greater than in the year just ended, the total home production of pig iron was only 8,500,000 tons, while that of 1902 was over 17,000,000 tons, or double that of 1891. In the period from 1880 to 1883, when the importations of iron and steel were larger than those of 1903, pig iron production only averaged about 4,000,000 tons per annum, or less than one-fourth the annual production of the present time; and in 1872 and 1873, when the importations slightly exceeded those of 1903, the pig iron production averaged only 2,500,000 tons annually, against 17,000,000 at the present time.

A Motor-Driven Mine Hoist.

The motor-driven friction-drum hoist illustrated herewith has been built to meet the demand for a small, compact, portable and, as nearly as possible, indestructible machine for use in mines, quarries, on board ships, and for contractors' purposes generally. It is manufactured by the National Hoisting Engine Co. of Harrison, N. J., and is equipped with a Crocker-Wheeler fully inclosed type series motor, which drives the drum through two trains of reducing gears. The portability of the outfit is indicated by the cut, which shows the motor, controller, drum, etc., all supported upon the one cast iron base. The motor is the 7½ H. P. size, wound for 220 volts and drawing normally, at full load, a current of 30 amperes. The controller, which is of Cutler-Hammer make, designed for intermittent regulating duty, is of the size to accompany a 7½ H. P. motor, and allows twelve speeds in either direction.

At maximum speed and power the hoist is capable of lifting 1500 pounds at the rate of 125 feet per minute with the motor running at 800 revolutions per minute. The position of the operator is at the side of the machine, shown in the picture, where, with his left hand on the controller, he can govern the speed of rotation of the drum in either direction, or, with his right hand on the chuck release, may disconnect the drum from the gears and allow it to rotate under the weight of its load while checking the speed by applying the friction hand brake with his foot.



A Motor-Driven Electric Hoist.

The equipment throughout is designed to withstand the rough usage and exposure that it must naturally be expected to receive. The resistance used in connection with the controller is of the Carpenter enclosed form and mounted in a safe position under the base of the frame. The leads between the controller, motor and resistance are run in flexible metallic conduit, all delicate parts liable to disarrangement are carefully enclosed and protected from dust, moisture and results of careless handling.

The company has a branch office in San Francisco, Cal., corner Fremont and Howard streets.

GOLD POCKETS occur under many conditions—in black slate, in talc, in diabase, at contacts, in limestone and in diorite, but usually where two or more veins or seams converge. There are usually three separate fissures, crevices or veins. First is the vein of quartz proper. This is usually barren except where the pockets occur. Next is the crossing—a seam or small vein or crack—cutting across the vein and third the gold seam, the latter being important. It strikes nearly parallel with the vein and dips toward it. Where these three unite the pocket of gold may or may not be found. The occurrence of pockets is very uncertain under any circumstances; and, although the searching for pockets has been reduced to almost a science, the element of luck is an important factor.

Some Observations on Alaska and the Northwest Territory.

Written for the MINING AND SCIENTIFIC PRESS by W. E. THORNE.

Along Forty-mile river the surface rocks are principally sedimentary overlying granite. These sedimentary beds dip at all angles up to 80° from the horizontal. In some places the anticlinal folds have been cut through by erosion, leaving granite bedrock. The greater portion of the bedrock is clay slates, limestone and schist. The strike of the formation is about north 15° west. A great deal of the formation is identical with that of California.

In some places dikes cut through the sedimentary formations. Usually along such dikes can be seen quartz veins, some showing pyrite and said to carry gold in small quantities. I saw some telluride ores, but made no test as to values. In the schists and slates numerous quartz stringers occur; in some places a number of these lie parallel, making a fair showing, but no work has been done on them. I saw some quartz from Chicken creek that was rich in free gold.

About the same conditions are found along the Yukon in so far as one could judge from the deck of a steamboat with a good field glass. I found by testing that a lot of the reported rich placer gravel was too poor to work even in so favored a locality as California.

High working cost is due to excessive cost of supplies, short season, frozen ground (in one 55-foot shaft it was found frozen all the way down) which never thaws out during the summer season. In fact, you can find frozen ground at a few inches in depth on the north hillsides all season. High wages make these gravels of no value as an investment, as there is no method in use to-day that would make them pay even operating expenses. The high wages of that country are of little benefit to the miner, as four months is the working season. What he makes will pay for his provisions and clothing. As a rule, they spend the balance of the year prospecting and are broke at the end of the year. As for the chance of making a strike, it is just as good in the United States, with nothing like the privations there. The newspapers of that country, as a rule, publish every fake story that they hear of reported strikes, fully 75% of those reported having no foundation except some "hot air" miner, and are published to keep up the rush into that country. No failures are ever reported, and there are plenty of them—some on a large scale, too. At least 70% of the population could leave that country and not reduce the output of gold 10%. This is only my opinion, and costs nothing, and can be taken for what it is worth. It comes from a five-months sojourn there out in the hills working, and not in a steam heated room in Dawson. I saw some gravel bars and bench claims that can be made to pay if good dumps can be had and worked on a large scale. I also saw some operations there on a large scale in which 75% of the expenses were charged to "office expense."

I found that, after a gravel bank is opened up, it will thaw from 4 to 16 inches in twenty-four hours, so that in piping one must have a large face to work on, also two giants for each head, with extra pipe, gates, etc., so that while one giant is at work the other can be put in place for the next run.

In some places there is a heavy overburden of muck. In working, the gravel is cut from under the

muck by the giant from 3 to 7 feet, then the muck can be shattered by powder. A light stream should then be turned on, when the muck will soon thaw and float off. This muck is decayed vegetation.

Another way of handling the muck is to remove the timber, brush and moss, then by a system of ground sluicing the muck is removed. I am not prepared to say which is the better method. I found in some places one would work all right, while in another place the other was better. I found that fully 90% of the miners in that country had had no practical experience in mining before going there. As a result, some of the theories as to placer gold formation would stump some of our best geologists. There are also some of the crudest gold-saving appliances I have ever seen in operation. I have never seen in any other part of North America such costly methods of handling material as are in use there. I am sure there is a great deal for one to learn about mining methods in that country, but I also think that practical experience before going in is of some benefit towards future dividends, as what little I have gained in twenty years saved our company a good many thousand dollars.

Small timber for fuel is plentiful for present needs, but for lumber is very scarce; logs that will make 6-inch boards are about the average, and not at all plentiful. The quality is like a second growth fir or spruce—very poor. Some of the trees examined showed from 150 to 200 rings or years of growth not over 10 inches in diameter.

Some coal is being developed which is of a fair steam quality, and in time may be sufficient for all needs, as the coal indications are found over a great deal of that country.

Chlorine Smelting, With Electrolysis.*

Written by JAMES SWINBURNE.

The chlorine process is simplicity itself. The sulphide ore is treated with chlorine so as to displace the sulphur and absorb all the chlorine. The chlorine is electrolyzed to get the metal and recover the chlorine. This is the process in its naked simplicity. When all the details necessary, even in connection with complex ores, are considered, in comparison with existing methods, the process is exceedingly simple.

As a good example, supposing pure galena is to be smelted. The galena is treated with hot chlorine so as to form lead chloride and sulphur. The sulphur is condensed as brimstone and the lead chloride is electrolyzed in the fused state, producing lead and chlorine. If there is silver or gold present the fused chloride of lead is treated with metallic lead. This replaces any gold or silver there may be, and the precious metals alloy with the remaining lead, so that ultimately a bullion is produced as rich as may be desired, the only difference being its smelting point, which must not be too high. The cost of desilverizing by the ordinary process is thus saved. This practice thus recovers all the silver, all the lead and the gold, and nearly all the sulphur. If the electrolyte vats were so tight that no air got in all the sulphur would be saved, but in practice a little sulphur is always burned into SO_2. Pure, or nearly pure, lead sulphide is easy to smelt in the ordinary way, but this smelting does not separate the silver and is thus incomplete. In time, therefore, the chlorine process is likely to replace the present methods, even for pure ores. Take another example—pure zinc sulphide. The process is exactly analogous to that for pure galena. But in practice zinc blende contains gangue and generally iron, and these must be separated. One of the greatest advantages of the chlorine process is that it is applicable to mixed ores, which are often absolutely refractory and useless otherwise. This process makes concentration unnecessary, unless merely for eliminating gangue, as the presence of several metals gives rise to no difficulty. In no case has one metal to be lost in order to extract another, and in no case is a metal brought out impure or needing refining. Take, for example, a mixture of sulphides of lead, zinc and iron, with some silver. An immense amount of work has been done on this class of ore, and great progress has been made in concentrating, so that one part will leave enough zinc to be worked, and little enough lead not to interfere with the metallurgy, and the other part will leave enough lead and little enough zinc. Each portion is smelted for one metal only, the other being worse than wasted, as it is a nuisance. An intermediate ore, often a large proportion, is thrown away.

The new process takes the ore as it comes from the mine, without any previous treatment; or, better still, it takes the slimes, such as the Broken Hill slimes, which are at present accumulating as a monumental memorial to the barbarity of present smelting processes. The slimes contain zinc, lead, iron, silver and gangue. Hot treatment with chlorine converts the whole of the metals into chlorides, producing a broth of mixed fused chlorides and gangue. The silver is extracted by substitution of lead, the lead is extracted by substitution of zinc, and the iron is thrown out as ferric oxide, not as metal, zinc oxide being used as substitute, and the gangue is got out by filtration. We have then nothing left but zinc chloride, and this is electrolyzed to yield zinc and chlorine.

The process thus consists of three essential elements:

Treating the ores with chlorine;

Chemical treatment of the mixed chlorides, by substitution, so that all the chlorine is combined with zinc;

Electrolysis of the zinc chloride to extract the zinc and recover the chlorine.

One of the chief merits of the process is that it is so perfectly cyclical. The chlorine merely goes round and round; the works takes in ore and electrical energy, and turns out metals, sulphur and gangue. In treating sulphide ores with chlorine, as in analysis, or in the action of chlorine on sulphides generally, chloride of the metals and chloride of sulphur are produced. This is the reaction described in most text books of chemistry. The formation of chloride of sulphur would be fatal to the process, however, as we should lose both the chlorine and the sulphur, but there is no convenient way of getting rid of large quantities of this offensive compound, far less of recovering the chlorine and sulphur. Decomposing with water is not a cyclic nor a practical process.

The discovery that sulphide ores can be decomposed on the large scale by chlorine so as to give off sulphur and not its chloride is, if we may say it with modesty, a possible turning point affecting a vast realm of metallurgy. The middle parts of the process, by which the mixed chlorides are converted into chloride of zinc by substitution and elimination of the other metals and of the gangue, involve ordinary chemical engineering only, though there is considerable room for ingenuity in inventing and working out the methods on a large scale. The electrolysis of zinc chloride is supposed to be very difficult or impossible. We have overcome many difficulties. Zinc is chosen as the final metal to be separated from the chlorine for two reasons: Because it is chemically easy to substitute it for all the metals we want to extract, as it is very electropositive; and because it is very easy to extract by electrolysis.

SMELTING LEAD ZINC BLUESTONE.—The actual process, as applied to some particular ore, may now be described. The Broken Hill slimes may be taken as a good example. The crushed ore is run into a transformer. This looks like a small blast furnace made of fireclay with iron outside, or of lined iron. It runs continuously, and we may start our description at the stage when a tapping has just taken place. The transformer then contains about a hundredweight of fused chlorides and gangue. The gangue almost floats in the chlorides. If much lead is present much of the gangue floats, so there is no caking or silting up. The top of the transformer has a cone like a little blast furnace. Ore is poured into the fused chlorides, and at the same time chlorine is blown in. The chlorine enters at the bottom by a sort of tuyere, which is a carbon tube. The cold part of this tube is connected to an iron pipe, which brings the chlorine. Dry cold chlorine is easy to handle. It does not touch metals, and iron can be used freely. The chlorine bubbling through the fused bath displaces the sulphur, which comes off and is condensed. The action of chlorine on the sulphides in question evolves a great deal of heat, so that the transformer is self-heating, and there is no coal or coke firing or outside heat of any sort. The temperature is controlled by the rate of admission of chlorine. If the temperature is too low chloride of sulphur may be formed. This may also be formed if there is a deficiency of ore supply. On the other hand, if the chlorine and ore are supplied too quickly, the transformer will get too hot, and some of the chlorides will distill over and be condensed with the sulphur. By running the transformer fast the temperature can be got so high that all the chlorides distill over, leaving only the gangue. The bulk of the transformer gives easy regulation.

The temperature is the main consideration in determining the size of the transformer. It must be of such a size that when running at its normal rate the heat is conducted through the lining and radiated from the surface at such a rate that the contents keep at the right temperature. There is considerable margin allowable in temperature, and the temperature is under control by regulating the flowing of chlorine and of ore. The temperature can always be lowered by running in a little extra ore or reducing the chlorine; but the chlorine feed depends on the electrolytic vats, and is practically constant. The larger the transformer the longer it will preserve its temperature with any fluctuations of chlorine supply, and the cheaper the pumping, labor, etc. It is therefore best to have large transformers. We have so far used a 10-ton, but a larger size with thinner lining will probably be better.

The amount of gangue in the ore is important. As the gangue is about the same density as the chlorides, a large amount may be present without inconvenience as to fluidity. It is, of course, an advantage to be able to work on ores with little metallic content. It is quite easy to work with the metallic contents only half the ore, or even less. Poorer ores can be made workable by addition of those with more metal. The temperature depends on the metals in the ore too. Thus blende heats much more than copper sulphide; so that, other things being equal, a copper ore with little zinc should be run through faster, or mixed with, say, a zinc-lead ore.

To return to the working of the transformer, it is started with the remains of the last charge, and then chlorine and ore supplied till it is full. The regulation needs no skill. A hole can be opened at the top of the transformer, and as it is connected through the sulphur chamber to a chimney there is a gentle suction. This draws air in the hole, which burns the sulphur vapor. The blue flame shows there is enough ore. If too little is fed, fumes of ferric chloride fill the top of the transformer and pass into the sulphur. This is to be carefully avoided, and there should be excess of sulphides in the transformer until the end of the charge. At the end the ore is stopped, and the transformer run till brown fumes appear. These are by-passed round the sulphur chamber. The charge is then run out and allowed to cool.

At first great difficulty was expected in pumping the chlorine, as a pressure of some ten to fifteen pounds on the inch is needed when the transformer is nearly full. The pumping presents no difficulty, and a chlorine pump will run day and night continuously without trouble. The well-known patented method with sulphuric acid flooded pumps would have been available; but such complications are quite unnecessary with dry chlorine. The dryness is of vital importance here.

We now come to the intermediate or chemical stage of the process. This varies with the ore used. We may take the Broken Hill slimes, and imagine there is copper, too. This would be about as troublesome an ore as we could have. We have used the Broken Hill ore and mixed it with a Tasmanian copper ore, but we have chiefly worked on it alone. The fused mass from the transformer consists of chlorides of lead, zinc, iron, manganese, copper, silver and gangue. It is run into water and through a filter press when cool enough. This takes out the gangue and lead chloride, carrying most of the silver. The gangue is easily separated from the lead and silver chlorides, and these chlorides are then dried and fused in contact with lead which extracts the silver and any gold; and then with zinc, which gives lead, practically pure, and anhydrous neutral zinc chloride, which is ready for the electrolysis vats.

The filtrate from the press contains a little lead and silver in solution, and copper, iron, manganese and zinc. The lead and silver are taken out with spongy copper. The copper is taken out as sponge or "cement" by zinc, and we have left iron, manganese and zinc chlorides.

The iron is chlorinated up to the ferric state, and zinc oxide is added to cause precipitation. This throws down hydrated ferric oxide. This is the base of iron paint, and is marketable, its value depending on the color obtained. The solution is further chlorinized in presence of more zinc oxide, and the manganese goes down as peroxide.

We have now substituted zinc for all the other metals in their chlorides, and have nothing left but zinc chloride. This is evaporated down carefully and fused. This decomposes some of the chloride and makes an oxychloride. Steinhart evaporates in vacuo to produce neutral anhydrous zinc chloride. We have not done this; we find that with cautious boiling down there is not much oxygen in the final result. This is got rid of in open preliminary vats, which use inexpensive anodes, which are gradually used up. The consumption is less than if all the oxygen went off as monoxide. The anhydrous neutral chloride from these vats is then added to that from the lead chloride substitution, and is taken to the final electrolysis vats.

The electrolysis vats are internally heated, as in the case of aluminum. The cathode is fused zinc, and the anode is carbon. Some makes of carbon do not stand well, but suitable carbons serve to stand permanently. Of course chlorine has no action on the carbons. The vats are kept under a very light suction, so that if there are any leaks air goes in instead of chlorine coming out. The carbons are not hot enough to be burnt by this small admission of air. As the vats are kept warm by the excess of the electrical power over the chemical, the larger the cell the lower the electromotive force, so that if the cell were large enough we could get down nearly to the electromotive force corresponding to the heat of formation of zinc chloride at that temperature. So far 3000 amperes has been the current used, but this means a very small vat. The output of fused salt vats is enormous in comparison with aqueous work. A 10,000 vat is now being tried. Above that size the current will be inconvenient. With the small vats four volts per cell is needed, with 10,000 amperes three should do. It is best to count on four; this allowance ought to cover the power for the preliminary electrolysis too. The current efficiency is practically unity. Zinc smoke is of course formed if the temperature is too high. The vats are very simple; merely iron cases lined with fire brick. The chloride soaks into the porous brick and solidifies somewhere, so it is really a vat with zinc chloride walls.

(TO BE CONTINUED.)

*Abstract from Trans. Faraday Society.

Spitzkasten and Spitzlutten.

Written for the MINING AND SCIENTIFIC PRESS.

Spitzkasten consist of a series of devices for concentrating pulverized ores hy means of water. The device is of German origin and has heen in use in Europe for many years. Spitzkasten in one form or another are also in use in many concentrating mills in the United States and elsewhere. The form of construction is various and the principles depended upon to effect the concentration of the material under treatment also vary somewhat. By means of spitzkasten and spitzlutte concentration of the pulp from stamping or grinding mills is carried on continuously and automatically. The spitzkasten as usually made are rectangular boxes having a pointed hottom, into which the pulp is discharged from a launder leading from the mill. In the hottom of the box at the point, or lowest depression, is an orifice which may be enlarged or reduced at will. Through this the coarse material passes, while the finer slimes, remaining longer in suspension in the water, flow out near the top through a launder, and are carried onward for a second or further treatment. Often the hox, instead of having a four-sided, pointed hottom, is simply a V-shaped box, 2 feet or more in depth, with a deeper depression at one end. This is also fitted with an outlet at the lowest point of the box. In some of these classifiers a stream of water under moderate pressure is introduced at or near the hottom, which causes the slimes to continue in suspension longer and consequently effect a more complete separation from the coarse material.

The accompanying illustration (Fig. 1) is that of a classifier employed at the slimes plant of the Zeila mine at Jackson, Cal., and will give an idea of the construction of one of these hydraulic sizers or classifiers. The pulp falling from a launder into the V-shaped hox passes to the first outlet, near the center

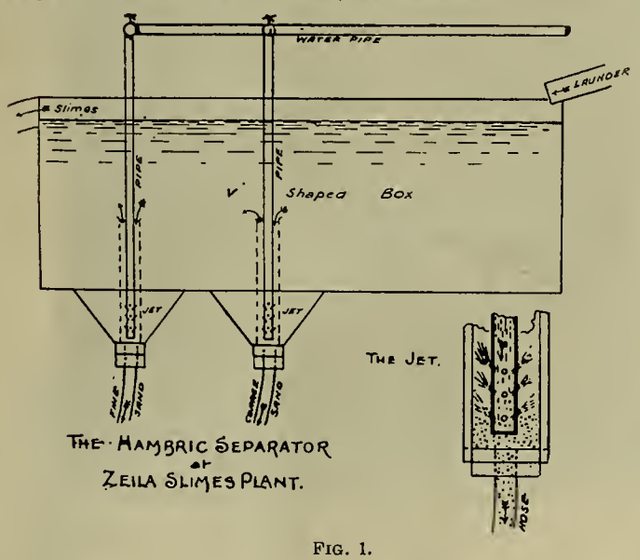


FIG. 1.

of the hox. This consists of a pipe within which is a smaller pipe having perforations, hored in such a way that the water in this pipe under pressure is forced outward and upward in the form of a number of jets, as shown in the smaller sketch. This causes a violent ebullition of the sands, the finer material constantly rising in the outer tuhe and overflowing into the main hox, while the coarse sands pass out at the bottom. The fine pulp from the first pipe seeks the second outlet, where it is subjected to similar treatment, the slimes rising again and eventually finding an outlet through the discharge end of the sizer, while the "middlings" escape from the bottom of the second pipe. The discharge from these pipes may he retreated or not, depending on their value, but the primary object has been accomplished, that of separating the coarse from the fine material, as hoth cannot be successfully concentrated at a single operation. The slimes overflowing from the classifier are sent to the canvas tahles for further concentration by that method.

The spitzlutte is somewhat different in construction, though also of variahle size and form. The spitzlutte is usually (hut not always) cone-shaped. One form of spitzlutte which gives satisfaction is thus described hy H. E. Armitage:*

"The spitzlutte consists of two inverted cones, one inside the other. The inner cone is suspended from the frame hy a threaded bolt EE′ fastened to the crosshar aa′ on the cone. (See sketch, Fig. 2.) The outer cone rests on the dead-water tank cc′. The slimes run into the inner cone and pass out through the perforations B in the hottom, into the space hetween the two cones. Here they encounter an upward current of water coming from the pipe hh′. This pipe is connected with a tank (not shown) at a sufficient height to give the required head. The finer slimes are separated and washed out at the point cc′, where they run into the trough EE′, surrounding the outer cone, and are carried away for suhsequent treatment hy the spout F. The larger and heavier particles of mineral fall into the hopper A, beneath the cones, and are drawn off through the stop cock G on to a jig or other device for further concentration. By raising or lowering the inner cone, hy the screw and nut EE′, the space at the point of discharge can he increased or decreased. It is essential that this annular space he the same area as the area of the circular space heneath the inner cone at H, so that the up-flow of water will be of uniform velocity from the starting point at H to the discharge at cc′. This flow is regulated by means of the valve K, and hy it the percentage of slimes separated can be controlled. The stop cock at G is only opened sufficiently to allow the ore that falls into the hopper A to run off."

The form of sizer above described is hetter suited to the treatment of material containing coarse particles—18 or 20 mesh, as well as slimes—and is adapted to ores which, owing to their tendency to slime, such as galena, gray copper, etc., are crushed through rolls in preference to stamps. The spitzlutte is placed at a point intermediate between the crushing machine and some mechanical concentrating device, usually a jig, hut by careful arrangement

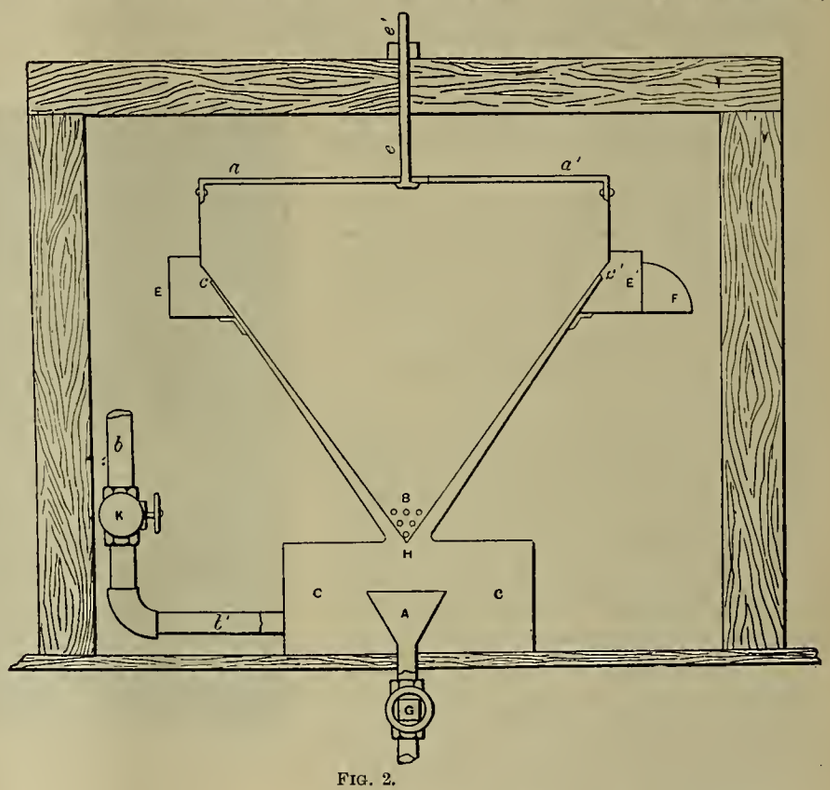


FIG. 2.

it will also size material containing no grains larger than those which will pass a 30 or 40-mesh screen. As will be observed from the ahove, the whole success of the operation depends upon the proper adjustment of the areas through which the material passes. The character of the material under treatment determines the quantity and pressure of water introduced through the clear-water pipe.

*Trans. Am. Inst. Min. Engs., Vol. XVIII, p. 257.

Direct Steam Ore Stamps.

TO THE EDITOR:—Mr. Charles H. Fitch, who writes in your issue of July 11 on "Direct Steam Ore Stamps," has paid the writer a compliment which I am ahle to return, and at the same time perhaps contrihute something of interest to your readers, not concerning ore processes of which we know little or nothing, hut by pointing out Mr. Fitch's article as the best example of analytical treatment for prohlems of a "dynamic-economic" nature that has appeared for years.

Constructive engineering work is successful, or otherwise, just as the designer has proceeded hy a logical and analytical course, aided, of course, hy experience, and it is not often that we find in so prosaic a hranch as ore crushing an essay of this nature.

I commend it to the hundreds of engineering students in colleges as a classic in technical literature—one that more than indicates the true and only road to successful design and construction of machines of any kind involving non-computahle forces and ohscure conditions of operating.

The factors are all in, "down to the grease," and the method pursued is the antithesis of the ingenious, contrived of things that see only in one plane, so to speak, and hecomes hy his failures an ohstacle in progress.

There are hlunders enough at hest, even when we proceed hy logical or analytical methods, and understand the limitations of human effort, especially when the very foundations of our physical laws are threatened by radio-activity.

Not a steam stamp or one machine scheme in a thousand is treated as does Mr. Fitch in his essay, and if I am in the mining husiness when he makes the first direct stamp he can enter my order for the machine.

J. RICHARDS.

San Anselmo, Cal. July 31.

The Guadaloupe y Calvo District, Chihuahua, Mexico.*

NUMBER IV—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS hy H. Z. OSBORNE.

At Los Tarros there is a 10-stamp mill, idle. Four hours' travel a little west of north of Los Tarros is Bohorigame, in a valley 2 or 3 miles in width, surrounded hy high mountains. Its elevation is 5500 feet. A postoffice is located here, with a semi-weekly mail. It is the center of a rich mineral section.

Three hours west from Bohorigame is Cehollitos, at an elevation of 6500 feet, where is located the Santa Nina gold mine. Considerahle surface work along the vein for 300 or 400 feet was done thirty or forty years ago. Later some Americans sunk a shaft 100 feet, and ran a drift ahout 200 or 300 feet to get under these old workings, which are said to have heen in high-grade ore. They encountered a flow of water, however, which their limited facilities would not permit them to handle, and work was ahandoned.

Ahout two hours south of Cebollitos is the Los Angeles mine, owned hy Dr. Wilson, Mr. Cowan and Mr. Syme, Americans. A considerable amount of development work has been done at this mine, on a vein averaging 4 or 5 feet in width and varying from 2 to 15 feet. Three tunnels have been run, the two first for a length of 300 or 400 feet on the vein, and the third, at a vertical depth of ahout 250 feet, for about 150 feet. A 2-stamp, triple-discharge mill has worked ahout 3000 tons of ore, which is said to have yielded over $40,000, and the tailings are said to assay over $10. The best ore only was worked. The vein is said to average over a half ounce gold throughout.

Southeast of the Los Angeles mine are the old Santa Cruz mine and Mala Noche, the former about two hours and the latter ahout five hours, over rough trails. The mountains in this section are more cut up and uneven than they are east of Guadaloupe y Calvo. Not infrequently there are evidences of mining done in the past, in old tunnels or inclines, and ruins of adohe smelters, or arrastras. The "antiguas" are for the most part silver mines, as the "ancients" did not seem to be attracted hy gold as they are nowadays. There are great numbers of

*See illustrations on front page.

gold veins in this section, but the croppings are generally of low grade, and the Mexicans will not work veins that are not rich enough from the surface to admit of working in tahonas, or arrastras, and when the ore body is worked out, or the pay ends, or water appears, work ceases. As a rule, therefore, very little work has been done on the gold veins. They are generally in porphyry and the gangue is reddish quartz. In the case of the Los Angeles mine the vein is thoroughly oxidized to depth of 200 feet, with no sulphides showing in the tunnel at that level. In other mines, as at the Guadaloupe and Clemencia, at La Cumbre, the sulphides of iron show in less than 100 feet from the surface.

At Santa Cruz is an old silver mine, said to have been a large producer in its day. Between Santa Cruz and Mala Noche are a great many unprospected veins, crossed by the trail. At Mala Noche an American, Mr. Lafayette of Indian Territory, in company with Charles S. Coleman, has purchased a number of "antiguas," carrying copper, silver and gold, of a promising character. It is the intention of the owners to open up these veins, most of which are of considerable size.

From Mala Noche it is two hours south to Cerro Colorado, or "Red Hill." This hill, or mountain, is opposite the old San Manuel mine, which has a history as a silver producer. Red Hill is owned by Americans—George D. Moulton of Dennison, Texas, and T. E. Ivey of Los Angeles, Cal. As its name implies, this hill is distinguished by its red color. It contains several large veins and a good many smaller ones. The Indio is the most promising vein, from 5 to 14 feet wide, and carries gold, silver and lead. La Reforma, another big vein, carries copper and silver, stringers and bunches of which are of high grade. The Plomoso vein is mostly lead. There are a large number of other veins on the hill, but little work has been done on any of them.

About three hours travel from Red Hill, but 2 or 3 miles only distant in a direct line, are the veins of the Rincon de Alisos. There are gold veins, showing some very rich ore at and near the surface. The rich bunches in the Ojito vein are in hematite. The vein is from 2 to 5 feet wide, in porphyry. Higher up on the mountain the porphyry is overlaid with "cantara," and lower down, about 1 mile distant, granite is exposed. La Leona embraces three parallel veins, in a width of 80 feet. These veins vary in width from 1 to 10 feet. They are of black quartz, with a little copper stain. The ore, however, is low grade.

Seven hours southwesterly from Rincon de Alisos is La Cumbre. The trail passes through the hamlet of Cinco Iagus (Five Wounds), crosses the Bazonopa river, one of the forks of the Sinaloa, at Las Placeritas, 3200 feet above sea level, and again ascends the mountains, La Cumbre being 6800 feet above sea level. There are many veins in this section, of which the Guadaloupe, or Fortuna, is the principal one. The Clemencia, owned by a Texas company, of which George D. Moulton of Dennison is the head, has a vein that shows a width of 26 feet, which is apparently an extension of the Guadaloupe, or Fortuna, vein. The Guadaloupe is owned by a New York company, which at the time of my visit had done hut little work on the mine. Its Mexican predecessors, however, had taken out the upper portion of it, where oxidized, for a length of fully 1500 feet or more and worked the ore in tahonas. A magnificent vein is shown, from 8 to 32 feet in width. It is said that the owners of the Guadaloupe will commence extensive work on the mine this fall. There are several other veins that have yielded more or less gold, and a 10-stamp mill is kept employed on ores from the various mines pretty regularly. All the ore is packed on burros from 1 to 3 or 4 miles over steep trails. While packing is done much cheaper than it can be done in the United States, it is still an expensive way to handle ore, and none hut that of good grade can be worked at a profit. Mr. Weed, in the paper heretofore referred to, gave the following description of the geology of La Cumhre mines:

"The older rocks are andesites, altered breccias and lava flows, haked and recrystallized near the diorite intrusions which cut through them. These diorites are coarsely granular, and in appearance are dark-colored granites. Both diorite and andesite were eroded, at a period when the rhyolitic-dacite eruptions began, into a mountainous country as rough as that now seen, so that these recent rocks now covering the summits form the mountain spurs, and are cut into deep canyons by the Bazonopa river. Before the rhyolitic intrusions occurred the country was extensively fissured, and quartz veins were formed traversing the andesites and granites. These veins are particularly large and well developed in the Guadaloupe and Fortuna properties at La Cumbre, and though they pass under the rhyolite caps, and their absolute identity is lost, the group of veins of which the Fortuna is a part can be traced for several miles. Their course is nearly east and west (north 70° east mag.), and the dip is toward the south. The Fortuna vein shows from 8 to 32 feet of quartz, but the hanging and foot walls show decomposed rock, and crosscuts show much alteration for many feet on each side of the vein. This alteration has caused the complete disappearance of the dark-colored minerals of the rock, whose iron has united with the sulphur of the circulating water and formed pyrite, partly in little veins, but mainly as disseminated crystals.

"The vein outcrops are well-defined reefs, which usually stand in relief ahove the slopes. The vein filling consists of white and blue quartz, with pyrite scattered through it, together with some chalcopyrite and zincblende. The capping of oxidized ore is very thin, the sulphides being encountered but a few feet below the surface. Bunches of very rich ore sometimes occur, and usually with a green quartz, colored by a mica, whose appearance strongly suggests the vanadium-mica (roscoelite) which, according to Lindgren, is commonly associated with the richest gold ore of California. This ore and the rosy ore of somewhat lower value often occur as shells encasing nodular masses of zincblende.

"The character of the quartz, the lack of comb structure, and the evidence of replacement of fragments of the crushed granite and andesite, indicate that the vein is largely formed as the result of replacement. The decomposition of the country rock confirms this, and in the coarse-grained granite the character of the vein is identical with the copper veins of Butte, Mont., which are typical examples of replacement veins."

Altogether, the country between Guadaloupe y Calvo and La Cumbre is most interesting, and is likely to develop some valuable mines. Besides the points which I visited, there are several others in the neighborhood which have either developed mines or excellent prospects, as at San Jose, San Juan, Chicuris, Callabocillos and San Jose de Gracia. The mineral belt, with a considerable percentage of gold veins, extends both northerly and southerly from this locality. To the north is Batopilas, Chinipas and Choix, and to the south San Dimas and the rich mines of Durango.

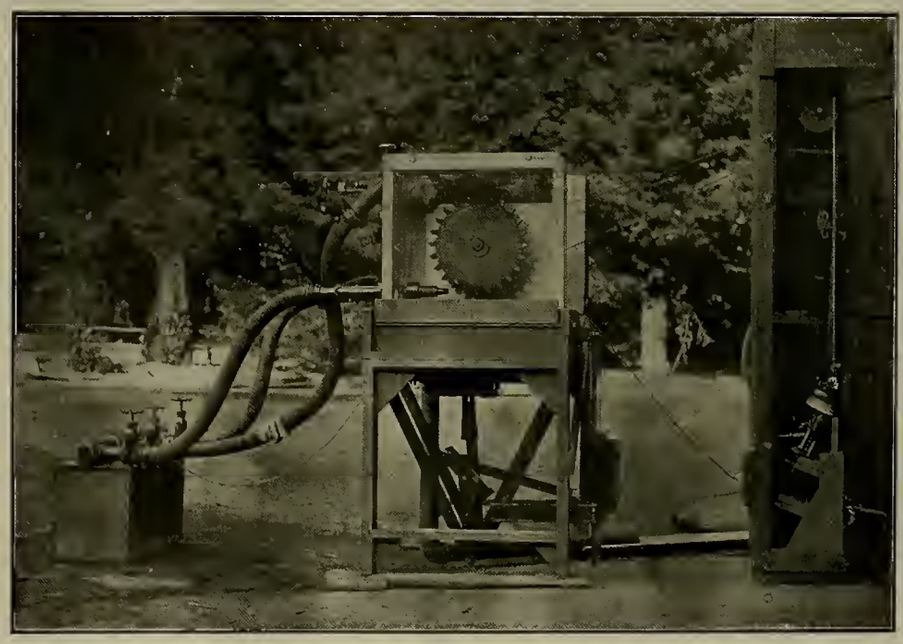
The advantages of this section are a good growth of timber generally throughout the mountains—pine, oak and madrona—and usually the country is well watered. Neither timher nor water is so abundant as it is in the mountain regions of California, but they are incomparably better than in Nevada and Arizona. Labor is cheap—from $1 to $2 Mexican for miners, car men, etc., but, of course, it is not so efficient as American lahor. Nearly all kinds of work are done on a stent system. When a man has drilled the required length of hole or holes, or moved the quantity of ore, his day's work is over. If he fails to perform the required work, it is deducted from his wages proportionately. The climate is generally good in the mountains.

The disadvantages are the difficulties of transportation and the isolation from the world that life there requires. Everything from outside must he brought in on pack mules, and the trip, either from Parral or the coast, takes eighteen or twenty days. The cost is not so great as might be expected, the charges for packing from either Parral or the coast being from $8 to $12 Mexican per carga of 300 pounds. This is a slow way to get in reduction works, but at present it is the only way. An infinite amount of patience and hope, as well as considerahle money and experience, is required for successful mining in this part of Mexico. With this combination, however, I doubt if I have ever seen a country that afforded more opportunities for successful mining ventures than the section of which this article treats.

Tangential Water Wheel Efficiencies.

The above is the title of an exhaustive treatise by Geo. J. Henry, Jr., member A. S. M. E., associate member A. I. E. E., being an experimental investigation of the relative values of different bucket shapes, in the shape of a paper read before the Pacific Coast Electric Transmission Association at San Rafael, Cal., June 16, 1903. It is copyrighted, 1903, hy Geo. J. Henry, Jr. Mr. Henry is the chief engineer of the Pelton Water Wheel Co. In the paper Mr. Henry states that the conclusions arrived at are not "theories deduced entirely on paper, but are the result of an elaborate series of experiments carried out since 1899 in the special laboratory of the Pelton Water Wheel Co., with a view to scientifically and practically determining, beyond a doubt, the relative advantage of different bucket shapes."

"To obtain the best efficiencies it is necessary to have the proper pipe line, gate valves, nozzles, water wheels and buckets, wheel case, wheel pit and tail race, and all of these parts must be properly designed for the particular conditions under which they are to operate, and all will vary with the head or pressure—the water quantity and the revolutions which the wheel is to make. Many a water wheel bucket has been overworked for years, and then charged up with losses that occur because of its being improperly worn, due to this overwork. Again, buckets are frequently charged up with all kinds of losses which are really due to something for which the bucket is not responsible. Pressure, or wheel diameter, or speed on a given wheel, cannot be varied radically without materially altering the efficiency."



One of the Pieces of Experimental Apparatus as Used in the Investigations, Showing the Arc Light and Shutter for Illumination, the Wheel and Nozzle Enclosed in a Plate Glass Case, Prony Brake and Accessory Measuring Apparatus.

In his discussion of the subject, Mr. Henry argues that "to obtain the best possible bucket efficiency it is necessary that the water jet he taken up on the bucket surface and brought to as near rest as possible with the least loss of energy."

The several causes of loss of energy and the methods of correcting those losses are taken up, Mr. Henry stating that "every water wheel plant has all of these losses to a greater or less extent, and it is obvious that when 80% is then obtained from an operating wheel, the improvement of any one of these, or, for that matter, the entire elimination of any single loss, if this were possible, would not, to any great extent, improve any wheel's gross efficiency. The writer has a number of times obtained as high as 90% efficiency in laboratory tests on buckets only."

He continues: "Let us give some attention to the above detailed losses and endeavor, as far as possible, to determine those points, the careful calculation of which will obtain for us the best possible tangential water wheel bucket.

"1. Given a certain stream of water at a given spouting velocity, it is advisable that this be taken upon the bucket surfaces of just enough buckets to catch every particle of water upon the dividing wedges and turn it all on the curved surfaces, and discharge it at just enough velocity (and entirely in a direction at right angles to the entering stream axis) to clear the next following bucket. This resulting velocity will be the tangent of the discharge angle, multiplied by bucket velocity.

"2. The air and surface friction must be main-

tained as small as possible by the use of a nozzle which will give a perfectly circular and solid stream. The bucket surface and cutting edges must be of a shape which, with a minimum wetted surface, will allow the stream, without crowding at any point, to spread out in a thin fan-like discharge on each side. The surface must be such that the water will not adhere, and as smooth as possible.

"The surface may be ground and polished, or better, ground and well painted with a special compound. If all of these points are carefully studied out and the front of the bucket properly shaped and not cut away too low, the imprisoned water will not cause any appreciable loss.

"The windage will also be a minimum if the number and surface of the buckets is a minimum.

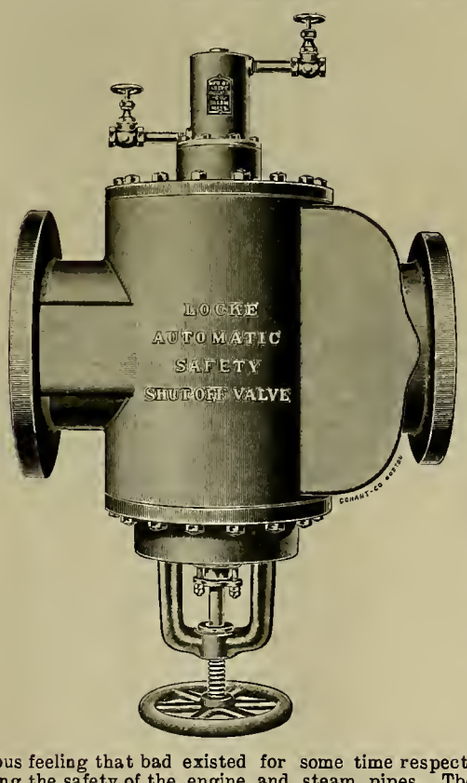
"The above losses and considerations for their prevention are all of such a nature, and so entirely interdependent, that their quantitative value cannot be predetermined except in a general way. In designing a water wheel, however, it is certain that the exercise of the most careful judgment is necessary in the laying out of the surfaces, so that all the losses, or at least their sum, or total bucket loss, will be kept down. Thus, if too much bucket surface be allowed, we increase both surface friction and windage for a given output, and if we attempt to cut these down by reducing the surface, we crowd the stream, so that eddy currents will occur and the stream will not properly discharge from the bucket side."

Following is a discussion of different shapes, styles and makes, profusely illustrated, designed to reinforce the writer's argument and conclusions. The forty-three page pamphlet is a notable addition to current technical literature on a subject of great importance to the mining and engineering world.

Locke Automatic Shut-off Valve.

The Locke automatic valve, illustrated herewith, is designed to remedy the number of accidents occurring wherever high pressure steam is being used, and to do away with the dreadful result when the contents of steam boilers are suddenly discharged into confined boiler and engine rooms.

A 12-inch valve of this kind was placed on the steam main at the plant of the Fall River Manufacturing Co., Fall River, Mass., on account of a nervous feeling that had existed for some time respecting the safety of the engine and steam pipes. The superintendent and engineer were standing, one on either side of the steam cylinder of the engine, when, without warning, the cylinder was broken apart across the valve ports. The superintendent states that he supposed they had but a moment to live when he heard what he believed to be a break of the steam pipe, but to their relief they found it was the closing of this large automatic valve. The steam was shut off so suddenly that the men were not even scalded. Since that time this valve has been improved by the addition of a small electric valve by which it may be closed by the pressing of an electric button. These buttons may be distributed about the plant wherever desired, constituting an effective engine stop.



Further protection may be secured by applying their recently patented safety device, by which the engine is stopped when even the cylinder or flywheel develops any weakness, so that the parts start ever so little from their normal position. These valves are constructed with a band wheel and screws so they may be opened or closed in the ordinary manner. They are manufactured by the Locke Regulator Co., Salem, Mass.

Real Values in Mine Management.

Written for the MINING AND SCIENTIFIC PRESS by CHARLES H. FITCH.

To say that a mine requires able, experienced management for its profitable operation is in a way begging the question. It is a trite admission, to which no exception can be taken, but it does not indicate what good management is. We are left to protest:

O tell me not; red roses—
That they are surely red.

We can do better than leave the subject among vague generalities which add nothing to our stock of wisdom.

Success is not identical with good management. More managers have bad their reputations made by rich mines than by management. A man in charge of a rich mine may make mistakes, but the yield covers them up, and there is time for correction. So long as good dividends continue directors do not go behind the returns to seek for machinery of expensive first cost and low efficiency, nor for wasteful metallurgical practice which has lost grip on millions which might have been saved from going "down Lost creek." They let not well enough alone, for the management of some profitable mines has been very defective, and even in these cases the inference of a great manager from a great mine is easy and popular.

On the other hand, a very capable manager may struggle with insuperable difficulties. Such a man, when he ought to receive a crown of glory for producing any dividends at all, is likely to get scant favor and small reputation because dividends are small.

In justice to all concerned, we ought to have some ability to judge, not only from results which depend largely on factors other than managerial ability, but from methods. By analysis of methods we may know whether the best possible is being done with facilities available.

A manager may be anxious for employment and may accept a salary, and may then be pinned down to a hand-to-mouth policy which prevents him from doing well. Such a policy is always uneconomical and can never be justified except by straightened circumstances and the day of small and slow things. Much money is needed to fill out the measure of an able man's ability.

For example, there are in Chicago many smoking chimneys of boilers with cramped settings forced to do excessive work. A stoker, no matter how able, cannot stop the smoking unless he has carte blanche to order larger boilers and better settings. So no capability in the unfortunate man subject to their whims may be able to save the directors, who delude themselves with the idea that they can impose cheap, ineffectual methods upon him, and somehow skim through by luck and escape the losing consequences of such methods. This is worse than pure speculation, acting with admitted unwisdom, and looking to chance to overrule our folly being a shade less excusable than acting in ignorance.

There are a number of leading considerations by which management can be judged, even by persons not expert in technical details. Some of these follow. If the manager is restrained from giving full exercise to the best methods, he can show what he is made of by getting as near the best as circumstances will permit.

1. SIZE.—Operations conducted on a large scale are much more economical than small operations. If a manager does not plan for large operations, if he puts ten stamps here and five stamps there, instead of combining all resources for a large plant, he wastes money. The manager of a large Canadian mine, a few years since, was charmed with the idea of little steam mills and put in a number of them, supposing that they would be as efficient as one large mill. They proved more costly in fuel, in administration and in every way. He deliberately sacrificed the advantage of large units which he might have enjoyed, and the failure of the property is charged to this cause.

The preference for littleness, selfishness, seclusion, a quiet life, etc., are all signs of bad management.

But, on the other hand, prudence will point to awful examples of big mills with no ore supply. This is no excuse for smallness. The ore supply should be first ascertained. A wise manager for a low-grade proposition will say: "We must have a big mill or none. To warrant a big mill we must have a developed mine; that's all." A foolish manager will say: "We will put up a little 5-stamp mill, and get a little money out of the ground, and feel our way. Maybe we have a mine; maybe not." This is not judicious. It is putting smallness forward as a security, while it is really doubly detrimental, both in excessive ton costs and in causing us to shirk our real duty at this stage of the game—the determination of the mine.

2. COST OF CRUSHING.—It is foolish to assume that crushing can be done at "not to exceed $1 a ton." This expression occurs so frequently in prospectuses that it is entitled to the respect due age. Figures for brittle heavy rock crushed coarse in large plants are assumed as applying to tough light rock crushed fine and requiring screening in steps. The latter work may cost $10 a ton, so dreams of profit go glimmering.

In rating capacity look out for specific gravity. Crushing machines make little account of weight. Bulk is what fills them up and rehandling costs enormously. The proper policy is to ascertain degree of crushing truly, and do it on as large a scale as possible, automatically as possible, and with as little repetition as possible.

3. COST OF TRANSPORTATION.—Great economies can be effected by aerial tramways, automatic surface and underground systems, haulage systems, and air and electric trains. Cost of transportation can be made about as little as expense of works will allow. But it is not at all a question of nerve to put in an expensive installation. Heroism is not business. Business wants to be safe. The manager ought to be so much afraid that he will take every precaution. The question is: Can a good profit be made in a transportation investment? Can a larger profit be made with it, interest on outlays and delays considered, than without it? If in doubt we are forced back to the original question, the crux of good management. What mine have we got? What is in it? Is it worth while?

4. COST OF POWER.—The most general answer to the question of transmission is electrical power. This lends extension to water power, but interest on works considered a large compound steam engine can often be made to furnish more power for the money, and in a few years, if not already, gas engines will give water power an even sharper competition. A good manager will look more at the running than at the first cost. A cheap fuel eater will take how much mine working to support? That is a good way to consider it. Putting in a first-class plant, obtaining the chief essentials of economy, is like buying a mine. If the mine pays it is worth buying. But if the profit on the mine is to be run to waste it is love's labor lost.

5. COST OF LABOR.—There may be labor problems which can best be solved by severe discipline, but the great trouble with mine labor everywhere is that it is too low grade. Labor is better humored than fought. Wars are unprofitable. Firmness is essential. A manager who wobbles is like a fly wheel out of balance—no good. Beyond that I believe the hope of this ticklish problem is to bring up the standard of intelligence, of home and family life, independent manliness, benevolent fraternity, insurance against being crushed to the wall. Men are driven to crime by fear. If men are secure they will harmonize and pull all together. This is profitable.

Automatic machinery is worth while wherever it can be introduced. Give a good mechanical engineer your problem. There are many cases where he can put in mechanical devices which will earn splendid salaries, and turn them over to your profit.

6. COST OF ROOFING.—Where a heavy expense of mine timbering must be met there is a greater margin for system and ingenuity to work upon. Gophering, picking the eyes out of a mine and such practices are the reverse of good management, or of any management at all. They are hand to mouth, tentative ways of doing, feeling instead of thinking. Knowledge of the mine, looking to timber supplies from the cheapest source (not always the nearest) and systems planned for continuous breaking down and working, will indicate whether a manager has his business well in hand, or is acting without a definite basis or investigation of the most favorable policy.

7. COST OF HOISTING.—There are a number of questions, such as those of dump, filling and unwatering, which resolve themselves into cost of lifting weight, solid or fluid, hoisting, baling or pumping. One comparison may be emphasized in minimizing these expenses. Pumping with direct-acting pumping engines is notoriously expensive. Hoisting with large compound engines figures out as one of the smallest items of cost in mining. It is the best policy to establish elevations most convenient for surface works and put in ample hoisting plant, and use it for baling, skip hoisting and movement of material on the principle that it is one of the smallest charges against tonnage.

8. SIMPLICITY.—While clear profitable results can sometimes be realized by complex operations, a general prejudice should prevail in favor of simplicity. Large scale and uniform simple order of operations are the story of large, profitable, low-grade mines. The ban should be put on processes, which get into difficulties from which they can be extricated only by operation after operation. Inventors do not sufficiently realize that every step means money lost.

In conclusion, a mine should have a good manager, but it may be set down as axiomatic that no mine which is not well developed can have other than an ignorant manager. A man so situated may be a good man, but until he learns his mine his capabilities as a manager are obscured.

Notes on the Metallurgy of Copper of Montana.*

NUMBER II.

Written by H. O. HOFMAN.

The Montana Ore Purchasing Co. broke ground for smelting works October 17, 1892; first matte tapped January 1, 1893, in seventy-six days. Ore roasted in two Allen - Brown - O'Hara furnaces (hearths 9 by 100 feet, each treating sixty tons in twenty-four hours), and smelted in two reverberatory matting furnaces (hearth 12 feet 10 inches by 20 feet, and firebox 5 by 6 feet; natural draught, stack 80 feet high and 4 by 4 feet in the clear, and charge 7 to 8 tons; time of melting 3.5 to 4 hours) and one blast furnace, 42 inches in diameter at tuyeres. After a year's run, blast furnace replaced by two matting reverberatories like those first built. In 1894, two Herreshoff furnaces (9 feet inside diameter, with five hearths) were added to the roasting department. These giving satisfaction, eight more were erected in 1895 and thirty in 1899, making in all seventy Herreshoffs. The O'Hara's destroyed by fire 1901, and not rebuilt. Early in 1894 hearths of matting reverberatories were enlarged to 13 feet 6 inches by 25 feet, fireboxes, however, remaining 5 feet by 6 feet; at the same time fuel was changed from lump to slack coal, and undergrate blast substituted for natural draught. These changes increased the tonnage per furnace for twenty-four hours by ten to fifteen tons. Furnaces again enlarged, 1898, and two more built, 1899, making six in all (hearth 16 by 33 feet, firebox 6 by 8 feet, stack 80 feet high and 5 by 5 feet in the clear).

January, 1900, two blast furnaces (42 by 120 inches at tuyeres; 11 feet from tuyeres to throat; cast-iron water jackets) were blown in. These water jackets giving much trouble by cracking, furnaces were replaced by larger furnaces (42 by 160 inches at tuyeres and 10 feet 6 inches in height) with steel water jackets. Converting plant started August, 1893, with two vessels of the Parrot type (5 feet external diameter); in 1894, two more were added, and in 1899–1900 four more. Two barrel converters (bowls 10 feet 6 inches long and 7 feet diameter), installed 1901, are in constant use, while the upright Parrot converters are worked only when these are unable to handle all the matte. It is the intention to erect two additional horizontal and to remove the remaining upright converters. Present plant: Seventy Herreshoff roasters, six reverberatory matting furnaces, two blast furnaces, two horizontal and eight upright converters.

The Anaconda Copper Mining Co. has at Anaconda three separate plants, the Upper, the Lower, and the New or Washoe Works. The Upper Works were started by Marcus Daly in 1883 and with fifty-six hand reverberatory roasting furnaces, with hearths 50 by 14 feet, and twenty-eight reverberatory matting furnaces, with hearths 20 by 14 feet. A smelting charge weighed three and one-half tons, and twenty-one tons were treated in a furnace in twenty-four hours. In 1885, two Bruckner roasting furnaces were added. After the fire in 1889, the works were rebuilt and remained practically unchanged until they were closed down in November, 1901. At that time they contained forty Bruckner roasting furnaces with cyliuders 18 by 9 feet, four MacDougall roasting furnaces (16 feet diameter and 21 feet high), with six hearths, four Wethey calciners, with hearths 100 by 12 feet, and 11 reverberatory matting furnaces, with hearths 31 by 16 feet, a matting furnace taking nine-ton charges and treating sixty tons ore in twenty-four hours.

The Lower Works of the Anaconda Copper Mining Co., located 2 miles below the Upper Works, were built under M. Daly by O. Stallmann. The smelting departmeut was started December, 1888, with fifty-six Bruckner cylinders (9 feet 6 inches by 18 feet) and twenty-eight reverberatory matting furnaces, with hearths 22 by 16 feet, a matting furnace receiving six-ton charges and treating forty tons ore in twenty-four hours. The smelter buildings, which were entirely of timber, were entirely destroyed in March, 1889, by a fire which started in the coal bins. They were quickly replaced by a steel structure. In 1890, forty Bruckner furnaces of the same size as the first ones were added to the plant, and in 1899 were added four MacDougall furnaces of the Evans-Klepetko pattern (16 feet diameter and 21 feet high), with six hearths. Of the twenty-eight original matting furnaces, seven were enlarged in 1899; three had hearths 32 by 18 feet, 33 by 18 feet and 45 by 18 feet; and four, hearths 35 by 18 feet. They were charged with about eleven tons of ore and averaged seventy-five tons in twenty-four hours.

The converter plant was started in 1890 with fifteen stalls for upright vessels, 10 feet high and 6 feet in diameter. In the same building were six blast furnaces 8 feet by 3 feet 6 inches at tuyeres and 10 feet high.

New Electrolytic Refining Plant, still in full operation, started in 1894, refines part of the converter copper of the Washoe works, the rest being shipped to Baltimore for treatment. The old experimental plant, started in 1891 and closed in 1893, contained 630 tanks.

The New or Washoe Works of the Amalgamated Copper Co. were planned and erected by F. Klepetko. When the Amalgamated Copper Co. obtained control of the Anaconda and Washoe Companies, it was decided to erect new works instead of remodeling and enlarging those of the Anaconda Co. The works were started in 1902, contain forty-eight six-hearth MacDougall-Evans-Klepetko roasting furnaces, 16 feet diameter and 21 feet high; five blast furnaces (56 by 180 inches at the tuyeres and 14 feet 10 inches high); fourteen matting reverberatories (hearth 20 feet by 51 feet 2 inches) and eight converter stands (barrels 12 feet 5 inches long and 8 feet in diameter). The fumes from these four departments are drawn off by four stacks, 200 feet high and 23 feet 6 inches inner diameter, the lower 20 feet being lined. As the fumes damaged the crops in the Deer Lodge valley, it has been decided to deliver them 500 feet higher up into the air. The fumes from the four departments will be conducted through branch flues into one brick main, 2300 feet long, built on a hillside, and ending in a stack 300 feet high and 30 feet inner diameter. The main will be 37 feet deep; the first 1300 feet will be 60 feet wide, and the remaining 1000 feet 120 feet wide. Underneath will be a tunnel to receive the cars, into which will be discharged the flue dust. It is expected that the new addition will be finished this summer (1903).

Boston & Montana Con. Copper & Silver M. Co.'s Great Falls Plant.—Ground broken in the spring of 1890. Plant first consisted of twenty-four Bruckner roasters (cylinders 8 by 16 feet), eight tilting reverberatory matting furnaces (hearth 13 by 16 feet) and two five-ton upright converters. Matting furnaces, having regenerative chambers and fired with producer gas, resembled the Campbell open-hearth steel furnaces. Plant has been greatly enlarged since 1890, under the management of F. Klepetko, and furnaces much changed to meet constant demand for increased capacity. Present plant: Twenty - four Bruckner cylinders (8 by 16 feet), all idle except two or three used for drying slimes from the concentrator; eighteen six-hearth MacDougall-Evans-Klepetko roasting furnaces (16 feet diameter and 21 feet high); five gas-heated stationary matting reverberatories with regenerative chambers, four of which have hearths 42 feet 6 inches by 15 feet 9 inches, and one has a hearth 29 by 12 feet; five blast furnaces (18 feet high to charging floor, four are 56 by 180 inches, and one 44 by 180 inches at tuyeres); twelve five-ton upright converters (7 feet diameter and 14 feet 7 inches high); one anode casting reverberatory (hearth 14 feet 8 inches by 22 feet 6 inches) with Walker casting machine; and an electrolytic copper refinery with 312 tanks and four copper refining furnaces of different sizes.

The early history of this company may be summarized by the beginnings of the several operations: Concentrator, March, 1891; Bruckner cylinders, April, 1892; reverberatory matting furnaces, April, 1892; converters, August, 1892; blast furnaces, April, 1893; refining furnaces, January, 1893; electrolytic refinery, February, 1893.

Nearly all the smelting works have concentrating works.

THE ORES.—The ores of the Butte district are classified by Goodale as copper-silver ores, silver-copper ores and silver ores. The copper-bearing minerals of the copper-silver ores are chalcocite, bornite, enargite and chalcopyrite; the gangue is quartz and feldspar. The copper and silver-bearing minerals of the second class are wurtzite, sphalerite, bornite, chalcopyrite, pyrite, tetrahedrite, enargite, tennantite and galenite; the gangue is quartz and feldspar, with some barite and fluorite. Of the silver ores, which are of secondary importance, the silver-bearing minerals are pyrite, sphalerite, galenite, tetrahedrite and argentite; the gangue is quartz, rhodocrosite and rhodonite. With regard to metallurgical treatment, the copper-bearing ores are divided into first and second class. The line of division varies with the different mines. In general, first-class ore contains 10% to 15% copper and is smelted direct, usually in the blast furnaces, without having been roasted. Second-class ore, which forms about 90% of the ore mined, contains 3% to 6% copper and is concentrated; five concentrates are always roasted and, as a rule, smelted in the reverberatory matting furnaces; coarse concentrates, about 5 mm. in size, are often added to the blast furnace charges without having been roasted, the amount charged reaching 30% to 35%.

METALLURGICAL TREATMENT. — The metallurgical processes in the Butte district show much uniformity with regard to the general principles on which they are based. They comprise roasting, smelting, converting, electrolytic refining and casting. There is considerable diversity in the details of practice.

First-class ore, forming about 10% of the product of the mines, is, as a rule, smelted raw, and furnishes the desirable coarse ore of the blast furnace charge. Concentrates, coarse limestone and converter slag are the basic fluxes added to slag the siliceous gangue. In one instance, some first-class ore is roasted in lump form in stalls. This makes it less refractory than raw ore, and, furnishing available iron, permits the running of slags richer in iron, and hence more fusible than would be otherwise possible. Heap roasting, practiced in the early days, has been abandoned.

In crushing, the copper-silver ores readily break into small grains, making often more fines than can be carried by a stall or even by a blast furnace. This necessitates separating part of the fines by screening, the screenings going into the fine-ore roasting furnaces.

The form and general arrangement of the open stalls now in operation are the same as given in Peters' "Modern Copper Smelting." The management differs from the description given by him. In making the bed of decayed wood, first used by A. J. Schumacher at the Parrot works, no attention is paid to an open cross channel to start the fire. While Peters prefers to close the front of the stall with large pieces of lump ore, at Butte it is closed down to 2 feet from the bottom with a plate of sheet-iron, which is braced by iron cross-bars to prevent bulging, caused by the swelling of the ores while roasting. The plate is supported by blocks of wood, between which are placed small sticks and kindling. During the roast, when the contents of the stall has risen to the highest point and begins again to shrink on account of the slight clinkering which always takes place, the front plate gradually glides down to the floor. A stall holding thirty tons of first-class ore, with about 10% of copper and 30% to 35% sulphur, burns thirty days, the sulphur being reduced to 3 5% to 4%.

The fine-ore furnaces are represented by four types, the Allen-O'Hara, the Wethey, the Pearce and the MacDougall; long-hearth reverberatory furnaces, used in early times, having been given up entirely.

The Allen-O'Hara furnace is one of the improvements on the original O'Hara furnace. The two superimposed hearths are each 9 by 90 feet; the six carriages, with their plows, make the circuit in three and three-fourths minutes. Thus the ore, lying 3 inches deep, is stirred every thirty-seven seconds, and remains about six hours in the furnace. A test showed that 3.64 H. P. was required to run the furnace. The ore charged is a mixture of concentrates and fines from first-class ore, usually in the proportion of 4½ : 1, containing about 35% sulphur.

From forty-seven to fifty tons of charge is roasted in twenty-four hours, or sixty pounds per square foot of hearth area, the sulphur being reduced to 8%. One hundred pounds moist ore gives 72.7 pounds of calcines and one pound of flue dust. A furnace is attended in an eight-hour shift by one-half car-man, who brings the ore; one-half fireman; one wheeler, who removes the calcines to the smelting department; and one-eighth repair man, during the day shift only. A partial analysis of an average sample of roasted ore gave: Cu, 10.8; SiO_2, 31.6; Fe, 38 0; S, 7.6; Ag, 7.3 oz. p. t. One of flue dust: Cu, 10 8; SiO_2, 34.4; Fe, 36.5; S, 8 2; Ag, 7.2 oz. p. t.

The Wethey furnaces in operation each have four superimposed hearths. The furnaces erected in 1894 had two sets of hearths, each 50 by 5 feet, with the rabble carriages running between them, the arms projecting from the inner sides into the hearth. The furnaces, erected since 1894, have been increased to 65 by 10 feet, with the rabble arms protruding on both sides and carried on carriages on the outside of the furnace hearths. The tripping doors, which close the continuous hearth slot, are not being repaired as they wear out, the furnace seeming to do satisfactory work without them. The position of the firehox, which was built at first to heat the second floor, has been changed so that the flame may enter the top hearth and dry and kindle the moist concentrates and slimes as they enter the furnace. While the smaller size furnace, with a hearth area of 2000 square feet, puts through at the present time sixty tons of raw material with 35% sulphur, or sixty pounds per square foot of hearth area, reducing the sulphur to 8%, and consuming 5.5% of slack coal, the larger size furnace, with an area of 2600 square feet, roasts in twenty-four hours ninety tons of ore, with 35% of sulphur, or seventy pounds per square foot of hearth area, reducing the sulphur to 5% to 6%, and consuming somewhat under 4% of slack coal. One fireman attends each furnace.

The improvement in the work of the longer furnaces is due to the heat from the firebox having to travel a longer distance before it escapes to the flue, and to the ore traveling in a direction opposite to that of the flame, whereby the heat is more fully utilized than with the shorter furnace.

The Pearce Turret furnaces of three kinds are roasting ores, the single and double-deck furnaces of R. Pearce and the six-deck furnace of R. F. Pearce. A single-deck furnace, 36 feet in diameter, with a 6-foot hearth (or a hearth area of 505 square feet) and two stirrer arms, roasts in twenty-four hours fourteen tons of concentrates (Cu, 7.0%; Fe, 24.0%; Zn, 12.0%; S, 32.0%; SiO_2, 23 0%; Ag, 14 oz. per ton), reducing the sulphur to 7% to 8%, and burning 400 pounds of coal per ton of ore. The percentage of flue dust is very low.

(TO BE CONTINUED.)

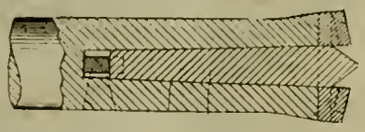
*Trans. Am. Inst. Min. Engs. (Condensed).

Mining and Metallurgical Patents.

PATENTS ISSUED JULY 28, 1903.

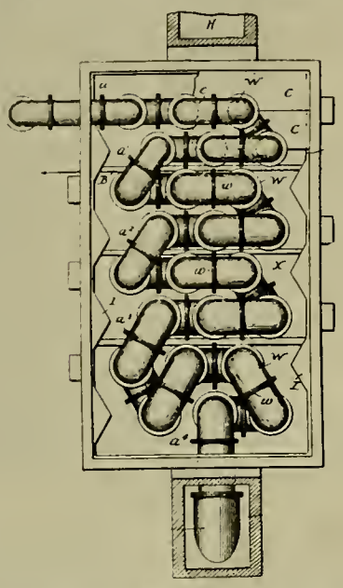
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

ROCK DRILL BIT.—No. 734,515; H. Collins, Witwatersrand Gold Fields, Transvaal, South Africa.



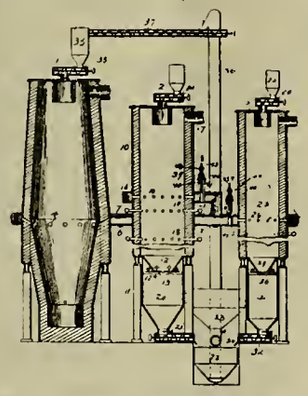
In hand rock drill or rock drill bit combination with drill or bit formed with angular grooves or slots across end thereof made tapering from center to edge of drill, of removable cutting teeth having bases made with corresponding taper in direction of lengths and adapted to be fitted into tapering angular grooves in drill end and means, located in center of drill, engaging inner ends of teeth to lock in position.

COMBINED HOT BLAST OVEN AND DUST COLLECTOR.—No. 734,523; H. W. Edwards, Oakdale, Ga.



Combination of chamber having inlet and outlet for hot furnace gases, of series pipes arranged vertically in staggered relation within chamber, and connected to form continuous conduit for blast, and means for supplying blast to end pipe nearest outlet of chamber, pipes offering less obstruction to passage of gases at outlet end of chamber than at inlet end.

SMELTING APPARATUS.—No. 734,594; P. Naef, New York, N. Y.



Smelting apparatus consisting of blast furnace, coking oven and limekiln, means for conducting gas from blast furnace to coking oven and limekiln, means for mixing solid products from coke oven and limekiln with ore, and means for conducting mixture to and discharging into blast furnace.

PROCESS OF MAKING BRICKS FOR REFRACTORY LININGS OR OTHER USES AND THE PRODUCT THEREOF.—No. 734,458; E. W. Engels, Dusseldorf, Germany.

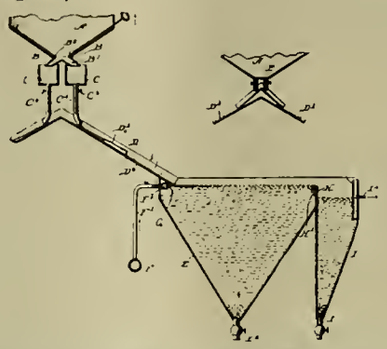
Process of producing bricks for refractory furnace linings, which consists in applying to surface of unburned brick, while in a plastic state, carborundum, and forcing carborundum into surface by pressure, before firing brick or body, subsequently firing or burning brick or body at a temperature less than that of electric arc for producing highly refractory surface which does not readily crack or separate from less refractory and more fusible interior portion.

AMALGAMATOR.—No. 734,618; G. C. Scott, Columbus, Ohio.



In amalgamator, combination with opposite supports, of bearings thereon at different elevations, polygonal rotatable casing between supports, tubular journals piercing respective ends of casing and mounted to rotate in adjacent bearings, upper journal forming an inlet and lower journal outlet, series of longitudinal spaced parallel amalgamated plates extending from side to side of casing with ends of series terminated short of ends of casing, tubular journals communicating with respective spaces between corresponding ends of casing and series of plates, baffle disposed across inner open end of tubular inlet journal, side walls of casing being provided with discharge openings at lower end thereof, cage carried by outer end of discharge journal, normally closed valve for journal, adjustable screw-threaded stem piercing outer wall of casing, and spring connecting valve to stem.

ORE SEPARATOR.—No. 734,641; C. F. Wheelock, Birmingham, Ala.



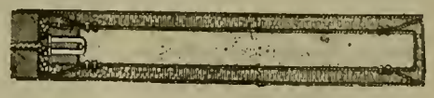
Combination of vessel adapted be filled with water and provided with means for precisely determining level of water, chute declining toward and adapted to reach level; transverse water pipe slightly below water level, approximately parallel with and proximity to discharge edge of chute discharging laterally in same general direction as chute; means for delivering water under pressure to pipe; means for regulating pressure; and means for causing thin uniform stratum dry graphite to descend chute.

ROPE SOCKET SWIVEL.—No. 734,664; H. M. Brittan, San Francisco, Cal.



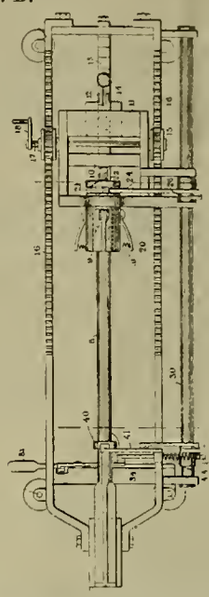
A rope socket swivel for well drilling apparatus, comprising shell provided with cylindrical chamber, rotary piston mounted in chamber, piston having longitudinal bore in which drill rope attached, and means of locking piston to shell to prevent relative rotation of parts, whereby device may be employed as swivel connection or as rigid connection.

SAFETY BLASTING CARTRIDGE.—No. 734,684; T. F. Durham, Philadelphia, Pa.



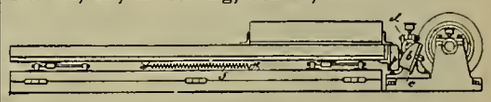
In blasting cartridge, inner and outer receptacle, each having closed lower end, fire-extinguishing agent in outer receptacle in which inner receptacle is immersed, explosive in inner receptacle, arms on ends of inner receptacle each of which extends diagonally beyond end of inner receptacle and engages ends of outer casing at inner periphery thereof.

DRILL SHARPENER.—No. 734,708; J. H. Hicks, Central City, S. D.



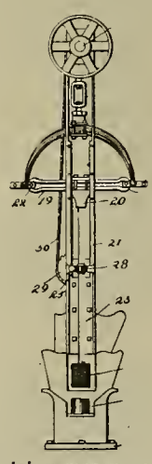
Combination with means of supporting cutting end of drill, of spring actuated means for elevating drill, and means actuated by operator for intermittently rotating and depressing drill.

HEAD MOTION FOR ORE CONCENTRATING TABLES.—No. 734,758; L. Searing, Denver, Colo.



In head motion for ore concentrators, combination of part to be actuated, and variable speed actuating means, consisting of curved reciprocating shoe for varying in one direction of movement of actuated part and at speed gradually increasing throughout, movement relative motion of shoe and part to be actuated, by shifting point of contact between the two along surface of part to be actuated during reciprocation.

STAMP MILL.—No. 734,828; W. A. Dalton, Tucson, Ariz.



In stamp mill, driving means, comprising in combination connecting rod adjustably clamped to bowed spring carrying at outer ends flexible members attached to crosshead in which is revolubly mounted stamp stem, crosshead, bowed spring, flexible connections between ends thereof and crosshead, crank shaft connected with spring, means for adjusting connection between spring and crank shaft and for rotating stamp stem, consisting of vertical worm gears on stems and horizontal worm engaging gears, worm being driven by crank shaft.

Mining Summary.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ARKANSAS.

BOONE COUNTY.

The Renner tract of 280 acres of mineral land, 5 miles east of Lead hill and south of the Washington mine, was sold last week to Baxter county parties.

SEARCY COUNTY.

The Maumee M. Co. of Harrison have decided to proceed with the erection of their concentrating mill, says Manager Hamilton.

NEWTON COUNTY.

M. Kaufman, of Dardanelle, has bought 200 acres of mineral land near the Speers mine at Yardelle, for a company of Arkansas valley men. He also bought the G. H. Cotton and C. S. Denton tract, 390 acres for $8560.

ALASKA.

J. P. Frizell of Portland, Or., reports finding on Unimak island, one of the Aleutian chain, extensive deposits of carbonates of iron of good grade.

A strike of ore is reported in the Eureka mine, near Juneau, at the 550 foot level, which averages $28 in gold per ton. This ledge outcrops on the surface 50 feet wide, says Manager T. V. Newell.

Dawson advices state returning Tanana stampeders say the wash up to June 16 was: Pedro, 2000 ounces; Gold Stream, 1000 ounces; Clear creek, 200 ounces, and Forks, 100 ounces.

ARIZONA.

COCHISE COUNTY.

F. A. Storm of New York, manager of the reorganized Copper Belle M. Co., is arranging for the renewal of operations at their group at Gleeson.

At the Middlemarch mine, near Bisbee, Superintendent O'Gorman reports having developed a flow of 50,000 gallons of water per day, which is more than enough with which to operate his concentrators.

M. C. O. Rollins and S. S. Sutton of the Crescent Copper Co. have an option on sixteen claims in the Modern district, 12 miles from Bisbee.

GILA COUNTY.

R. Fleming, mine superintendent of the Black Warrior C. Co., near Globe, says little is being done at Black Warrior at present, but by September 1st construction work will begin on the 100-ton blast furnace to be added to their smelter equipment.

GRAHAM COUNTY.

G. C. Gill, president of the Shannon Copper Co. at Clifton, says preparations are being made to build another concentrator—a duplicate of the one put up last year. The company is producing sixteen tons of copper daily.

A temporary injunction has been issued against the Standard Copper Co. of Clifton in favor of W. B. Thompson, to prevent them from taking ore from the San Jose mine, near Clifton, pending the settlement of a suit to quiet title to the same, which will be tried in October. The case will involve property valued at $270,000.

MARICOPA COUNTY.

(Special Correspondence). — It is reported that a deposit of tin ore has been found north of Phœnix.

Phœnix, Aug. 2.

(Special Correspondence).—The development work is going ahead at the Vulture mine near Wickenburg, says Manager Sanders.——Mills & Philes are working a group of gold and copper properties in the Cave Creek district.——W. L. McKay is taking out copper ore for shipment from his claims near Cave creek.——B. Ford has men at work on his mines in the White Tank mountains, west of Beardsley.

Wickenburg, August 3.

At the Angel mine west of Wickenburg, operations are being resumed under direction of S. C. Bird, of Bridgeport, Conn. He says an arrangement has been made with the Wickenburg smelter for working of Angel ores. There is ore on the dump that will he shipped to the smelter.

The Haxworth group of twenty-five claims at Agua Caliente has been sold for $100,000 to T. James of Chicago, Ill., and C. T. Kenman of Milwaukee, Wis.

MOHAVE COUNTY.

(Special Correspondence). — Hawks & Shaefer have their whim at work on the Tintic mine, near the Merrimac mine, near Chloride. The underground workings are flooded and as soon as they are unwatered and the drifts cleared of debris development will be resumed by drifting from the 90 foot level of the shaft. The ores carry $100 per ton in gold, with some silver.

W. J. Cleeland of Philadelphia, Pa., president of the Philadelphia & Arizona M. Co., says work will be resumed on the Minnesota mine, which has been closed since spring. Forty men will be put on and it is intended to drive the drift on the 600-foot level ahead, and to go down 400 feet deeper in the main shaft. Large bodies of milling ore are said to be showing in the lower workings.

The new silver prospect which is being opened up northwest of Chloride, near the Juno mine, by J. Carroll is reported improving. Sinking continues.

Hughes & Mitchell continue in ore on the Century mine, near the Altata. The new shaft is down 65 feet, where there is a body of ore of shipping grade 2 feet wide. The ore is a mixture of horn silver and iron carbonates. A shipment of the ore, which is mostly on the dump, will be made next week.

The first half of the 100-foot contract for sinking the 140-foot shaft on the Sunrise mine, below Chloride, is finished and a large body of ore is being opened up. J. Barry of Los Angeles, Cal., is owner of the property and is superintending the work. He says development work will be increased and the Sunrise will become one of the steady shippers of the camp.

J. Dixon reports mining operations active around Cerbat. He is taking out high-grade gold ore in developing the mine, which he owns. The gold values, however, are decreasing and are being replaced by silver. Sinking will continue and drifting will be started.

Only two of the leading mines are being worked at Stockton Hill, the Earl and the De la Fountaine. Both of these have a large number of men at work and making good shipments of ore.

Chloride, Aug. 3.

At the Great West mine, in Weaver district, near Kingman, the Pacific Reduction Co. is preparing to build its reduction plant. Scarcity of water is one of the drawbacks. The ores carry values in gold.

The Marquette Exploration Co., of Chicago, Ill., who have bonded for $250,000 the Dempsey & O'Dea group of claims in San Francisco district, 9 miles west of Chloride, are making preparations to increase development work.

PINAL COUNTY.

(Special Correspondence).—The Copper Buttes M. Co. have seven men at work sinking a shaft on one of their claims, 8 miles west of Kelvin.

Kelvin, Aug. 2.

The Christmas Gift gold mine, 30 miles south of Casa Grande, was bought last week by the Platt Cobre M. Co. of Denver, Colo. The property is considered of great value. Complete equipment and operations will follow.

J. W. Sisson, of New York, president of the Troy-Manhattan C. Co., reports work progressing in their mines at Troy. In the Alice mine, the Alice tunnel is being driven from the west side of the mountain to cut the Alice vein at depth of 800 feet, and will be some 1700 feet in length. Through it, all the ore from the mine will be delivered into bins at the tunnel portal and conveyed by aerial tramway to the reduction works to be built on the Gila river. The Prescott & Eastern railroad, under construction, will pass within a few miles of the Troy mines.

SANTA CRUZ COUNTY.

Superintendent J. A. Fraser says the Ragnarok mines, in the Oro Blanco district, have been sold to D. H. Jennings of Bridgeport, Conn., and J. T. Quinlan, E. L Foster, F. M. Bishop et al. for $150,000. There are three veins on the Ragnarok which will furnish a good tonnage of free-milling ore. Operations will be started this week and machinery put in for the treatment of the ore. Oro Blanco is 75 miles south of Tucson and just over the Pima county line in Santa Cruz helow Arivaca.

YAVAPAI COUNTY.

The Rapid Transit M. Co. has thirty hurros packing ore from the mine to Middleton station, on the Bradshaw Mountain Railroad, from which point the ore is shipped to the smelter. The railroad will be continued to Crowned King and a wagon road will be built to the Rapid Transit by the way of Gray Eagle and Tiger, making a short haul from all mines in Oro Bella hasin, says the Prescott Courier.

YUMA COUNTY.

The Belle of Arizona group of gold-bearing quartz claims, 2 miles from the Guadaloupe mine, and 8 east of Quartzsite, have been bonded to W. M. Kellogg of Hartford, Conn., for $25,000.

The Socorro mine at Harrishurg has shut down for an indefinite period, the management reporting labor troubles as the cause.

In Cunningham pass, 2 miles from the Bullard mines, near Harrisburg, the Bill Crown and War Eagle group of sixteen claims has been sold to Eastern men and the Bill Crown M. Co. incorporated, with F. C. Smith of Chicago, Ill, R. Dunlap and R. F. Lintermann of Chicago, Ill., as officers.

The Ward group of mines, above the Socorro mine, near Harrishurg has been bonded to G. W. Middleton of Prescott, and men have been put to work running a tunnel, which at 300 feet they expect to cut a ledge of free-milling ore.

CALIFORNIA.

AMADOR COUNTY.

At the Fremont Con. mine at Amador City work on the 40-stamp mill is progressing and part of the machinery is on the ground. The gallows-frame is finished and is 96 feet high.

W. A. Nevills says arrangements for starting work on the Moore mine, south of Jackson, have been completed. Timbers for the repair of 500 feet of shaft are ready to be shipped to the mine. The uncertainty of the labor situation is the only drawback.

The Climax mine, east of Jackson, has been bonded to P. B. Aiken et al. of San Francisco, who have started development work. The property was formerly known as the Reed & Askey.

At a meeting of the directors of the Lincoln Co. at Sutter Creek, held last week, it was decided to close down. The work of taking up the track is in progress.

BUTTE COUNTY.

L B Johnson, assistant superintendent of the Gold Bank mine, near Forbestown, owned by H. P. Stow, reports work progressing. A number of ledges may be most economically worked by driving the Gold Bank tunnel through the mountain and building a mill at its mouth. This would do away with hoisting expenses and give greater fall to the water which drives the present mill. A power plant at the mouth of the tunnel would develop five times the power now developed at the present mill-site without adding to the water supply. The Gold Bank tunnel is driven into the mountain 750 feet vertically below the collar of the Gold Bank shaft and is 2300 feet in length.

CALAVERAS COUNTY.

The Angels Quartz M. Co at Angels report they intend to add another twenty stamps to their mill, the work of grading for which was started this week.

EL DORADO COUNTY.

The Rescue M. Co. has been organized by A. F. Anable of Rescue and J P. Vane of Oakland, with R M. Crackles, P. A. Marriotte and W. E. Reed, and has bought the Coon Crossing gold quartz mine, near Rescue. They will begin development next week. The ledge, averaging 20 inches in width, is of high-grade ore. A F. Anable, superintendent of the Golconda mine, near Rescue, will superintend the development work at the Rescue. They intend to put up a 5-stamp mill, to be operated by either steam or gasoline. The following are the directors: R. M. Crackles, P. A. Marriotte, W. E. Reed, A. F. Anable and J. P. Vane.

Thirteen men are at work at the Noonday copper mine near El Dorado. The road to the mine is being repaired by the company, preparatory to hauling out the ore for shipment.

A new three-compartment shaft will be sunk on the Darling mine, east of Georgetown, says the Gazette.

FRESNO COUNTY.

The Chicago West Point, Chicago Limited and Chicago Reliance companies, operating near Coalinga, have been consolidated under the name of the Chicago Con. Oil Co.

J. A. Bunting and M. Scott have bought the controlling interest in the Esperanza Oil and Gas Co., operating at Coalinga. The Esperanza has two flowing wells of 19° gravity oil, producing 400 barrels each per day. Its No. 3 well is in the oil sand, with good indications.

KERN COUNTY.

The Junction Oil Co., near Bakersfield, has its fifth well down 650 feet and the sixth rig is being built.

The California Kern Oil Co., operating at Kern river near Bakersfield, are preparing to build a refinery on the property. The company has completed its second well.

C. H. Congdon, superintendent of the Union Pacific Oil Co, operating in the Carisa district, 6 miles southwest of McKittrick, reports operations resumed.

The Potomac, in Kern River field near Bakersfield, is again placing all its wells "on the beam," abandoning the use of the air compressors after two years' trial, says Manager Morton, the reason for this being that the compressor requires too much submersion, while on the beam the well can be pumped dry. The Mercedes and Globe companies are still using the air compressor, and the Potomac increasing its boiler capacity.

MARIPOSA COUNTY.

Manager Ward has resumed operations at the Pinon Blanco mine, near Coulterville.

MONO COUNTY.

The cyanide plant at the Dunderburg mine, near Bridgeport, was totally destroyed hy fire last week; cause unknown. Preparations were being made to begin working of tailings and some of the tanks had been filled.

NEVADA COUNTY.

The Sixteen-to-one mine at Gaston resumed work last week, says Manager Eagan, of Sacramento, who is at the mine.

Manager G. Lezinsky of the Gold Tunnel M. Co. says they have taken possession again of the Orleans mine, on Gold Flat, near Nevada City, the Baldwin lease having expired. Arrangements will be made for sinking a new shaft and the ledge developed.

It is expected that operations will be resumed at the Eagle Bird mine, near Maybert, which is owned by an Eastern company, and which has for three years past only kept its pumps moving, says Foreman Wilson.——At the Gray Eagle the 10-stamp mill has been running steadily with satisfactory results, says Superintendent H. Kalaher. The Gray Eagle is worked through a tunnel.

The mill at the Last Chance mine, near Nevada City, will be started up this week. Considerable development work will be done.

Superintendent E. M. Labadie, of the Grass Valley Con. mine, near Grass Valley, owned by J. M. O'Brien, of San Francisco, has started sinking another shaft 300 feet from the old one. He has men at work on the 800 foot level raising on the hanging wall. Heavier machinery will be put in.

At the Hudson mine on Deer creek, below Nevada City, work is progressing. The pumps have been taken out of the old shaft and are being set up in the three-compartment shaft, and the hoist from the incline shaft also moved. The entire plant is to be run by water power under a 400-foot head.

Manager Hay of the Ironclad mine at Rough and Ready has bought 120 acres of land on Randolph flat and will put a hoisting and pumping plant on the Reese shaft, which will be reopened.

PLACER COUNTY.

G. Skidmore of North Bloomfield has bought a half interest in the T. Power gravel mine, at Iowa Hill, and development work will be increased.

A rich body of gravel is reported struck on the Peckham Hill property at Spring Garden, on the Forest Hill divide. The group is composed of a number of claims, aggregating several thousand acres, and owned by A. C. Burrage of Boston, Mass. The tunnel is going ahead, says Superintendent G. McAulay.

SAN BERNARDINO COUNTY.

J. Goldsmith, manager of the Tennenbaum turquoise mines, near Manvel, says he has resumed operations on their group.

SANTA BARBARA COUNTY.

On the Western Union Oil Co ground near Santa Maria there are seventeen wells, and the company propose to sink more. Well No. 13 will be made a test well and they will go down 3000 feet. The work will be done with the rotary drill. Most of the company's oil is being sent through the pipe line to Careaga, from which place it is pumped to Alcatraz, and thence loaded on deep sea vessels, says A. J. Osgood, superintendent.

SANTA CLARA COUNTY.

(Special Correspondence) —The Quicksilver M. Co., operating the New Almaden quicksilver mines, are handling an output of 4000 tons of ore per month. The ore carries the cinnabar in disseminated particles, and is reported to run 0.5% in mercury.

They have six furnaces in operation, two of which are of two compartments and one of three compartments. They have an ample water supply. At the mines the ore is being taken out partly through shafts and partly hy tunnels. T. Derby is superintendent.

New Almaden, Aug. 6.

SHASTA COUNTY.

The Shasta King mine, near De Lamar, is reported closed down for the present.

At the Anchor mine, in Buck gulch, near De Lamar, connection has been made between the tunnel and the shaft. Ore taken out during the driving of the tun-

nel is being taken back in 500 feet, hoisted 270 feet, dumped into bins, hauled one-third of a mile in wagons and sent to the smelter, says Superintendent H. C. Anchor. He expects to make an output of fifty tons a day.

SIERRA COUNTY.

At Poker Flat, near Downieville, the Poker Flat M. Co. are putting in a roller quartz mill.

F. P. Roddy et al., who have bonded the Willoughby mine, near Gold Valley, have men at work preparing to open up the mine. J. B. Lasslat is superintendent.

SISKIYOU COUNTY.

P. S. Gallagher, of Cherry Creek, near Yreka, sold two of his claims to C. Paige last week. Gallagher says he will put men at work sinking a shaft on his McCormick mine.

The work of running a tunnel in the Headwaters quartz mine on Humbug creek, near Yreka, is progressing and they expect to strike the ledge at 200 feet. The company has a mill on the ground with steam engine and boiler, ready to start orushing at any time.

TUOLUMNE COUNTY.

(Special Correspondence). — John A. Neale of Sonora is mining on town lots in the center of the city of Sonora. For years these lots were covered by business buildings, but they were destroyed by fire in 1900, and the owner is now placer mining on the site of the buildings. Besides a large return in coarse gold, Mr. Neale has found a considerable sum of money in coin. Many of the coins are gold, and both gold and silver coins are of many foreign countries. Mr. Neale says the result of mining operations on these lots will more than pay for rebuilding the structures destroyed by fire. He is also working the Neale pocket mine, formerly the Sugarman, on Bald mountain, near Sonora. This mine has produced many thousands of dollars in crystallized gold and tellurium.

Sonora, Aug. 3.

W. Floyd has bought the Sharwood & McTarnahan two-third interest in the Garfield quartz mine, south and adjacent to the Grizzly mine, near Carters, for $5000. A. B. Smith has bought the Collins half interest in the Annie Belle gold mining claim on Mt. Eaton, near Carters.

B. Kolich of Columbia has bought a one-third interest in the Old Home placer mine, near Yankee hill.——C. F. Lukens has bought a sixth interest in the Belcher, Daisy, John W, East and West Ledge quartz mines and the Belcher millsite, near Carters.

A. C. Johnson of Carters has bought the Jacoba one-sixth interest in the El Oro quartz mine, 2 miles south of Carters on Long Gulch mountain.——The Gladys G. M. & M. Co. has bought the Clare D, Jean G and the Bride quartz mines, also the Fanny S, Isabelle and Lulu B quartz mines.

W. S. O'Brien has bought the Curley interest in the Niagara quartz claim, 5 miles north of Groveland. —— H. J. Hughes, J. Barry and E. Sharp have a bond for a deed to the Josephine quartz mine, northwest of the Jones mine and south of the Brown Bird, near Sonora.

G. Williams will resume operations on the Christmas-Berrybush mine on Bald mountain, near Columbia.

At the Telegraph Hill mine, near the Dambacher ranch, a new boiler and hoist have been set up.

YUBA COUNTY.

The Pennsylvania mine at Brown's Valley has been closed down and the machinery on the property is being sold, including a $50,000 electric plant.

At the Pennsylvania mine at Brown's valley, 12 miles east of Marysville, on the 2nd inst., while J. Dean and G. W. Richards, miners, were on the truck in the shaft with the pump at the 1400-foot level the cable parted and the car dropped 100 feet down the incline. Dean rolled off and escaped, but Richards was killed.

COLORADO.

BOULDER COUNTY.

The Dirigo group of mines of six claims in Hawk Eye district, 8 miles from Black Hawk, has been sold to L. D. Godshall of Denver, and final payment made this week. The price is reported at $22,500. Extensive development work is planned. Milling ore has been opened up. The Moffat railroad will pass within 2½ miles of the group. It is intended to thoroughly develop the property before an attempt will be made to treat the ore.

CLEAR CREEK COUNTY.

The Chicago Mountain M. Co. has bought the Black Swan tunnel, the R. B. Hayes and other patented claims 1½ mile from Idaho Springs, on Chicago creek, which they will consolidate with their other claims. The tunnel is being cleaned out and the new track laid, preparatory to driving ahead to develop the Chicago mountain veins, says the Times. The tunnel runs in on the Black Swan vein. —— It is reported that local parties will take over the East Hukill claim in Hukill guich, who will put on a steam plant and continue to sink the shaft. The property is owned by the Haggerty estate at Coalport, Pa.——Anderson, Tanner & Carlson have bought the steam hoisting plant on the Crockett mine, near the Stanley, and it will be put on the Beacon of the West, near Russell guich, which they are operating under lease and bond. —— The New Century mine in Hukill gulch has its steam plant in operation and has begun sinking the shaft.

CUSTER COUNTY.

W. D. Murphy, who closed down the Vanderbilt mine last week, has transferred his miners to another group near Silver Cliff and adjoining the Silver Bar mine.——It is stated the Valley M. Co. will build an ore-treating plant near its mines. President Magamen says they have decided to increase development work.

The Vanderbilt mine, near Querida, has been shut down. It was being operated under bond and lease by D. W. Murphy of Kansas.

Mining operations on the American Flag mine, owned by the American Flag G. M. & M. Co. of Pueblo, near the Bassick mine near Silver Cliff, will be increased. The shaft will be sunk from the 150-foot level. H. Fugel is president.

The Bassick G M. Co., near Silver Cliff, has decided to deepen the main shaft to the 1800-foot level, extending it 200 feet. Arrangements are being made with the Canon City Electric Power Co. for running their hoist with electric power, says Superintendent W. H. Anderson, of Aspen.——The Little Bernice group resumed work this week after a temporary idleness. The company is driving a drift and the cutting of a good shoot at the 280-foot level is expected next week. A quantity of medium-grade ore is being sacked daily from the Louella mine by Thomas & Lawrence. The Blackburn claims are being developed by Smith & Knight.

FREMONT COUNTY.

The Purity Coal & Oil Co. of Denver men has made arrangements for starting a shaft for coal development adjoining the Rockvale coal mine, south of Florence. The company has decided not to sink any oil wells on its coal ground until later.

The Union Oil Co. is arranging to drill for oil near Florence. Leased from the United and other oil companies they have 560 acres of unexplored territory. Of this 480 acres are on the north and 80 acres on the south side of the Arkansas river, says President L. F. Collins. The United Oil Co. is doing considerable work preparing for an increased oil production from the south end of the field. The lines that are used in conveying the oil from the wells to the refinery are being enlarged.

GILPIN COUNTY.

C. Duffield of Denver has resumed operations on the Baltimore tunnel in Gamble gulch, near Rollinsville, and owned by Maryland parties. —— D. C. Earl has a lease on the Perigo mill, and will run it on ores from the Perigo workings. It has not been running steadily on account of the wet condition of the Perigo workings.——Iowa parties are interested in the Blue Grass M. & M. Co., operating the Lone Star, Champion and Tenderfoot group in Phœnix district. They are continuing developments on the Lone Star and Tenderfoot claims and are opening up ore. It is intention of company to build a mill of twenty-five tons daily capacity, either on South Beaver or South Boulder creeks.——It is reported the Mountain Chief mine on Tip Top will be reopened. The shaft will be unwatered and sunk 100 feet deeper.

The Cadillac M. & M. Co., in which Canon City, Colo., and Cadillac, Mich., parties are interested, has taken a lease and bond on the New Hampshire group of claims, near the head of Lump guich, near Rollinsville.——T. Tregay has resumed work on his Honest Boy claim up Lump gulch.

The Evergreen mine, near Apex, has been sold to W. R. McCormick of Denver for $25,000. The tunnel will be driven ahead. The Evergreen ore carries copper and silver, with small values in gold.

GUNNISON COUNTY.

(Special Correspondence).—Excitement still runs high at Nugget City, near Gunnison, where the gold strike is reported. A large number of men are going into the new field.

Gunnison, Aug. 1.

(Special Correspondence).—At the property located by J. C. Bowerman, 3½ miles from Pitkin, the workings are filled up and guarded. Bowerman reports very high assays. They are starting a tunnel to cut the vein 256 feet below the surface. It is stated their reason for not working the property at the shaft is on account of people packing away their specimens and rich ore, and they decided to cover it up until they can build a shaft house. It is believed by many that some one will make a good find, as there are a large number of prospectors in the camp. The nature of the rock where the strike was made is porphyry and quartz.

Camp Bowerman, Aug 3.

HINSDALE COUNTY.

(Special Correspondence).—The Henson creek lead mines, 3 miles west of Capital City, made a short run with their new mill last week and closed down temporarily. It may be necessary to make some changes in the mill before they will be able to run.

The Hanna M. & M. Co. are overhauling their mill and putting in additional machinery. They will install zinc separators and concentrators. The mill when completed will have a capacity of 100 tons per day.

Capital City, Aug. 1.

(Special Correspondence).—The Ute & Ulay Co. have their shaft down 420 feet and drifting for the vein. If the vein proves satisfactory, it is the intention of the company to build a mill. J. Duffy is superintendent.

The California Con. M. & M. Co. have struck a 3-foot vein, the ore shoot averaging 2½ feet in width. The main tunnel is in 600 feet. They have eight claims, including mill-site. A mill will be built this fall. The company will put in a larger compressor and additional drills. The group is on Henson creek, 3½ miles from Lake City. They are working nine men at present. W. Krudup, vice-president of the company, is superintending the work on the mine.

Henson, Aug. 1.

(Special Correspondence).—The Isolde mine, in Burrows Park, has struck another vein of ore, which runs $300 in gold per ton.

The Tobasco G. M. & M. Co., closed down for some time, has again started operations. There are twenty-five men at work and this number will be increased. They have about 5000 tons of ore on hand. O. W. Pierce is manager.

Lake City, Aug. 2.

LAKE COUNTY.

The tonnage for July of the mines of Leadville camp varied little from that of June, being 60,000 tons. Of this amount the Arkansas Valley plant and other trust plants took 60,000 tons, while 20,000 tons went to the Salida smelter and the zinc plants. All of the large producers are under contract.

The machinery for shaft No. 1 of the Gilt Edge mine, which adjoins the A. Y. and Minnie in California gulch, at Leadville, is in place and the work of connecting it with No. 2 shaft started. The latter is down 500 feet, and when the drift from the bottom reaches under No. 1 an upraise of 150 feet will be made.

The Fitzhugh shaft of the Elkhorn M. Co. of London, England, and in Big Evans gulch, near Leadville, has been leased to R. Estey and T. D. Kyle. The mine is supplied with a plant of machinery.

The long drift which will connect the ore bodies of the Midas and the Coronado mines at Leadville was completed last week and is 900 feet in length. The Midas has upraised to make connections with the drift, striking it at 100 feet above the present workings, says the Chronicle. The Coronado has repaired the damage done by the recent fire and are pushing development work, besides shipping 100 tons a day.

It is reported the Dolly B group in Big Evans gulch, at Leadville, will resume operations this month. P. K. Connolly is manager.

LA PLATA COUNTY.

The Eureka & Bulldozer mines, near Durango, having joint workings, have resumed under new management, and a double-compartment shaft started, from which drifting will be begun at 50 and 100-foot levels, and ore extracted from present workings.——The Comstock, Columbus, Cumberland and Bessie G. properties are idle, but it is expected operations will be resumed this season.——The Providence Co. is operating the Wilkinson group with three shifts and has begun to ship regularly.——The Durango Girl mine has been taken over by the new management, the Hazard Co., which bought it recently. They will put on more men and increase development.

SAN JUAN COUNTY.

J. H. Pape of Colorado Springs, manager of the Ledge M. Co. at Silverton, reports operations going ahead and seventy men are at work. The 200-ton concentrating mill is handling 100 tons per day, but will be run up to its full capacity, as preparations are being made to break down 200 tons a day. The Ledge is located 1½ mile from the Yankee Girl and Guston and said to be the same vein system. It is equipped with shaft house and hoist good for 1500 feet.

TELLER COUNTY.

C. Boll, who has a lease on the Molly Kathleen mine, above the El Paso Gold King at Cripple Creek, will put up a 100-ton cyanide mill below the dump on the west side of the shaft. In the second level the ore shoot has been broken into for a distance of 25 feet. This ore assays one ounce in gold. The ore body lies between basalt and andesite. On the 700-foot level development work is in progress. At this point they have come into the Gold King quartz vein. The cyanide mill will treat both the dump ore and that hoisted from the 200-foot level.

It is stated that the Mary McKinney M. Co. resumed work this week, and 100 men will be employed. The mine has been shut down three weeks owing to changes to the shafthouse, and in addition the company has been putting in ore washing machinery. The Mary McKinney has increased the capacity of its ore bins to 250 tons.

The work of remodeling the Beatty plant, near Cripple Creek, is reported completed. Stevekin & Zimmerman announce that they will soon be ready to receive ore. The mill has been converted into a cyanide plant and will treat the dumps of the Golden Cycle and Lillie mines.

The Key West G. M. Co. has given a lease to P. Gortner et al. on its Con. Virginia claim on Carbonate hill, near Cripple Creek. It has a shaft 50 feet in depth, which will be used by the lessees.

The directors of the Banner G. M. Co. last week granted a lease to Wilder & Crummer on the middle block of the Fountain Valley claim of the company, near Cripple Creek, at 20% flat royalties. The lessees will use the Fountain Valley shaft, which is down 145 feet, and from this point will do exploratory work.

Of the 255 blocks into which the Cripple Creek holdings of the Stratton estate have been divided for leasing purposes, three more were let last week to parties who start developments this week. So far, the directors have leased twenty blocks of ground, all in Poverty gulch, leaving 145 blocks in that section and ninety on Bull Hill yet to be let out. The above mentioned three are: J. Simpson of Cripple Creek on block 12, a portion of the Nada claim; C. Butler of Cripple Creek on blocks 99 and 100 of the same claim; and the third to J. Grannis of Colorado Springs on block 135, embracing the Baby McKee claim in Poverty guich. On each of these the lessee is required to do heavy sinking and other development work. W. Lloyd, secretary of the Stratton Cripple Creek M. & Dev. Co., says it is intended to lease all of the Poverty gulch holdings before leasing the Bull hill estate.

F. J. Campbell, manager of the Vindicator Con. G. M. Co., in his report covering the operations of the company for the first six months of 1903, shows: Smelting ore, a gross production of 4,991 tons, yielded an assay value of $258,667; freight and treatment charges were $49,734.59. The gross production of milling ore was 3,057 tons, which yielded an assay value of $49,135.58; freight and treatment charges, $21,997.55. The combined tonnage was 8,048 tons, that yielded a total assay value of $307,913.19 and net proceeds of $236,081.05. The production came from three shafts, as follows: Smelting grade—Shaft No. 1, net tons, 4,016; Shaft No. 7, net tons, 953; Shaft No. 11, net tons, 20. Milling grade — Shaft No. 1, net tons, 2,394; Shaft No. 7, net tons, 297; Shaft No. 11, net tons, 365. The total operating expenses of the mine were $113,364 31; the general expenses, $6,509.35. Of the production of $307,813.19 the lessees shipped ore amounting to $36,218 98.

The State Investment Co. of Denver, H. A. McIntyre president, will lease out all of its holdings in Cripple Creek district at royalties of from 5% to 20%. There are twelve claims for lease, and not all contiguous.

The Mineral Hill Railway & Tunnel Co. has been organized at Cripple Creek, with D. F. Blackmer president and manager and L. C. Moore secretary and treasurer, and they propose to drive a tunnel into the hill for 3000 feet. The tunnel has been started on the west side of Mineral hill on the Favorite fraction, and is in 190 feet. The management expects to eventually cut the granite contact, which traverses the hill at a depth from the surface of 800 feet.

McLeod & Eshy have a lease on the surface workings of the Unexpected mine, near Windy Point, adjoining the War Eagles mine, at Cripple Creek, and will build a cyanide mill of fifty tons daily capacity. They propose to use a ¼-inch mesh.

IDAHO.

BLAINE COUNTY.

The Idaho Mines Con. Co. resumed operations at its Red Cloud group of mines, near Hailey, this week, says I. E. Rockwell, manager.

BOISE COUNTY.

The Lincoln mine, in Pearl district, of which J. T. Hodson of Salt Lake City, Utah, is manager, will be equipped with electric power, the wires for which are being strung. Heretofore the plant has been operated by gasoline engines, says the News.

CUSTER COUNTY.

The Loon Creek G. M. Co., near Custer, has bought the Black Queen group of three claims, a gold-copper property, on Canyon creek. The ledge is said to be 7 feet wide and the croppings average $6 in gold. Manager Eddy of the Loon Creek G. M. Co. put men to work on the group this week.

ELMORE COUNTY.

J. L. Weaver, who is putting in a dredger near Glenn's Ferry for taking out Snake river gold, says he will begin operations this week.

S. J. Baldwin of Boise has a bond on the Pearl group in Dixie district for himself, E. S. Leaver and D. Stauffer of Salt Lake City, Utah. This group includes seven claims and a fraction adjoining the Gold Ring group on a parallel ledge. It is intended to start development work next week.

IDAHO COUNTY.

The Lucky Lad Co., operating in Buffalo Hump district, near Hump, has decided to put in a 2-stamp mill, with gasoline power for the winter, to test the property, which is being worked by a shaft, now down 50 feet. A crosscut on the vein shows 20 feet of ore of good grade. The company expects to go down 200 feet this winter, hoisting machinery being on the ground to sink to this depth. The mill will be run on the rock taken out in development work.

The Jumbo mill, near Roosevelt, will be ready to run next week.

LEMHI COUNTY.

C. Wright, manager of the Haidee mine, near Salmon, reports the tunnel going ahead at rate of 4 feet per day.——R. L. and R. M. Edwards, D. Kane and J. H. Hodgson have a bond on the Shoo Fly mine and have started to clean out the shaft and begin development. —— The Gold Ridge M. Co. has bought the Kane & Ramey quartz and placer property on Silver creek and has put men at work.

SHOSHONE COUNTY.

C. S. Crysler, principal owner of the three gold dredgers, the Mascot, Delta and Northern, near Delta, operating on Beaver and Trail creeks, has sold all his interest in the Northern dredger to Eastern men, but retains the control of the Delta and Mascot. He has bought the placer ground on Potosi gulch where it empties into Trail creek, near Delta. Crysler and Eastern men are preparing to start development work on the Wake-up-Jim group of claims on the divide between Delta and Murray, says the Spokesman-Review.

MICHIGAN.

HOUGHTON COUNTY.

The annual report of the Wolverine M. Co., near Kearsarge, for the year ended June 30, 1903, with comparisons, is as follows:

	1903.	1902
Mineral product, lbs.	11,330,370	6,232,800
Refined copper, lbs.	8,260,386	4,984,367
Proceeds of copper	$1,030,756	$ 658,602
Interest	2,504	6,730
Total receipts	$1,033,260	$ 665,332
Expenses	548,923	424,330
Mining profit	$ 484,337	$ 241,002
Construction	38,014	264,688
Net profit	$ 446,323	$ 23,686
Prev. surplus	276,467	540,153
Total surplus	$ 722,790	$ 516,467

The Centennial Co., near Calumet, has removed the old shaft house at the "A" shaft on the Kearsarge lode and has started building a larger shaft house there.

The Champion Copper Co. has let a contract for a water works system for their Painesdale Champion mine location. A tank holding 200,000 gallons will be located on a tower 75 feet high, back of the town, with a pumping station at Lake Serrault. The automatic stokers in use in the Champion mill, in connection with the fuel economizer, are reported showing a saving of 10%. Four men—two on each side—handle the battery of five boilers, three only being in steam since the compounding of the heads. The Champion has reduced the amount of water used to the ton of rock stamped from thirty-five tons to twenty-six tons, making 3,100,000 gallons to 500 tons of rock, the daily capacity of each head.

The report that the Calumet & Hecla Co. at Calumet will start production from the Osceola lode shafts this year is said by the management to be incorrect. Work on this lode will not start until the entire mill has been transformed to electric power to correspond with the six new heads—a matter of at least five years.

The new shaft at the Winona mine, at Winona, is 8 feet in the ledge, which is giving good copper indications.

KEWEENAW COUNTY.

The Mohawk mine, near Allouez, is reported producing at the rate of 7,000,000 pounds of copper per annum and that this copper is costing them about 9 cents per pound.

The new shaft at the Ahmeek mine, west of the Mohawk, near Allouez, is down 36 feet to near the ledge. Trouble has been experienced with sand, and two additional drainage shafts are being sunk. The hoist from the Centennial is on the ground and an eight-drill compressor from the Trimountain has been received.

ONTONAGON COUNTY.

The site of the smelter of the Michigan Smelter Co., owned by the Copper Range Co., operating near Rockland, has been cleared and railroad tracks are being laid for the delivery of material. The smelter company has experienced considerable difficulty due to the scarcity of unskilled labor, says the News.

MISSOURI.

GREENE COUNTY.

At Springfield it is expected a branch oxide plant of the New Jersey Zinc Co. will be established, says the News-Herald.

JASPER COUNTY.

Superintendent J. H. Stephens of the Granby Co. reports a new strike in Snake hollow on the company's tract at Joplin. Rawley, Muncie & Co. are sinking a shaft and they struck lead at 60 feet and jack at 80 feet. New Mexico parties have begun drilling in Leadville hollow on the Granby lease.

Q. Yates, J. Cragg, B. Herron et al. are sinking a prospect shaft in the Kansas City bottoms in the Consolidated M. Co. ground near the Watkins-Baird mine, near Joplin. B. Herron is superintendent.

J. W. Ellis, T. Leggitt, J. B. Gibson and D. Pool have drilled through 20 feet of ore on their lease 2½ miles southeast of Webb City.——J. Luke's Holy Smoke mine turned out 112 tons of ore last week, clearing $2500.

B. M. Stevens is moving the Boston-Cherokee mill to the Mulberry mine at Duenweg.

The American-Cornfield Zinc Co. at Carterville has moved its plant from the New Century mine to the Myrtle D., where forty tons of jack and twenty-five tons of lead are produced each week, says the Herald.

One hin of zinc ore from the mine of Power & Co., on the Empire reserve, near Joplin, brought $41 per ton last week, says the Joplin News-Herald. It graded up to 64.5% zinc.

LAWRENCE COUNTY.

A good body of zinc silicate was struck last week at 100 feet in the drill hole being put down on the U. Z. land, near Aurora.

Jones & Co. have a lease on the Good Luck land, east of Aurora and north of the Frisco tract, and on which a shaft has been started.

NEWTON COUNTY.

Woodcock & Sons have bought the Cannonball mine at Granby and shut down the Rheumania. They will start work on the Cannonball this week.

SHANNON COUNTY.

The National L. S. & M. Co. was incorporated last week at Springfield by O. W. & O. D. Fisher, H. & S. A. Cordz, H. P. Thomas, F. L. Eddy, B. Heer, M. Paulsen and W. J. Orr, to operate near Birch Tree.

STONE COUNTY.

At Galena Downing & Co. are making regular shipments from one of the Mossback claims.

Boughton Bros. & Beckwith, at the Victoria mill, are running tailings and report good returns.

Greenfield, Day, Graffe & Co. are taking out 150 tons of zinc ore a week that will average $2 per ton.

Wheeler, Hallam & Hillhouse, on the Mossback lots, are sinking a shaft and will start shipments next week.

The Roena M. Co. has leased the Bonesteel mill, which it will start up next week.

Board, Messenger & Sanders have repaired the Overleigh mill, on the Schermerhorn land, and are making two tons of ore a shift from the tailings.

R. Ping has leased Scott & Co.'s mill and will start up next week. He also bought the Dwight mill on the New York Zinc Co.'s ground.

H. Bates and T. Teborr have leased the Commercial mill on the L. D. Phillips land, and are running the Dansingburg tailings.

W. J. Wilkes has put another set of 30-inch rolls in the Monte Cristo mill at Galena, and is running the Woodpecker tailings.

On the Boice & Milliken farm, 3 miles southwest of Galena, both lead and zinc ore were struck at a depth of 100 feet in the drill hole by A. Brown of Socorro, N. M., who will sink a shaft.

Jeffiers, Webster & Ping have leased the Manhot mill on the Wyandotte land, near Galena, and will expect to make twenty-five tons of zinc per week when they get the mill repaired. The ore assays 50% zinc and no iron or lead.——C. Foster, A. and D. Elder and C. Day have taken one of the old prospects on the New York Zinc Co. ground and took out thirty tons of zinc and 14,000 pounds of lead last week. They are working at depth of 65 feet.

MONTANA.

BEAVERHEAD COUNTY.

At the Birch creek smelter of the Western M. Co., operating the Indian Queen mine near Dillon, Superintendent G. H. Hiberlein reports operations continue full blast. The plant is not large enough to treat all the ore, having a capacity of thirty-three tons per day, and they propose to increase the capacity to 150 tons per day, work on which will begin by Sept. 1st.

At the Indian Queen, in the main tunnel 350 feet from the opening, a raise of 180 feet has been made in ore, and at that height a cross tunnel run connecting with the surface shaft. A winze is being sunk from the same place in the tunnel to the 150-foot level. At the station a 6 H. P. gasoline engine runs the hoist and a small pump. T. Ellis is superintendent of the mine. The Western M. Co. is also sinking on the Snowball claim.

Superintendent Stanchfield of the Ajax mine, near Dillon, says the vein opened up is showing 7 feet wide and assays $7 in gold, forty ounces silver, with 8% lead. Drifting in tunnels Nos. 2 and 3 is going ahead. It is expected the company will build a tramway, power plant and mill, work to begin next month.

BROADWATER COUNTY.

Roseberg & Sutton of Helena are pushing work on their concentrator at the Stray Horse mine, at Winston, and expect to have it running by Sept. 1.

CARBON COUNTY.

The property of the Rocky Fork Coal Co., near Red Lodge, is to be sold Sept. 1 to the Northwestern Improvement Co., which owns and operates the coal properties of the Northern Pacific Railroad Co. This company has six mines in Montana and Washington, producing 2,500,000 tons of coal a year.

FERGUS COUNTY.

At the Barnes-King mine, near Kendall, last week, the north drift from the 200-foot level opened into ore, the whole face of the drift averaging $12 per ton in gold. It is the intention of the Barnes-King Co. to drive the tunnel north from the 200-foot level, a distance of 4000 feet, to the Dog creek part of their property where another ore body is opened up. The tunnel will come out near the surface at the north end, and ore from the north end claims will be hauled via this route for treatment in the company's mill, says the Kendall Chronicle. Additional drills have been put in operation in the north tunnel, says Manager E. W. King, and he has eighty-five men on the pay roll.

Work was resumed last week in sinking the shaft at the Abbey mine, near Kendall, and will go to depth of 400 feet. E. Johnson is superintendent.

JEFFERSON COUNTY.

A strike of high-grade silver ore is reported made last week in the Liverpool mine at Lump gulch, near Clancey. The company has sunk the shaft from the 400-foot point to 750 feet with crosscuts at the 500, 600 and 750-foot levels, and in each of these has found ore, the vein being 6 feet wide at the 500-foot level with a 1-foot pay streak. The Liverpool Co. is composed of Eastern men.

The Boulder-Comstock mine, 1½ miles from Basin, has been bonded to A. S. Ray & Co. of Butte, who have started development work. A hoisting plant will be put in and the shaft sunk 200-feet from the 280-foot level. The ore carries silver and copper. Water level has not been reached.

The Dunstan mine at Elkhorn has been bonded by C. Hopkins, who will develop it thoroughly. Parties are negotiating for a bond on the Relief mine at Elkhorn. The Elkhorn Queen, Holter and Paymaster mines are being worked.

The Jacquemin-Rothfus mines near Elkhorn have been sold to the Pittsburg-Montana M. Co. for $25,000. There are three claims in the group.

After a shut down of three years work is again under way on the Eva May mine near Basin. The ore shows gold, silver and copper.

Manager Hewitt has let a contract for another 1000 feet of tunnel in the Bullion mine of the Cataract M. Co., near Basin. All of the tunnel will be planked.

LEWIS AND CLARKE COUNTY.

The Capital M. Co. of Helena is taking out high-grade gold ore from the Faith mine, in Holmes' gulch, 3 miles from Helena, and shipments have begun.

Hardgrove & Cary report opening up a promising iron lead at the head of Nelson gulch, 5 miles from Helena.——The Royal Potosi M. Co. of Butte has started work on its properties in Potosi district, which have been idle for some time.

Austin Bros. have bonded the Strawberry group, near Marysville, in Skelly gulch.——The New Boston M. Co., composed of Dakota men, has been incorporated to work a group of mines at Corbin, near Helena.

PARK COUNTY.

Work is going ahead in the Kimberly-Montana mines at Jardine. The 40-stamp mill on the Revenue mine, one of their group, is running steadily and the tailings are cyanided. The new 40-stamp mill will be running by Aug. 15, says the Inter-Mountain.

SILVER BOW COUNTY.

Work is progressing at the site of the Pittsburg & Montana C. Co. smelter being built in East Butte. Five cars of steel arrived last week. The foundations for the two 400-ton furnaces are completed and the erection of the steel frame work of the smelter has begun. Development work continues in the Farrel shaft of the company. While crosscutting the lead on the 1200-foot station a body of ore running 8% in copper, which is the same class of ore as was struck on the 800-foot level, was opened into.

NEVADA.

DOUGLAS COUNTY.

The Longfellow G. M. & M. Co. has incorporated to operate near Gardnerville by E. W. & M. E. Carman and F. Everett.

ESMERALDA COUNTY.

Superintendent Colcord of the Con. Esmeralda M. Co., 12 miles from Hawthorne, says he is making preparations to build a 40-stamp mill on their group, and it is expected to have the mill running by January. About 230,000 feet of lumber will be used.

L. L. Patrick & Co. last week made the first payment on the group which they have bought in the Tokop district, 55 miles south and west of Tonopah. Work will begin next week and the group developed. Later a mill will be put up.

EUREKA COUNTY.

Manager P. Porter last week made first payment on the Keystone group of mines near Eureka, for Chicago men, and has started development work. In the main ledge, a contact between the limestone and granite, he has opened up a body of copper-bearing ore.

LINCOLN COUNTY.

A. J. McQuaid, of Pueblo, Colo., having the Good Enough and the Rajah mines, near Searchlight, under bond, says he will increase development work. The Good Enough is the northeast extension of the Searchlight mine. The Rajah lies between the Southern Nevada mill and the Blossom mine.

M. G. Banks, superintendent of the New Era mine near Searchlight, says 6000 feet of water pipe have arrived, which will be used to pipe water to the mill which will be built.

In Newberry district, near Searchlight, the Chiquita group and the Juniper group have been bonded to the Providence Exploration & Development Co. of Providence, R. I., for $35,000 and first payment made. The Juniper group of five claims is 6 miles south of Spirit mountain, in the Newberry range. The pay shoot in the ledge is 3½ feet wide, averaging $15. A 2-stamp mill has been run on the property for several years. The development work on the Juniper consists of 650 feet of shafts and drifts in the ore body. The Chiquita group lies 4½ miles west of the Juniper and has 800 feet of workings.

LYON COUNTY.

Reports from Como indicate a revival of mining operations in that camp. The

Comc-Eureka mine and mill are in full operatinn under Manager J. H. Rae and thirty tons of ore are being crushed daily. Electric powor for operating and lighting the mine and mill is transmitted from the company's plant at Dayton, which has a reserve of 1100 H. P. if required. The company employs twenty men ——Work was rcsumed in the North Rapidan tunnel this week.

NYE COUNTY.

The suit against the Tonopah M. Co. by the Tonopah & Salt Lake M. Co for the possession of portions of the Butler group of mines was decided on the 3rd inst. In the United States Circuit Court at Carson in favor of defendant. The suit was brought on an adverse claim and a protest entered in the United States land office at Carson against the application of Butler's company for patent to consolidated claims embracing eight locations, complainants alleging that two of Butler's claims, the Valley View and the Silver Top, overlapped three of their locations. On August 30, 1900, Butler put up his location notices and on March 20, 1901, the company filed in the land office at Carson an amended notice of location, embracing eight consolidated claims. But the Tonopah & Salt Lake Co. had staked its claims so that in part they were coincident with the ground staked out in the amended notice of the Tonopah M. Co. The main plea of the complainant was that in several instances Butler's boundary stakes were not to be found, and also that his amended notice varied from that first placed by him. To this argument Judge Hawley gave the following answer: "When a valid location of a mining claim is once made it vests in the locator and his successors in interest the right of possession thereto, which right cannot be divested by the obligation or removal, without the fault of the locator or his successors in interest, of the stakes and monuments marking its boundaries, or of the obliteration or removal from the claim of the location not'ces posted thereon. The right of the original locators to change their original location, so long as such change does not interfere with the existing rights of others acquired previous to such change, is unquestioned. The amended certificate of location, when made, becomes the completed location of the discoverer, and is just as valid as if it had been made in the first instance."

C. Peters reports preparing to put in a mill of 10-ton capacity to work the high-grade ore from his mine at Ellsworth, 10 miles west of Berlin. The shaft is down 50 feet and a ledge 2 feet wide carrying $100 a ton in gold has been opened up.

The foundation for the mill to be built on the King Tonopah ground, near Tonopah, will be finished this week. They have fourteen men employed.

Diamond drill operations in the Mizpah mine at Tonopah are progressing and the hore will be driven to depth of 1500 feet below the 700 foot station.

NEW MEXICO.

GRANT COUNTY.

W. C. Chandler, who is reopening the Mountain Key mine at Pinos Altos, reports having struck a vein of gold ore which is 4 feet wide. This mine is 700 feet deep. Chandler is getting out some ore for shipment, the second grade of which he is concentrating.

The Shamrock M. & M. Co., operating at Pinos Altos, has taken a lease on the Pacific mine, owned by the Hearst estate, and has men at work. The ore from this mine is nearly all sulphides and the company is using it for fluxing purposes at its smelter.

The American Con. C. Co. will put up a reduction plant on its group in Shakespeare district, south of Lordsburg, says Manager A. R. Gibson This plant will be operated in addition to the concentrator already on the group. Gibson has also made arrangements for development by his other two companies—the Gibson Dev. Co. and the Shaw-Gibson M. Co.

LINCOLN COUNTY.

The Cashier M. Co. of Denver, Colo., operating at Anchor, has decided to run 1500 feet more of tunnel. The vein is of free milling ore running $3 per ton. A. W. Schmidt of Antonito, Colo, is manager.

OTERO COUNTY.

The Alamo M. & Dev. Co. has incorporated at Alamogordo, with M. P. Coakley, W. C. Hood, W. K. Shelton and T. T. Leask, and W. Irish of Iowa.

SAN MIGUEL COUNTY.

Superintendent Fritze of the Torpedo mine last week lowered the new pump down the Anderson shaft and is unwatering the lower levels.

At the Gold Camp, near Rio Grande, a strike is reported in the Alligator tunnel, owned by the Dora M. Co., on the eastern slope of Mineral hill, showing a 3-foot vein of ore, 2 feet of which are galena-bearing quartz The ore runs 45% lead, 22 ounces in silver and $5 per ton in gold. The tunnel is in 150 feet and this ore body was found 125 feet from the surface.

SIERRA COUNTY.

Development work on the Richmond mine, near Hillsboro, is progressing, and in the 200-foot level a shoot of shipping ore 4 feet wide has been opened up. The Richmond is owned by Boston, Mass., men, who propose to sink a double-compartment shaft to depth of 1000 feet, blocking out sufficient ore to justify the erection of a mill or smelting plant.—— At the Happy Jack mine work is progressing. They expect to start the Andrews mill next week ——The Hillsboro G. M. & M. Co.'s mill will be ready to start up this week. The pipe line from the water right to the mill is completed. An additional table has been placed in the mill, says Superintendent Kasser. In the 200-foot level of the Little Ready Pay there are 4 fect of ore that will average $30 to the ton ——The Empire Co. report that mine will put down their working shaft 500 feet before starting to run any levels.

Manager Winspear and A. J. Hirsch report work started on putting up a mill and all necessary steam power equipment for the mines of the South Percha G. M. & M. Co., near Hillsboro. They also have a whim, which will be put up on the Kingston, one of their mines. The company expects to have the 20-ton mill ready for operation by October 1.

The Minnehaha mill will start up by September 10. The difficulty in securing the needed supply of lumber has been a drawback. Work on the Minnehaha mine has been suspended temporarily and operations concentrated on the Great Republic. J. L. Terry is superintendent.

SOCORRO COUNTY.

(Special Correspondence) — The 20-stamp mill recently erected by the Socorro G. M. Co. upon its properties west of Magdalena will be in operation in a few days. This property has been developed the past year under the superintendence of C. L. Herrick of the University Geological Survey, and consists of fourteen claims, covering several miles of quartz veins in andesite, which forms both walls. The veins vary from 4 to 12 feet in width and have been explored 125 feet below the water level, with the result of uncovering more uniform ore at the greater depths. The ore is oxidized and free milling, and, though low grade, exists in large quantity and over a large area The mill will be fully equipped for concentration below the plates.

Magdalena, July 30.

NORTH CAROLINA.

UNION COUNTY.

Manager G. S. Peyton, operating the mines and mill of the Colossus M. Co. at Waxhaw, says the production of gold from the cyanide plant has started the bullion going to a refinery in Chicago, Ill. E. Gayford is in charge of the plant at the Colossus and reports raising the saving from 84% to 92%. The ore body is 400 feet between walls, showing an average of $4 per ton, the cost to mill it being 85 cents.

OREGON.

BAKER COUNTY.

J. Fawcett of Omaha, Neb., president and managing owner of the Psyche M. Co., near Sumpter, says the company is making preparations to put in a hoist with depth capacity of 500 feet, together with pumps and other machinery. Ten stamps of the twenty are dropping, says Superintendent Elmer.

At the Eureka and Excelsior mines at Bourne, owned by J. Bourne, Jr., Superintendent J. S. Wyatt says operations were resumed this week.

GRANT COUNTY.

E. S. Topping and W. E. Sanders, who have a bond on the Oreole claim, near Susanville, started work last week. The Oreole is said to carry telluride.

Work was resumed at the Copperopolis mine, in Quartzburg district, last week, after a temporary idleness, says W. W. Gibbs, managing director. He will add another drill to the compressor plant and increase development work. In the main tunnel there is cobalt in the ore, besides values in gold, silver and copper.

The Jupiter G. M. Co., operating the Prairie Diggings mine, near Prairie City, is preparing to put in machinery, including a pump and hoist, with working capacity at depth of 600 feet, says Manager Messner. The shaft is double-compartment.

J. F. Watson, of Portland, says operations are to be resumed on the Keystone mine in Quartzburg district. A hoisting plant and other machinery are being put in. It is intended to do deep sinking work before putting in a mill.

JACKSON COUNTY.

The Jacksonville Times says during the past year a total of 350 mining claims were located in Jackson county.

JOSEPHINE COUNTY.

Work is progressing at the Granite Hill mines, near Grant's Pass, and the 10-stamp mill is expected to be in operation early in September. Development work has been carried on steadily. Improvements in the equipment of the Granite Hill placers are also in contemplation, among them a hydraulic elevator on the lower part of the ground.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The Gilt Edge and Dakota Maid mines of Bear Butte district, near Galena, have been bought by Eastern and local parties for $150,000, and the Gilt Edge - Maid G. M. Co. formed, officered as follows: J. L. Turner, Springfield, S. D; W. Lardner, W. Selbie, J. R. Wilson and G. A. Duncan of Deadwood, with W. D. Lowry, Minneapolis, Minn. G. A. Duncan of Deadwood is manager. The company will build a cyanide plant having an initial capacity of 125 tons a day. The ore is said to average $7 per ton. The two groups of claims comprise 132 acres of mineral land along Strawberry gulch.

The reduction plants in course of construction and proposed will increase the Black Hills gold out ut within the next six months as follows, says the Record: The Hidden Fortune G. M. Co. will mill 300 tons daily; the Columbus Con. G. M. Co., 1000 tons daily; the Golden Crest M. Co., 100 tons daily; the Reliance G. M. Co., 300 tons daily; the Dakota Maid-Gilt Edge Co., 300 tons daily; the Horseshoe M. Co, 500 tons daily; the Dorr - Lundberg - Wilson Co., 100 tons daily; the Homestake M. Co., 500 tons daily; the Phœnix G. M. Co., 250 tons daily — a total increase of 3350 tons over the present daily capacity of all the mills of the Black Hills.

The Dizzy M. Co. is prospecting the lower quartzite ore measures on its ground below Maitland by means of a diamond drill, says the Review. This company, organized for operations in Garden City district, has 1100 acres north of the Penobscot group and expects to begin sinking this month.

Men are at work at the Gold Eagle mine, near Maitland, opening up ore bodies. A cyanide mill will be built.

Sinking has been resumed in the Hidden Fortune shaft, near Deadwood, after a shut down of several months, owing to destruction of hoist by fire. The shaft has been unwatered and they are down 300 feet. At that depth a station will be cut and drifts run to explore the Bingham vein. The alterations to the mill are progressing and the company expects to start milling ore by September 15.

The Lead City Call reports that at the Oro Hondo mine, near Lead, work in the three-compartment shaft is progressing and it is down 530 feet. The shaft is in ore and will be continued to the 600-foot level, at which point crosscutting will begin, says Manager Nix.

The Spearfish mill of the Spearfish M. Co., operating in Ragged Top district, near Spearfish, is handling 220 tons a day, all of which is coming from development work, as no stoping is as yet being done. They are driving three breasts, all in ore, in the Black Diamond vein, on the south end of the property. The Kelly cut was run in 110 feet and three laterals driven, which are in 160 feet farther. These drifts are 12 feet wide. The vein is 10 feet in thickness. On the north end of the group a vein has been opened which is 11 feet wide, assaying $7 per ton, the ore body being proved by five shafts.

PENNINGTON COUNTY.

Milling ore is being blocked out in the mine of the Golden West M. Co. at Hornblende camp, near Rochford, which assays $4 50 a ton, of which it is claimed two-thirds can be saved by amalgamation. The company intends to build a mill in the spring to replace the test plant on the ground, and will be of 200 tons daily capacity. The tailings will be cyanided. From the mine to the mill the ore will be transported by aerial tramway. J. H. Fisher is superintendent.

UTAH.

IRON COUNTY.

T. E. Stenson has men at work on the Sidewinder mine, near Stateline, sinking a shaft on the ledge. Ore is being opened up showing values in free gold, with a little silver.

At Stateline the Johnny M. Co. has put in an air compressor and will increase development work. It is proposed to later install additional stamps at the mill.—— The Hope group, owned by a Wyoming company, with W. E. Stoddart of Laramie, Wyo, as manager, is getting ready to begin development. A gasoline hoist is being set up and a working shaft will be put down.——The Venus group will be reopened.——A one-fourth interest in the Tribune group has been bought by W. E. Stoddart.

PIUTE COUNTY.

(Special Correspondence).—The Mount Baldy M., M. & P. Co., with holdings above Ten Mile creek, near Marysvale, has been incorporated, with J. Patton, of New York, president, and R. De Witt, general manager. Assays from the Overlooked shaft give returns of $150 in gold, with small percentage of silver. There are five claims in the group. An electric plant is being put in to furnish power to the mill.

The Gold Run M. Co., of Salt Lake City men, has bonded and leased the Wedge group in the Horse Heaven district, F. Dalton, of Salt Lake City, will have charge of the property. Operations were started last week and more men will be put on as fast as development will permit, and the shipping of ore will begin.

The Henry Bradburn M Co., in the Cottonwood district, has men at work and report operations progressing. Two tunnels are being run to crosscut the vein, which is 75 feet wide. H. Bradburn is manager and J. U. Sargent, superintendent.

The Franklin M. Co. has started two tunnels, one on the Cottonwood side and one on the Bullion creek side. Two thousand feet will have to be run for them to meet. It is expected from surface indications a good body of ore will be opened up. O. Larsen is superintendent.

The B. W. & H., in Sevier canyon, sold a shipment of ore last week on controls, showing $17 gold and forty-nine ounces in silver. The ore is from a 3½-foot vein.

The Deer Trail mine is reported sold last week and arrangements are being made to resume operations. With these mines operating and the Treasure Vault, the L. & N., the Alderbaran and the Per Jue Surprise also producing, Marysvale district is again becoming active.

Marysvale, August 3.

The Annie Laurie mine at Marysvale has been closed down temporarily, says Manager C. I. Rader, pending improvements on the mill, which are under way.

SALT LAKE COUNTY.

The Falco group of claims at Bingham, owned by the Cluster M. Co., is to be opened up through a tunnel which was started last fall through the main Bingham canyon, says Superintendent Falco. The first ledge expected to be tapped is the Lead, while at 1100 feet from the mouth the Yosemite vein will be cut. The mouth of the tunnel is on the line of the Copper Belt Railroad.

Manager G. Lavagnino of the Butterfield mines at Bingham says operations will be resumed.

Manager E. W. Young of the Mystic Shrine mine of Bingham has bought the St. Elmo location near Bingham.

UTAH COUNTY.

The Salvator M. Co. has been incorporated to operate the Salvator and the Nevada lode claims in Tintic district, near Eureka; J. Knight, J. Evans, R. E. Allen, A. M. Knight and W. E. Rydalch.

WASATCH COUNTY.

The South Quincy M. Co. has been incorporated at Salt Lake City by A. V. Taylor, J. H. Powers, W. D. Sutton and A. W. Casey. The company holds a bond and lease on twelve claims in Snake Creek district.

WASHINGTON.

FERRY COUNTY.

E. D. Ross, secretary and treasurer of the Magnolia G. & C. M. Co., is making arrangements to start a 200-foot shaft on the Johnson mine on Iron mountain, 8 miles southwest of Northport. This property has 300 feet of tunnel, says the Review.

WISCONSIN.

LA CROSSE COUNTY.

C. Scofield of Brownsville, mining on Wildcat bluff, near La Crosse, reports having found quartz carrying gold.

WYOMING.

CARBON COUNTY.

Near Grand Encampment, the New Rambler mine is going down. The deepest point, 200 feet, is in ore and recent work has shown a second ore shoot. A crosscut was started from the shaft and run 170 feet north; from face of crosscut a winze sunk 50 feet on incline, and from bottom of winze a crosscut run 45 feet, in glance and carbonate ore. The ore in the crosscut is all of milling grade. The winze will go deeper.

FOREIGN.

AFRICA.

RHODESIA.

The Rezende Co, near Bulawayo, July 15, report: Results for the quarter ending June 30: Wet tons milled, 9790; fine gold recovered, 3579 ounces; value of return, £15,210; costs per ton, 18s.

TRANSVAAL.

The East Rand Mining Estates report in Palmietkuil borehole No. 2, reef of hanket (not main reef series) struck at depth of 1800 feet. Boring is being continued, and the hole is now down 2100 feet. The borehole on Grootviei is progressing, and it is expected the reef will be struck within next 850 feet.

WEST AFRICA.

At the Broomassie mines the first installment of machinery for the 40-stamp mill is being set up.

Con. Goldfields of the Ivory Coast, at Bassam, report on Catasso concession shows, in No. 1 west shaft the width of the lode is 8 feet at water level and gold bearing. Manager Woodyatt has driven 40 feet on the lode. In No. 3 east the width of the lode is 4 feet at the water level and gold bearing. The east lode across Mezan river contains free gold.

AUSTRALIA.

WESTERN AUSTRALIA.

The Proprietary Colliery, at Collie, have put in a fan at their mine with a capacity of 85,000 cubic feet of air per minute. The fan is not as yet working at its full capacity, but is giving 400 cubic feet per man per minute for all the men and horses employed in the mine. The fan is driven by a 16 H. P. motor, and the air way is lighted by electricity. The electric pumps in the mine are working satisfactorily, says Manager Evans.

The Kalgoorlie Gold Recovery Co. report 214 tons of concentrates treated at their Orotava works for a yield of 1244 ounces gold. The average was 5.81 ounces per ton.

The reported request of the Council of West Australia Mine Owners to the Government for the appointment of an expert mine inspector for the purpose of checking the reports of ore reserves in the mines of Kalgoorlie district, is denied by the directors of that company.

BRAZIL.

The Brazilian Government at Rio de Janeiro has issued a call for tenders to work the monazite sand placers of the Empire.

BRITISH COLUMBIA.

CASSIAR DISTRICT.

A strike of placer gold is reported near the headwaters of the Stickeen river in Stickeen division.

EAST KOOTENAY DISTRICT.

J. D. McDonald, general superintendent of the West Kootenay Power & Light Co. electrical power plant at Bonnington falls, and T. R. Stockett, Jr., general superintendent of the Crow's Nest Pass Coal Co., Ltd., are making arrangements to put in an electric lighting system for lighting the Morrissey mine buildings, employes' houses and the town of Morrissey. The plant will have a capacity of 3000 lights and he a two-phase alternating system. The engine for running the dynamos is on the ground. Stockett states that eight carloads of wooden stavepipe, from 6 to 12 inches in diameter, are on the ground for the water works line to the town. The ditch for this line, which will be 16,000 feet in length, is being cut. Material for slack coal storage bins at the coke ovens is arriving and work on these will start this week. One million feet of timber will be used in the construction of these bins, which will have a storage capacity of 5000 tons of coal. Additional bins will also be built to contain coal for domestic purposes. Sixty of the 250 coke ovens under construction are ready for filling, which has started, and they will be lighted up for the burning of coke as rapidly as they are filled. The regular production of coke started this week.

SLOCAN DISTRICT.

In order to provide funds for opening up a road to the property and driving a deeper tunnel, the Fisher Maiden-Troy M. Co., operating on Four Mile creek, near Slocan City, has decided to reorganize. They have a carload of ore sacked ready for shipment, awaiting completion of the road, in addition to 300 tons of second grade ore, averaging forty-two ounces per ton in silver.

KLONDIKE.

Dawson reports tell of another strike on the Pelly river, near its head; and a steamer has gone up the river with forty men to stake claims. The Yukon is said to be lowering so rapidly that before the end of August only the lightest draft vessels will be operating.

Reports from Dawson say another gold strike has been made on the upper Pelly river, 26 miles above Hoole canyon.

MEXICO.

CHIHUAHUA.

J. P. Jones, E. Davis and J. P. Cowen of New York are reported to have bought the Capusaya group of mines adjoining the mines of Pedro Alvarado, near Parral.

Operations will be resumed at the Prieto mine at Parrai, says Superintendent Terry, next week.

The roasting furnaces of the Red Hill mine in Cerro Colorado, in Parrai district, are ready for operation and, with the 100-ton lixiviation plant, will be started up this week, says W. E. Regers, manager.

The Cigarrero mine in Sierra Amaloya section is shipping eighty tons of ore per day. The location is on a mountain 5 miles south of the Mexican Central's branch from Jimenez to Parral. The ores are silver-lead, carrying gold values.

P. Ginther, manager of the Encinillas Mines, Ltd., reports the company's 80-ton smelting plant at Santa Rosalia will be finished this month.

On the Palmillo mine, near Parral, a power plant is being built by the owner, P. Alvarado, and another is under construction on the properties of the Consolidated M. Co. of Parral. Leases and bonds have been taken by J. C. Brooks on the San Diego mine at Santa Barbara; by the Saginaw M. & M. Co. on the Quatro de Julio of Parral; by the Stillwell people (the Kansas City, Mexico & Orient Railroad) on the Germania, which has 45 pertenencias adjoining the Refugio mine of Parral. Development work is being started on all of these mines.

DURANGO.

The Chicago men, F. J. Lichtenberger manager, who took over the four mines at Januco de Coronado, have organized the Coronado-Durango M. Co. The claims are the La Union, La Peruna, Gran Senora and Zaragoza.

It is proposed to build a railroad from Caliacan in Jalisco to Topia in Western Durango. The matter is being considered by men from Durango and the United States to handle the tonnage from the mines. Topia is a silver-lead camp, the principal mines of which are owned by the Selby & Miller M. Co. The property has 6000 feet of development and a 100-ton concentrating mill.

The American Security & Trust Co., of Detroit, Mich., are opening up a group of fifty-seven pertenencias adjoining the Mina Grande de La Paz, 1 mile from Yerba Buena. The Durango M. Co. is being organized to operate the group and machinery will be put in.

GUERRERO.

The Mitchell Copper Co. is preparing to build a railroad from its mines at La Diche to Acapulco on the coast, a distance of 60 miles.

JALISCO.

The Ampara M. Co. has paid the $230,000 balance on the Santo Domingo mine, near Etzatlan, and taken possession. There is claimed to be a large amount of low-grade ore in the mine, which will run one kilogram of silver and ten grams of gold to the ton.

OAXACA.

Gold placers have been located near Tuxtepec and a number of men have started development.

SONORA.

It is reported that Phelps, Dodge & Co., owners of the Copper Queen mine at Bisbee, Ariz, and the Nacozari copper mines at Nacozari, are making arrangements to employ Chinese labor at Nacozari instead of Mexicans. It is also understood it is intended to employ Chinese labor on the railroads. The mine company claims that Mexican labor is uncertain and scarce in Sonora, and that white labor cannot be obtained. It is estimated that 4000 Chinese have landed at Guaymas within the last sixty days and have been given employment.

E. S. W. Drought, manager of the Sonora Dev. Co. at Nacozari, reports the company's 10-stamp mill completed.

NEW ZEALAND.

The Con. Gold Fields of New Zealand, at Reefton, July 13, report: Progress Mines—Crushed 4852 tons of ore, yielding bullion (including tailings cyanided, £739, and sulphurets, £1008), valued at £9320; expenses, 14s 4½d per ton. Golden Fleece—Crushed 1230 tons of ore for bullion (including tailings cyanided, £276, and sulphurets, £95), valued at £2307; expenses, £1 6s 1½d per ton. Wealth of Nations—Crushed 1014 tons of ore for bullion (including tailings cyanided, £310, and sulphurets, £55), valued at £1420; expenses, 17s 6d.

The Komata Reefs G M. Co. report gold discovered in Roma Reef No. 4, level N.

The Waihi Grand Junction G. Co., Ltd., at Waihi, report: Diamond drill hole at angle of 69°. Core assays—At depth of 509 feet, $50; 531 feet, $40; 540 feet, $25. The foot wall of the lode is not yet reached. Lode No. 2, in northeasterly direction 130 feet, shows width of lode 4 feet; assay value, $25.

SIBERIA.

A Moscow firm—N. & P. A. Korzenetzof—has been granted permission by the Irkutsk department of mining to work asbestos mines near the Kutai, a tributary of the Angara river. The asbestos layers are found 7 feet from the surface. There are some asbestos mines in the Urals, in European Russia, but the larger part of the asbestos used for insulators in Russia is imported, writes R. T. Greener, United States commercial agent at Vladivostok.

TASMANIA.

The Briseis Tin Co. report for period ending June 30: Ore in stock, including black tin at mine and metallic tin at Launceston, 19 tons; overburden removed, 24,900 cubic yards; drift sluiced, 31,000 cubic yards; black tin cleaned up, 39 tons 14 cwt.; average total sluiceheads of water available from all sources, 185.

PERSONAL.

E. C. ENGELHARDT is now at Eltoro, Cal.

H. RAMSAY, a miner of Tonopah, Nev., is in San Francisco, Cal.

R. J. WALTERS has returned to Denver, Colo., from Vuican, Colo.

H. H. WILLISON has returned to Henson, Colo., from Denver, Colo.

D. G. JEWETT, formerly of Chloride, Ariz, is now in Los Angeles, Cal.

S. J. WILLIS has returned from Nevada to Waunita, Gunnison county, Colo.

J. H. NEALE, a mine owner and operator of Sonora, Cal., is in San Francisco, Cal.

GEO. JOHNSTON has returned to San Francisco, Cal., from a business trip to Mexico.

J. B. LUDDY is manager of the Sand Pile mine, near Forest Home, Amador county, Cal.

E. BAMBERGER of Salt Lake City, Utah, is on a mining business trip through Idaho and Oregon.

M. G. BANKS is superintendent of the New Era mine, near Searchlight, Lincoln county, Nev.

F. A. MCINTOSH has removed from Supai Agency, Ariz., to Woodstock, Ontario, Canada.

H. CARRY, C. E., formerly of Vancouver, B. C., has removed to Chalk River, Ontario, Canada.

J. A. MCINTYRE, of the South Keystone mine at Amador City, Cal., is in San Francisco, Cal.

E. C. VOORHIES, superintendent of the Lincoln mine, Sutter Creek, Cal., is in San Francisco, Cal.

C. L. HERRICK is superintendent and manager of the Socorro G. M. Co. at Magdalena, N. M.

W. G. SCOTT, superintendent of the Black Oak mine, near Soulshyville, Cal., is in San Francisco, Cal.

J. A. JACKSON, interested in oil properties near Fullerton, Orange county, Cal, is in San Francisco, Cal.

R. A. SKINNER has resigned as superintendent of the Globe mine, near Dedrick, Trinity county, Cal.

PRESIDENT SMITH of the Old Dominion C. M. Co., is at their mines at Globe, Ariz., from Boston, Mass.

L. C. DU BOIS, formerly of Lake City, Colo., has opened an assay and ore shippers' office at Salida, Colo.

J. C. GILL of Massachusetts, president of the Shannon Copper Co., at Clifton, Ariz, is visiting the mines.

J. A. FRASER is superintendent of the Ragnarok group of mines, in Oro Blanco district, near Arivaca, Ariz.

MANAGER R. B. HUGHES returned to Deadwood, S. D., last week from Chicago, Ill., on business for the Holy Terror M. Co.

L. COLBATH is assayer and chemist for the Gold Vein M. Co, at the Wedge mine, near Marysvale, Utah.

S. C. BIRD of Bridgeport, Conn., is superintending operations at the Angel mine, west of Wickenburg, Ariz.

A. J. MCQUAID has returned to Pueblo, Colo., from an examination of mines near Searchlight, Lincoln county, Nev.

J. BARRY of Los Angeles, Cal., owner of the Sunrise mine, near Chloride, Mohave county, Ariz., is at Chloride.

G. H. I. HIBERLEIN is superintendent of the smelter on the Indian Queen mine on Birch creek, near Dilion, Mont.

B. C. RIBLET, formerly of Nelson, B. C., now makes his headquarters at 601 Empire State Bldg., Spokane, Wash.

W. H. ANDERSON of Aspen, Colo., is superintendent of the Bassick G M. Co, near Silver Cliff, Custer county, Colo.

JAS. L. BRYSON, superintendent of the Mazeppa mine, near Stent, Tuolumne county, Cal., is in San Francisco, Cal.

G. JUNG has returned to Cincinnati, O, from Gunnison county, Colo., where he has been looking after mining interests.

G. LAVAGNINO, formerly manager of the Old Telegraph mine, is manager of the Butterfield mines at Bingham, Utah.

E. H. BARTON, superintendent of the Yellow Aster mine at Randsburg, Cal., is in San Francisco, Cal., on mining business.

A. J. OSGOOD is superintendent of the Western Union Oil Co., operating near Santa Maria, Santa Barbara county, Cal.

RICHARD P. WILLIAMS, of Greenwood, B. C., succeeds F. R. Mendenhall in the British Columbia representation of the Rand Drill Co.

G. H. CLEVENGER has succeeded J. B. Empson, resigned, in charge of the cyanide works of the Dakota G. M. Co., at Deadwood, S. D.

A. H. BUCK, who has been in Maguarichic, Chihuahua, Mex., surveying the properties of the La Luz G. M. Co., is in Colorado on a visit.

F. B. SCHERMERHORN, general manager of the Three Bears M. Co. of Jarilla, N. M., has returned there from a trip to Parral, Chihuahua, Mex.

F. M. SYMES, superintendent of the Gold Coin mine, Victor, Colo., has returned there from a trip through the western part of the State.

T. L. HENDERSON, of St. Louis, Mo., is president of the Great Western G. M. Co., operating the Afterthought copper mine in Shasta county, Cal.

A. F. NATHAN, manager of the Stillwell M. Co., returned to Chihuahua, Mex., last week from a month's trip to Kansas City, Mo., and the East.

F. DALTON, of Salt Lake City, Utah, is superintendent of the Gold Vein M. Co., operating the Wedge mine, near Marysvale, Piute county, Utah.

A. R. BOYNTON, of Chicago, Ill., vice-president of the McKinnon G. M. Co., operating at Silver City, Idaho, is at the mines, from Salt Lake City, Utah.

JOHN ROSS, JR, superintendent and manager of the Wildman & Mahoney M. Co. at Sutter Creek, Cal., has gone to New York and Boston on mining business.

W. FORRESTER is mill superintendent at the Latham mines, in Spruce Mountain district, south of Wells, Nev., and E. H. Osborne is superintendent of the mine.

J. S. WYATT, formerly manager of the Mountain Lion mine at Republic, Wash., has gone to Bourne, Baker county, Or, to take charge of the Eureka & Excelsior mine.

G. W. MEYERS, representing the Chrome Steel Works of Brooklyn, N. Y., on the Pacific coast, left San Francisco, Cal, on the 4th inst. for New York, to be absent six weeks.

S. GUGGENHEIM of the American S. & R. Co., accompanied by E. L. Newhouse, is inspecting the plants controlled by the company in Utah and Montana after a visit to Colorado.

H. RAMDOHR, late millman at the Chloride-Bailey mine, near Dedrick, Trinity county, Cal, is superintendent of the Globe mine in the same district, vice R. A. Skinner, resigned.

J. W. SISSON of New York, N. Y., president, and C. H Barney of Boston, Mass., vice-president, of the Troy-Manhattan C. Co., are visiting the company's mines at Troy, Pinal county, Ariz.

C. K. MCCORNICK of Salt Lake City, Utah, is at the Gold Roads mines and mill

at Acme, Mohave county, Ariz , and will leave for Paris next week to attend the annual meeting of shareholders.

J O. HARRON, THOS. RICKARD AND J. M. MCCONE, of the firm of Harron, Rickard & McCone, mining machinery manufacturers of San Francisco, Cal., go to-day to the "high jinks" of the Bohemian Club, in Marin county, Cal.

JUAN FELIX BRANDES has gone to New Mexico to examine the Fraser Mountain Copper Co 's property. The Transcontinental M. Co. of Denver, Colo., have recently appointed him their consulting engineer.

C. F. HOFFMAN AND J. D. HOFFMAN, mining engineers, returned to San Francisco, Cal , last week from a four months' trip through the principal mining districts of Alaska, in the interest of the Guggenheim Exploration Co.

J. H. MEANS, formerly on the staff of the California State Mineralogist, is in London, England, where he recently returned from West Africa. Mr. Means expects to leave London for a trip to French Guiana, South America, on mining business.

FREDERICK WULFF, a civil and mining engineer of Mexico, has returned to Torreon, Chihuahua, Mexico, from a visit to Oakland, Cal , accompanied by his son, F. Wulff Jr , a mining student at the University of California, and they will engage in mining together.

L. R MEAD, long-time secretary of the Risdon Iron Works, San Francisco, and of later years well and widely known as proprietor of the famous Byron Springs, has re-entered San Francisco business life and resumed connection with the Risdon Iron Works as auditor.

SUPERINTENDENT E. R ABADIE of the Champion mine at Nevada City, Cal , of the Champion Mines Co., has been appointed general superintendent of their properties, with offices in San Francisco, Cal. This also places him in charge of the Southern Cross mines at Forhestown, Butte county.

Commercial Paragraphs.

THE Jeanesville Iron Works Co., through the Denver branch, has delivered to the Ajax G. M. Co., Victor, Colorado, a compound condensing pump, to be installed on the 1100-foot level.

"GRAPHITE" for August is received. It is a model of what a "house organ" should be. It is issued monthly "in the interest of Dixon's graphite productions," hy the Jos. Dixon Crucible Co., Jersey City, N. J.; is full of good things, and any one reading it must come to the conclusion that a concern able to get up such a smart little publication must surely furnish a good product in their regular business.

JOHN A. YEATMAN & Co., hydraulic engineers, San Francisco, Cal., report the ten Adams hydraulic lifts sent to Nome district, Alaska, this season, in operation and giving satisfactory results. In one instance the machine is elevating to 21 feet, with pressure of 39 pounds per square inch (equivalent to 90 feet head)—exceeding the guarantee of 5 feet pressure head for each foot elevated. Two of the lifts are operated under artificial head produced by two-step centrifugal pumps.

ON August 1 the firm of John Johnson & Co., filter press manufacturers of Franklin Square, New York, was incorporated at Albany, with a capital stock of $110,000, fully paid in. This business was established in 1878, and was at the start an off shoot of S. H. Johnson & Co., Ltd., of London, England. The officers of the incorporated company are M. Hopkins, president; J. Johnson, vice-president and treasurer, R. Anderson, secretary. The board of directors include, besides the officers mentioned, S. H. Johnson, of London, and H. J. Linder and E J. West, of New York. The plant is equipped with special machinery for filter press manufacture, designed hy Mr. Johnson.

THE C. O. Bartlett & Snow Co. of Cleveland, Ohio, announce that, at considerable expense, they erected at their works two of their dryers—one of their Triumph steam dryers and one of their direct-heat rotary dryers—and that they will be glad to make careful test runs, dry any kind of material, either by steam or direct heat, for intended purchasers under the following conditions: All material to he shipped, charges prepaid. When possible, send some competent man to take charge of the results, such as cost, time required, amount of moisture taken out, etc. They make no charges for use of dryer or power; they will charge only actual cost for labor required for handling the material to be dried. They say: "Send 500 pounds or a carload and we will show you actual results. This, we trust, offers an opportunity which will be appreciated hy many."

Catalogues Received.

The Denver Engineering Works Co., of Denver, Colo., have issued Bulletin 18, entitled "Gears." This publication is profusely illustrated and contains much valuable information on the subject of gears and gear cutting machinery; the horsepower of gearing, maximum speed, etc.

W. Ainsworth & Sons of Denver, Colo., have issued a handsome new Catalogue A-3, the advance sheets of which have been received. It is finely illustrated and fully descriptive of the excellent assayers' halances and supplies made by them. The catalogue will he sent on application.

Catalogue No. 39 from the F. M. Davis Iron Works Co., Denver, Colo , is descriptive of their new establishment at 1737 Champa street, a metallurgical department, in charge of Mr. W. B. Milliken, which is equipped and in operation for the purpose of assaying and testing ores in any quantity up to and including carload lots. The catalogue gives a complete list of prices for assays, chemical determinations, etc.

"Some Details as to Smelting Practice and Equipments" is the modest title of a treatise just published hy the Colorado Iron Works Co., of Denver, Colo , and which is replete with just the kind of information any one interested therein would like to have. The Colorado Iron Works Co. says "this pamphlet is not written as a price list, but to cover certain information as to smelting practice and set forth our manufactures in that line." The value of such a pamphlet is manifest; it does not contain theories or notions, heing compiled from actual smelting practice, and written hy specialists in their line. It is well illustrated and is a notable addition to technical literature on the subjects of which it treats.

Books Received.

"The Art of Pattern Making," by J. McKim Chase, is the title of a volume 12mo. vi + 254 pages, with 215 figures. It is a hook of value to the pattern maker, iron moulder and founder. Every phase of pattern making for castings is described and carefully illustrated. It embraces the practical experience of many skilled pattern makers. Price, $2.50; John Wiley & Sons, New York; Chapman & Hall, Ltd., London.

"Earth Work and Its Cost" is the title of a neat volume of 244 pages, hy Halbert P. Gillette. It deals with the art of estimating the cost of handling earth by means of various devices; transporting the loosened earth by means of wheelharrows, carts, dump carts, scrapers, wagons, steam shovels, etc It also goes into excavating by dredging, hydraulickling and by other means. The book is illustrated and will prove of use to those engaged in the work of excavating on a small or large scale. $2; The Engineering News Publishing Co , New York City.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING JULY 28, 1903.

734,408.—BOUGIE—F. R. Bachler, Oxnard, Cal.
734,802.—MUSICAL INSTRUMENT—G. H. Blair, Spokane, Wash.
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734,742.—STEERING DEVICE—M. W. Patrick, Niles, Cal.
734,747.—NEEDLE—F. J. Rabbeth, Redlands, Cal.
734,769.—PEN WIPER—J. J. Stanley, Vallejo, Cal.

Latest Market Reports.

SAN FRANCISCO, August 7, 1903.

METALS.

SILVER.—Per oz., Troy: London, 25½d (standard ounce, 925 fine); New York, bar silver, 55½c, refined (1000 fine): San Francisco, 55½c; Mexican dollars, 42¾c San Francisco, 42¾c New York.

COPPER.—New York: Standard, $13.25; Lake, 1 to 3 casks, $13.00@13.25; Electrolytic, 1 to 3 casks, $13.62½@13.75; Casting, 1 to 3 casks, $12.75; San Francisco: $13.00. Mill copper plates, $17.00; hars, 18@24c. London: £57 10s spot per ton.

There is no change in the copper market since last week. In the New York market the larger consumers feel safe in holding off and several of them report a considerahle shrinkage in the demand. The leading wire concerns report a very dull market with orders fully two-thirds less than a year ago. Wall Street is responsible for much of this dullness. New concerns cannot he started and new construction has to stop. One new concern had put in specifications calling for several miles of wire, hut the slump in Wall Street has scared investors and the company will not he floated till the spring.

LEAD.—New York, $4.20; Salt Lake City, $3.50; St. Louis, $4.00; San Francisco $4.50, carload lots; 4¼c 1000 to 4000 lbs.; pipe 5½, sheet 6, bar 5½c; pig, $4.75. London: £10 18s 9d per long ton=2.75c per lb.

SPELTER.—New York, $5 87½; St. Louis, $4.85; London, £20 2s 6d per ton; San Francisco, ton lots, 6½c; 100-lh lots, 7c.

ANTIMONY.—New York, Cookson's, 9¾c; Hallett's, 8½c; San Francisco, 1000-lb. lots, 7½c; 300 to 500 lbs., 7½c; 100-lb. lots, 10c.

TIN.—New York, pig, $27.25@27 50; San Francisco, ton lots, 28½c; 500 lbs., 29c; 200 lbs., 29½c; less, 30c; bar tin, ℔ lb, 30c @32½c. London, £125 5s spot.

PLATINUM.—San Francisco, crude, $18.00 ℔ oz.; New York, ingot, $19.00 per Troy oz Platinum ware, 75@80c per gram.

QUICKSILVER.—New York, $44.50@46.00; large lots; London, £8 15s; San Francisco, local, $44.50 ℔ flask of 76½ lbs.; Denver, $49.50. Export, $43.50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 34c.

SOLDER.—Half-and-half, 100-lb. lots, 18.75c; San Francisco, Plumbers', 100-lb. lots, 15 50c.

NICKEL.—New York, 50@60c ℔ lb.; ton lots, 45@48c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer plg, $19.50 @19.85; gray forge, $17.10; San Francisco, bar, 3c ℔ lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittshurg, $27.00@29.00; open hearth billets, $28.00; San Francisco, bar, 7c to 12c per lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer	$19 00@19.50
Foundry Northern 1	18.00@18.50
Northern 2	17.50@18.00
Northern 3	17.00@17.50
Southern 1	18 35@ ——
Southern 2	16.85@ ——
Southern 3	16 35@ ——
Forge	15 85@ ——
Charcoal	20.50@21.00
Billets, Bessemer	28 00@30.00
Bars, iron	1.65@ ——
Bars, steel	1.75@ 1.80
Rails, standard	28.00@30.00
Rails, light	34.00@40.00
Plates, boiler	1.90@ 2.00
Tank	1.75@ 1.80
Sheets, 26 store	2.90@ 3 00
No. 27	3 00@ 3.10
No. 28	3.00@ 3.10
Angles	1.75@ ——
Beams	1.75@ ——
Tees	1.80@ ——
Zees	1.75@ ——
Channels	1.75@ ——
Steel melting scrap	16.00@16 50
Relaying rails	30.00@31 00
Dealers forge	13.50@14.50
No. 1 railroad wrought	14.50@15.00
No. 1 cast, net ton	14.50@15.50
Iron rails	20.00@21.00
Car wheels	20.00@21.00
Cast borings	5 50@ 6 50
Turnings	11.00@12.00

LUMBER.—(Retail): Pine, ordinary sizes, $20.00@22.00; extra sizes higher; redwood, $22.00@23.00; lath, 4 feet, $4.25 @4.50; pickets, $19.50; shingles, $2.35 for No. 1 and $2.00 for No. 2; shakes, $13.50 for split and $14.50 for sawed; rustic, $26.00 @32.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, $3.25; Cut, $3.35; 10d to 16d, Wire, $3.35; Cut, $3.35; 8d, Wire, $3.40; Cut, $3.40; 6d and 7d, Wire, $3.50; Cut, $3.50; 4d and 5d, Wire, $3.60; Cut, $3.60; 3d, Wire, $3.75; Cut, $3.75; 2d, Wire, $4.00; Cut, $4.00. Special rates for carload lots.

LIME.—Santa Cruz, $2.25; Roche Harhor, $2.25 per bhl.

CEMENT.—Germania, $2.50 @ 2.75; Hewmoor, $2.90; Trowell, $2.90; Portland, $2.50@2.75 per bhl.

GENERAL SUPPLIES.

POWDER.—F. o. b. San Francisco: No 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.50 per 1000 feet; double tape, $3.00; single tape, $2.65; Hsmp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10½c ℔ set; 14 oz., 40s., 9½c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 24@25c ℔ lb.: carloads, 23@24½c; in tins, 35c; soda ash, $2.00 ℔ 100 lbs.; hyposulphite of soda. 2½@2½c ℔ lb.; caustic soda, in drums, 3@3½c ℔ lb; Cal. s. soda, hhls., $1.25@1.50 ℔ 100 lbs.; sks., $1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash. 10c in 40-lb tins; borax concentrated, 7@8c ℔ lb.; roll sulphur, 4@6c; powdered sulphur, 2@ 3c; flour sulphur, French, 2@3c; alum, $2.00@2.25; California refined, 2@2½c; sulphide of iron, 9c ℔ lb; copper sulphate, 5@7c; chloride of lime, spot, $2.50@2.75; sulphuric acid, in carboys, 66% B, 2½o ℔ lb.; nitric acid, in carhoys, 8c ℔ lh.

OILS.—Linseed, boiled, bbl., 44c; cs., 49c; raw, bbl., 42c; cs., 47c; Lucol oil, boiled, bbl., 41c; cs, 49c; raw, bbl., 39c; cs, 49c. Kerosene—Pearl, per gal., 20½c; Astral, 20½c; Star, 20½c; Extra Star, 24½c; Eocene, 23½c; Elaine, 26½c; Water White, in bulk, 14½c; Mineral Seal, iron bbls., 18½c; wooden hhls., 21c; cs, 24c; Mineral Sperm, cs, 26½c; Deodorized Stove Gasoline, bulk, 17c; do., cs., 23½c; 86° Gasoline, bulk, 21c; do., cs., 27½c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 16c; do., in cs., 22½ c; Lard Oil, E. W. S., bbl., $1.00; cs., $1.05; Neats-foot Oil, pure, bbl., 75c; cs., 80c; Sperm, crude, 70@60c; Natural White, 65c; Bleached do, 50c; Whale Oil, cs, 50@55c.

COAL.—San Francisco, coast, yard prices: Wellington, $8.00; Seattle, $6.50; Coos Bay, $5.50; Southfield, $8.00. Cargo lots, Eastern and foreign: Wallsend, $6 .50 Brymbo, $7.50; Pennsylvania, hd., $14. 00 Scotch, $8; Cumberland, $12; Cannel, $9.00; Welsh Anthracite, $11.50; Rock Springs, $9.50, long ton; Colorado Anthracite, $14.00. Coke, $10.50 per ton in bulk, $13 in sacks; Sunnyside, $8 50, long ton.

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6c; less than 500 lbs., per lb., 6½c; in 25-lb. tin pails, ½c per lb. above keg price; in 1 and 5 lb. tin cans, 100 lbs. per case, ½c per lb. above keg price. Dry Lead—In bhls., 1 ton and over, 6c; do. in kegs, 6½c.

RED LEAD.—500 lbs. and over at one purchase, per lb., 6c; less than 500 lbs., 6½c.

LITHARGE.—Pure, in 25-lb. bags, 8 @9c per lb.

BONE ASH.—Extra No. 1, 5@6c per lb. No. 1, 4@5c.

BORAX.—Concentrated, 7@9c per lb powdered, 9@12c; fused, 25@30c.

BORAX.—Crystal, 7c; calcined, 25c.

MANGANESE.—Pure, ℔ lb., 60c.

SODIUM.—Metal, ℔ lb., $1.00.

MOLYBDENUM.—$2 per lb.

CHROMIUM.—(90% and over) per lb., $1.00.

BISMUTH.—Subnitrate, per lb., $1.60.

MERCURY.—Bichloride, ℔ lb., 90c.

PHOSPHORUS.—(American) ℔ lb., 75c.

SILVER.—Chloride, ℔ oz., 90c@$1.00; nitrate, 55c.

ALUMINUM.—No. 1, 99%, small lots, 37c ℔ lb.; 100 lbs., 35c; 1000 lbs., 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

URANIUM.—Oxide, ℔ lb., $3.50.

ZINC.—Metallic, chemically pure, ℔ lb., 50c; dust, ℔ lb., 10c; sulphate, ℔ lb., .04c.

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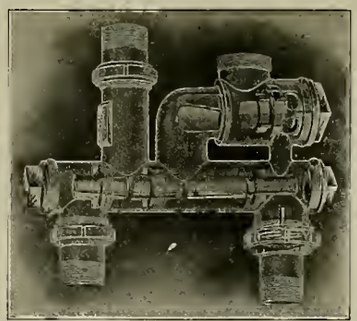
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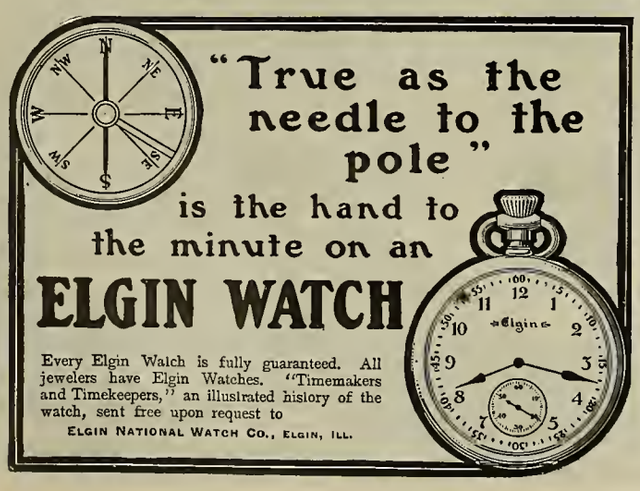
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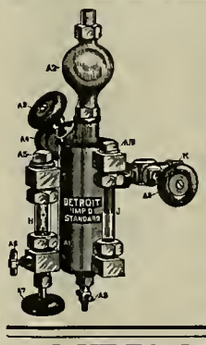
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Whole No. 2247.—VOLUME LXXXVII. Number 7. SAN FRANCISCO, CAL., SATURDAY, AUGUST 15, 1903. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Mining in Alaska.

When one hears Alaska spoken of as a mining region, the natural impression is that of an ice-bound region under perpetual snow, where the miner suffers many hardships, but eventually finds deposits of gold which quickly reward him for all his perils and hardships; but there is little more of romance in mining in Alaska than is found in other regions, and the percentage of successful adventurers is not greater than in new countries and districts elsewhere. There is one advantage, however, and that is of somewhat doubtful character; the country has not as yet been thoroughly prospected, and as the territory is of vast extent, it is not unlikely that new discoveries will still continue to be announced for many years. Since 1898 the United States Geological Survey has been systematically investigating the mineral resources and geology of Alaska, and much valuable information has been given to the world on conditions in Alaska as they really exist. Thus far, mining is largely in gravels of the streams and sands of the seashore, quartz mining having made but small progress. This is due partly to the natural disadvantages of the country, and to the expense of transportation, but more largely to the fact that few quartz veins, outside of Douglas Island and some other of the islands of the coast, have as yet been discovered which warrant the expense of equipment. No one believes that the discovery of a rich vein of gold ore in Alaska would not be followed by the prompt equipment of the mine with the latest and best machinery. Many phenomenal finds have been reported from time to time in the various districts, but as yet none of these "finds" have developed into a mine attracting attention by its richness. However, the gold in the placers came originally from rock in place, and valuable discoveries of quartz veins may yet be made.

The glaciers of Alaska are a prominent factor in carving the topography of the country, and the vast fields of gravel found there are largely of glacial origin. Then, too, moss covers almost the entire region, and these two things render prospecting for veins difficult. In some of the best placer districts the evidence thus far obtained indicates that the gold of the placers was derived from the erosion of a formation in which were innumerable rivulets and seams containing gold, there being no veins of workable size. This condition is not anomalous. In California the rich gravel deposits of the Forest Hill divide appear to have derived their gold from a similar source, as there is not sufficient vein-quartz bearing gold tributary to the placers of the ancient rivers to have produced the large amount of gold found in the gravels although quartz veins of large size are not lacking.



Building Log Dam for the Gallce Hydraulic Mine, Grants Pass, Oregon. (See Page 100.)



The Seri Indians on Tiburon Island, Gulf of California. (See Page 101.)



Home of a Yukon Bonanza King.



Testing Gravel on Forty-Mile River, Alaska.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION.

United States, Mexico and Canada.....$3 00
All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

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J. F. HALLORAN.....Publisher

San Francisco, August 15, 1903.

TABLE OF CONTENTS.

ILLUSTRATIONS: Page.
Building Log Dam for the Galice Hydraulic Mine, Grants Pass, Oregon..... 94
The Seri Indians on Tiburon Island, Gulf of California..... 94
Home of a Yukon Bonanza King..... 94
Testing Gravel on Forty-Mile River, Alaska..... 94
Sub-station of Goldpan Mining Co., Breckenridge, Colo.....100
Mining and Metallurgical Patents..... 102

EDITORIAL:
Mining in Alaska..... 94
Retaliatory Measures..... 95
The American Mining Congress..... 95
Advantage of the Leasing System..... 95
Opportunities of the St. Louis Exposition..... 95

MINING SUMMARY.....103-104-105-106-107

LATEST MARKET REPORTS.....108

MISCELLANEOUS:
Concentrates..... 96
Secondary Enrichment of Mineral Veins in Regions of Small Erosion..... 97
Considerations Favorable to Hot Blast Smelting..... 97
Desulphurizing Slimes by Heap Roasting..... 98
Drying of Peat..... 99
Chlorine Smelting, With Electrolysis..... 99
Electricity in Placer Mining.....100
Placer Mining in Southern Oregon.....100
Notes on the Metallurgy of Copper of Montana.....101
Tiburon Island and the Seri.....101
Mining and Metallurgical Patents.....102
Personal.....107
Commercial Paragraphs..... 108
Catalogues Received.....108
Obituary.....108
New Patents..... 108
Notices of Recent Patents.....108

The American Mining Congress.

The American Mining Congress meets at Deadwood, South Dakota, Sept. 7 to 12. In this movement the Black Hills Mining Men's Association is taking an active part, and a great deal is expected from this meeting of the Congress, the primary object of which was to influence, as far as possible, the creation of a national Department of Mines and the appointment of a cabinet officer to represent the department. The MINING AND SCIENTIFIC PRESS has repeatedly pointed out the desirability of having a Department of Mines created, but thus far no positive steps have been taken by Congress in this direction. It is to be hoped that the American Mining Congress may eventually wield sufficient influence at Washington to bring about the desired end. In the meantime, however, the Mining Congress will take up and discuss various mining and metallurgical topics, and the meeting will afford an excellent opportunity for leading mining men from widely separated regions to form personal acquaintances, with an interchange of ideas which will prove, individually and collectively, valuable to those attending the Congress, and to the mining world at large.

Retaliatory Measures.

The miners who were recently driven out of Idaho Springs, Colo., by a deputation of citizens, have appealed to the District Court of the county at Georgetown, and Judge Owens issued warrants for the arrest of forty-seven of them. After a hearing they were put under bonds to keep the peace. Altogether eighty warrants were issued. Among those placed under arrest were the acting Mayor and members of the City Council of Idaho Springs and other municipal officers, leading merchants, citizens, bankers and mine operators. Learning of the issue of the injunction of the court fourteen of the eighteen miners driven out returned at once to Idaho Springs, where four of them were promptly arrested and placed in jail charged with complicity in blowing up the Sun and Moon transformer house, and warrants are out for several others. The exiled miners have taken another step in the matter by filing suits against twelve members of the Citizens' League, each asking for $10,000 damage. The next move in this game is looked forward to with interest by both sides.

Opportunities of the St. Louis Exposition.

Seldom, if ever, has the mining industry of the United States had a better opportunity to display the advancement made in mining practice and metallurgical science than that which will be afforded by the St. Louis Exposition in 1904. Several mining States have already announced their intention of making an elaborate display of their mineral wealth on this occasion, but there appears to be, with a few possible exceptions, no definite plan of what, or how, to exhibit, beyond the usual display of "specimen rock" in glass cases, which has been a customary feature of every exposition for years past.

The mining industry is the foundation of the great development and unparalleled prosperity of the United States. This great industry is entitled to something more in the way of an exhibition than a mere display of specimens in a case.

Specimens of the rich ores of gold, silver, copper, lead and zinc, etc., are attractive, and it has been found that "rich specimens" appeal more directly to the pocketbooks of investors than any amount of learned dissertation on ores, mines or mining. What the investing public seeks is satisfactory financial returns on investments, whether in mining or other industrial pursuits, and rich specimens promise these results to the mind of the average mining investor more surely than any amount of talk or literature. But there is another phase of the exhibition of the mineral resources of a State, and this is the exhibition, not only of the ores, but of the machinery employed in its treatment—not merely an exhibition as machinery, but actually in operation, crushing, concentrating, roasting and otherwise treating ores.

At several expositions of recent years mines have been exhibited in miniature, and these have proven a great attraction and given the general public a more comprehensive idea of "what a mine is like," perhaps, than anything else. One of these was a complete mine in miniature in the Colorado exhibit at the Midwinter Fair, held in San Francisco, Cal., in 1894. Many thousands of people visited this miniature mine, and mining men, as well as those unfamiliar with mines, pronounced it nearly perfect. The shafts with the swiftly moving cages; the long levels with trammers and cars; the stopes, winzes, and sumps, all were shown in detail, and the whole formed a most interesting object lesson, and one which made a lasting impression on the minds of all who saw it. Since a mine in miniature proved so popular, one naturally inquires why this exhibit attracted so much attention. It was due entirely to the mechanics of the ingenious model. The machinery was in motion. The cars moved to and fro on the tracks along the levels, the cages were operated in the shafts, and the whole thing presented an animated underground scene. If a mine in miniature, with its toy machinery, proves an object of such interest, how much more interesting and profitable would a full-sized plant be. At a mining fair held in San Francisco, Cal., in 1898 a hydraulic mine, and an underground drift mine in full size and operation, attracted much deserved attention and favorable comment.

Several States are already considering this idea, and it is stated that the Joplin, Mo., district will have a concentrating mill operating on zinc ores shipped in from that district, while a second mill will treat ores from the lead region of Missouri. The Black Hills of South Dakota will have a gold mill operating on the free-milling and concentrating ores from that section. In comparison with modern metallurgical methods, the Mexican exhibit will contain an arrastra, slowly grinding out the golden grains, representing side by side "the old times and the new" in mining. Lead and zinc furnaces will be in operation, actually turning out these metals from the ores from Missouri concentrated in the mills. It is also said that in the Mexican section the primitive method of smelting copper, as practiced for three centuries in that country, will form a feature of the exhibit.

In addition to the above, drilling machinery will be at work, actually boring deep holes, and it has been suggested that a coal mine may be opened under the exposition grounds, if it be as reported that coal seams underlie the site of the exposition.

All of this shows that unusual interest is centering about the mining exhibit, and the mining State that fails to take advantage of this opportunity to contribute some practical display to the general exhibit will not be in the race at all. A fine exhibition of ores and minerals is perfectly proper; but these are inert, and the public has seen them time and again at former exhibitions. It is now ready for something more than a specimen exhibit, and this is the opportunity for the several mining States to take advantage of the unusual and widespread interest displayed by the general public in mining. Rock breakers, stamps, crushing rolls and grinding devices all have a place in a competitive exhibit of this kind, as well as concentrators of the numerous types, jigs, buddles and hydraulic classifiers, and furnaces of various kind can also exhibit at this time to better advantage than ever before.

This is an opportunity, and every mining State should send the best it has to St. Louis, that the world may see what the United States is doing for the advancement of mining and metallurgy in this age of improvement and innovation in all branches of industry.

Advantages of Leasing System.

That the leasing system in mining camps, both old and new, is productive of good results, is evidenced by many districts where this system of working mines is in vogue. Leadville, Cripple Creek, and many other mining districts of Colorado, and also in Nevada, Idaho and elsewhere, are good examples of the results of the leasing system. By its means large territory can be thoroughly and promptly proven. In many places individuals or companies own large tracts of mineral land which they are unable to operate except at one or two points, owing to the great extent of their holdings. By dividing this land into blocks, and leasing the several blocks, the entire tract quickly becomes active, and the various veins and deposits are vigorously prospected and worked by men who usually thoroughly understand the business of mining, and who operate at a minimum of cost. The result is often satisfactory to all concerned and often to the commonwealth. The leasing system is particularly applicable to regions or districts producing high-grade ores. Low-grade camps must be developed by large capital, for there is not the incentive to the small investor and leaser found in those districts producing low-grade ores. There are many other districts where the leasing system would be beneficial and would quickly open the mines now lying idle, because the owners are unable or unwilling to undertake the development of their large holdings. Where the leasing system is in vogue the custom mill or smelter is almost a necessity, as leasers are usually practical miners and prefer to leave the treatment of the ores to those who make a business of it.

The system of leasing has a further advantage not to be overlooked. Not only are the leasers usually experienced practical miners, but they are not hampered in their operations by expensive office expenses. It is the general expense at a mine that often makes the difference between profit and loss. Elegant "city offices" maintained at great expense, with a "managing" or "resident director," under large salary, add very materially to the expense of operating. A central general office may be a necessity, but the elaborate and expensive equipment of some of these, and the manner of conducting this branch of the mine's business, are things seldom if ever seen in connection with a leasing proposition. The resident director or manager is sometimes a superfluous individual. If the superintendent or manager is capable, the resident director-manager does not make him more so, and may be an obstruction to the proper and most economical administration of the business of the mine, entirely aside from his salary and expenses.

The leaser works practically, economically and intelligently. What the mine requires in the way of equipment he provides if he can, but manages in some way to supply all that is actually necessary. He generally builds substantially, if not elaborately, and every dollar is made to go as far as experience and good management can make it go. It is not unusual for leasers to work a mine successfully and profitably which failed to pay under corporate management.

CONCENTRATES.

THE line of variation of the magnetic compass moves westward at the rate of four or five minutes aonually.

WHEN tempering a heated drill it should not be held at a state of rest in the water, but moved up and down to secure uniform temper on both tho uppor and lower sides of the drill.

IF MINING PROSPECTUSES were to state all the trutb about evon good mines there would be far less mining done than there is at present. No mine is perfect, but the promoter would not mentioo this fact, much less accentuate it.

CLAYS wbich contain a bigh percentage of iron oxide, lime, magnesia, and various alkalies, fuse much more readily than pure clays. It is also contended that the clay containing coarser grains will stand a higher temperature than those composed of finer grains.

HOLES can be drilled in soft rock, frozen clay, etc., much more rapidly by means of a churn drill than by striking with a hammer or by any machine drill. Tbere is a tendency of material of tbe kind mentioned to cause a drill to "stick" wben not used as a cburn drill.

THERE is no autbentic record of a circular mortar with a singie stamp haviog been used at Sutter Creek, Cal., io 1875, or about that time. Prospectors at various times bave rigged up ingenious crushing devices for milling ricb gold quartz, but as far as known none of tbese makesbift affairs were entitled to be called a mortar.

PURE METALLIC ZINC will last indefinitely in tbe atmospbere. Soon after exposure it becomes coated witb a film of zinc oxide, wbich protects it from furtber oxidation. Its use bas been suggested io tbe construction of monuments and other structures, for wbich purpose it would be more enduring tban marble.

WITH a pressure of 100 pounds at tbe nozzle, 1¾ inch diameter, a stream cao be tbrown vertically 103 feet, and horizontally 96 feet. The nozzle will discharge 574 gallons of water per minute. Witb a bigher pressure, equivalent to a higber head, tbe amount discharged and the distance to wbicb tbe water may be tbrown, will be increased.

THAT a series of samples taken in a mine and assayed is oot always an iodex of the value of tbe ore body sampled may be accounted for in many ways. Usually it is due to the inexperience or lax methods of the one taking tbe samples, or to bis deductions from wbat be considers facts, wbich upon investigation may prove not to be facts at all. The report of similar experience is not uncommon.

CONCRETE steel is concrete reinforced with bars of steel. It is mucb used in construction work. It is supposed to render tbe concrete more firm and durable. It is also known as "ferro-concrete." Concrete built as a facing to masonry often develops a crack between the two as a result of unequal settling. This is the more pronounced if the concrete bas not been tborougbly rammed wben put in place.

BATTERY plates detached from tbe mortar have usually given satisfaction. The table may eitber be built away from tbe lip of the mortar 30 inches or tbereabouts and connected with tbe mortar discbarge by iron pipes, or tbe table may be built on rollers, so tbat it may be moved up to tbe mortar when crusbing, or moved out from it wben cleaning up. The greater number of mills, bowever, bave fixed plates.

FOR tbe purpose of experiment, the managers of the De Beers Consolidated Mines of Soutb Africa filled a vessel with diamonds of various sizes and values, representing tbe "run of mine," and reached the conclusion tbat a cubic meter of diamonds would contain 1,167,000 carats, wortb, approximately, $75,000,000. A yield of twelve carats per 100 loads (1600 pounds) is considered the average yield of the diamond mines.

A HOLE worn through tbe side of a mortar can be repaired by providing an iron plate and securing it to the mortar by means of bolts, placing the plate over the bole. The joint should be made tigbt by tbe use of a rubber gasket. The mortar sbould tben be provided witb liners to prevent furtber wear. Never sbould stamps be allowed to drop in a mortar not provided with dies, not only because of iojury to the mortar, but because good mill work canoot be done in so deep a mortar.

RED OXIDE OF COPPER for various uses in tbe laboratory aod in the arts may be made by precipitation from a solution of copper sulpbate of the metallic copper by means of metallic zinc. Tbe copper falls in minute flakes. During tbe process the solution should he stirred occasionally. The copper is recovered hy filtration and the filtrate dried for two or more weeks, during which time it turns very dark—almost black. Tbis drying and oxidizing process should be stopped at about tbe end of three weeks, and the oxidized copper placed in an air-tight cast iron vessel, io which it is subjected to a red heat for several hours in a reverberatory furnace. This process converts it into a brilliant red oxide. The oxide remains in this conditioo under ordinary circumstances for an indefinite time.

THE cost of mining in Mexico varies as in every other locality with the conditions surrounding the mine. In a general way, when all conditions excepting wages are about equal, it may be said mining can be carried oo in Mexico at a cost somewhat lower than in the United States, owing to the generally lower wages, though Mexican labor is not so efficient as in the United States. Mexico, moroover, is free from the strike nuisaoce tbat is becoming such a marked factor in the expense of mining in the United States.

QUICKSILVER kept in a bottle or other vessel does not evaporate under ordinary temperatures, and it is not necessary to cover the mercury with water or other liquid, but a dilute acid solution is recommended for quicksilver containing aoy impurities, suoh as lead or copper, which are most likely to be found in it, being derived from small pieces of babbitt metal, fragments of copper plates, and the detonating caps used in blasting. When mercury is clean, a dilute solution of cyanide of potassium will tend to keep it brigbt.

LEATHER BELTS are not "always" used io driving dynamos or otber electrical machinery, in preference to rubber belts. Either leather or rubber belts, or ropes, may be used in driving, tbe cboice being largely a matter of convenience. It is preferred to have a considerable distance between tbe driving and driven pulleys, as tbe necessary friotion is obtained not so mucb by tension as by tbe weigbt of tbe belt or rope itself. It is preferable to run with the top side slack, and to make tbe bottom side tbe driviog side, as this gives a large arc of contact.

THE altitude of the City of Mexico is 7606 feet and tbe average annual rainfall is stated to be about 23.2 inches. That at Chihuabua is somewbat greater, being 25 8 incbes. Tbe latter city is at an altitude of 4713 feet. The amount of rainfall at any place cannot be even approximately estimated by tbe altitude, as they bear little relation to eacb otber. For instance, tbe rainfall at tbe city of Cueruavaca, at an altitude of 5186 feet, is 111.9 incbes, and at Oaxaca, at an altitude of 5153 feet, is but 28.6 inches, and at Matamoras is 37.2 incbes at an altitude of 143 feet.

THE rigbt to follow the ore or vein is limited by tbe end lioe, but under ordioary conditioos the vein may be followed downward, on its dip, to indefinite deptb. This is tbe universal rigbt in all of tbe mining regions of the United States, where the mineral lands were originally on the public domain, except at Leadville, Colo., wbere, owing to the form of the mineral deposits, tbe extralateral rigbt is not recognized, as no jury bas yet been impanelled in tbat district wbicb would admit tbat the ore deposits were lodes, and tbe right to follow them on their dip was consequently denied.

GOLD occurs in "soapstone" (steatite) in a number of places in California. The most noted locality is on aod near the Tonzi ranch, 6 miles west of Sutter Creek, Amador county, wbere, along tbe eastern side of a wide serpentine belt, the massive serpentine has been sheared to a schistose condition and is sligbtly gold-bearing. The serpentine, tbough not really talc (soapstone), is so closely allied to that mineral that the two are essentially the same. Several attempts have been made to treat tbese gold-bearing soapstones, but witbout financial success. The gold is extremely fine, occurring in sbeets like gold leaf, and rarely in grains. Investigation of these deposits does not indicate tbat they are commercially valuable.

IN SHAFT SINKING a bucket is generally preferred to a skip for the reason tbat a bucket can be easily moved about on tbe bottom of the sbaft to accommodate sbovelers. A low skip is usually convenient in a tbree-compartment shaft wbere tbe sinking is done in the middle compartment, even tbougb tbe skip must remain on the track, and cannot be shifted about like a bucket. It is a mistake to reduce tbe size of the manway and pipe compartment to small dimensions for reasoos of economy. Tbis compartment should be tbe largest in tbe sbaft, in order to afford room for workmeo wbo are obliged to bandle pipes, pumps, etc., and wbere tbis compartment is also used for boisting it sbould he somewhat larger tban tbe other compartments.

THE Supreme Court of the United States (case of Tartar vs. Spring Valley M. Co.) decided—and it has since generally been held throughout tbe Pacific coast States and Territories tbat "the right to water by prior appropriation for any useful purpose was entitled to protection. Water is diverted to propel macbinery in flour mills and saw mills, and to irrigate land for cultivation, as well as to enable miners to work tbeir claims; and in all sucb cases the right of the first appropriator, exercised within reasonable limits, is respected and enforced." The party who first appropriates the water of a stream for mining purposes obtaios the rigbt, hotb as to parties who attempt to take it by tapping the stream above, or who need it in the stream below. A homestead or other entry is subject to rights of a prior locator of water. Tbe location of the water should be made, the ditcb line staked and work commenced and prosecuted with reasonable diligence. If the notice and record are not followed up within reasonable time by actual work in carrying out the intended appropriation they amount to absolutely nothing. What a reasooable time is may have to be determined by the courts, but it is generally presumed to meao a sufficient timo to enable the locator to get his tools and men on the ground and begin actual work.

THE habit of feeding quicksliver in givon amount at stated intervals regardless of the value of the ore is a pernicious one and should never be adopted by young mill men who desire to make a success of milling. An ore may average about the same value from month to month, but there is always a daily and often ao hourly difference io value of almost any ore. The condition of the outside plates should determine the time and amount of quicksilver to be fed. Rarely ao oro is found wherein tbe values are regular, and with these the mill man is safe, but ordinary practice requires that the battery man must keep awake and watch his plates constaotly. The mill wbere the battery man can find nothing to do is either crushing very poor rock or the mill foroman sbould be engaged in some other kind of employment.

LACCOLITE is a name derived from the Greek meaning cistern. It was first applied by G. K. Gilbert to those peculiar intrusions of igneous rock injected into sedimentary strata, but wbicb did not reach the surface until exposed by erosion. Tbe first occurrence of tbis character to be described was in tbe Henry mountains in soutbern Utah. There are numerous laccolites in Utah Nevada, Colorado and the Black Hills of Soutb Dakota. The fact tbat laccolites frequently are accompanied by valuable ore deposits is of interest, particularly tbose of tbe San Juan country in soutbwest Colorado, tbose at Leadville and some of those in Soutb Dakota. It bas been noticed, however, tbat tbe ore deposits are more directly associated with dikes wbicb intersect the sedimentary rocks and laccolite sheets as well. Tbe material forming laccolites is not always tbe same, but is usually an acid rock.

ALABASTER is a compact variety of gypsum, of earthy appearance, sometimes faintly tinged witb color, as pink, yellow or greenisb. It is sometimes used for ornamental purposes, being carved into various imitative shapes. Gypsum is used for fertilizing purposes and is known as land plaster. Calcined and ground, it forms plaster of Paris used as a "bard finisb" for walls and ceilings of houses, also in tbe construction of various ornamental pieces for structural work. In recent years large amounts of "staff," a material largely employed in the construction of temporary buildings, sucb as are built for exposition purposes, has been made from gypsum. Tbe amount of gypsum produced in the Uoited States is about 700,000 sbort tons aooually, worth approximately $2.50 per ton. The situation of a deposit and local demand for tbe material are the principal considerations io determining tbe value of a deposit of gypsum. One of the largest concerns handling gypsum is tbe United States Gypsum Co. of Omaba, Neb. They bave works in Nebraska, Iowa, New York, Michigan and Oklaboma.

GLASS is made essentially of silica (quartz sand) as an acid element; soda or potash as an alkalinc base, and lime and oxide of lead as the alkaline earths. To the alkaline eartbs commercially employed tbere sbould also be added baryta and alumina, tbe former in place of lead, and the latter a common ingredient in certain kinds of glass. The composition of window glass is purified quartz sand, 100 parts; chalk or limestone, 35 to 40 parts; sulphate of soda, 40 to 45 parts; cullet or waste and broken glass, 50 to 150 parts. These are mixed before charging ioto the pots. To make colored glass various oxides of the metals, iron, manganese, gold, arsenic, copper, cbromium, uranium, cobalt, etc., are added in greater or less amount to tbe cbarge. Tbe amouot of metallic oxide and tbe lengtb of time tbe charge remains in tbe furnace determines the color of glass. Cobalt produces a blue color; uranium makes yellow glass, also salts of silver and antimony oxide; a peculiar yellow is produced by tbe addition of powdered cbarcoal to tbe cbarge; cupric oxide produces green, and manganese oxide violet. An excess of manganese produces black glass.

THE most reliable method to determine tbe steam consumption of an engine is to make an evaporation test; that is, to measure tbe water fed to the boiler in a given time and delivered to the engine in the form of steam. Tbis method, however, entails considerable trouble and expense. So engineers often figure out the water consumption from indicator diagrams. The terms water coosumption and steam consumption are here used indiscriminately, for a pound of water will produce a pound of steam at any pressure. Figuring that way can never be wbolly accurate, because tbe data requisite to insure results are not thus procurable. That is, the amount of water accouoted for by tbe indicator is always considerably less than it ought to he because of cylinder condensation, valve and piston leakage, to tbe extent that it might be that only 50%, or at best not more than 90%, of the water passiog through the cylinder would be accounted for by the indicator. But if the cylinder were properly steam jacketed, or if superbeated steam were used, and there were no leakage of steam from valves or pistons, tbe water consumption could he closely calculated from an indicator diagram.

Secondary Enrichment of Mineral Veins in Regions of Small Erosion.

Written for the MINING AND SCIENTIFIC PRESS by C. L. HERRICK, Ph D.

In the rapidly growing but still very unsatisfactory literature of mineral deposition it appears to the writer that one element of very great importance has been nearly entirely overlooked.

The question has often been asked why there should be so marked a difference in the reliability of gold-bearing veins found in two parts of the same range, as, for example, the Rocky mountains of Colorado and the same range farther south. It can not be denied that, with essentially identical conditions of country rock and vein filling, the veins of New Mexico and Arizona have a greater tendency to exhibit a falling off of value in depth and a greater variability near the surface than do those of the northern regions.

Without entering into any comparison of the several regions, the writer hopes to present a working hypothesis which is based on a sufficiently wide range of observation to be at least of practical value and to form the basis for further discussion. While the fact above alluded to will be questioned by some New Mexico mining men, who will in the same breath admit it by appeal to much-used statement that in New Mexico there have been few, if any, attempts to reach adequate depth, yet we will admit, for the purposes of this discussion, that the gold ores in New Mexico are more fickle in distribution, and the mineral veins are less reliable in depth than farther north.

Practically all gold-bearing veins in this region are either found in andesite, or other basic rock, or are in such geological association as to indicate that the fissures passed through such intrusives. The sequence in the Territory and southern Colorado has been, first, andesite and allied porphyries; second, trachytes and trachyte pitchstones, etc.; third, acid rhyolites, with free quartz, and often of almost granitic appearance, grading into acid glasses and obsidian; fourth, recent basalts and basaltic tufas, the last mentioned being Post-Tertiary. In none of the above, except the first, are mineral-bearing veins of first intention found, though cases exist where a gold quartz vein passed through an andesite into a rhyolite.

It is known that the andesite is later than the Permian, for there are found numerous instances where larger or smaller fragments of granite, Carboniferous limestone and Permian sandstone are incorporated in the brecciated phases of the andesite. It is also well known that the andesite flows are multiple and that the earlier andesite is often incorporated in the latter along contact zones, and the andesite is prone to be greatly shattered and badly mended by successive outbursts.

The quartz veins are frequently much disturbed and displaced by faults within the andesite. It becomes a very difficult question in these cases whether the quartz veins were in situ and have been displaced by the faults, as ordinarily supposed, or whether the faults laid open the rock and the infiltration conformed to the several sets of fault openings. It is the writer's opinion that the latter possibility is often overlooked. For example, in a gold vein which the writer has opened for several hundred feet, where both walls are of andesite and the vein is upon the average over 5 feet wide, an intrusion of one wall, obviously due to cross faults, causes a "pinching" of the vein to a mere crevice with quartz filling. Beyond a second cross fault the vein resumes its original width and character. It is fairly obvious, in such a case, that the intrusion of the foot wall was brought about before the filling of the vein by quartz.

On the same vein an entirely similar cross fault throws the vein laterally some hundreds of feet. The cross fault is sharp and the wall is smooth and appears "slickensided," though, it must be observed, what miners call "slicks" in clayey ground, are generally of water origin. The quartz is 4 to 6 feet wide at the break and stops sharply. One would say that this is a clear case of throw of quartz vein by faulting of the country rock. There is, however, a rib of good quartz carrying good values in the slip passing toward the continuation of the vein in the direction of throw for some distance. We might suppose that this quartz is secondary and has been deposited since the faulting of the main vein, but it has none of the appearance of such segregation quartz and is quite like the original vein in appearance and value. It is not banded nor ribboned, as segregation quartz here tends to be.

It appears to the writer more probable that the longitudinal and the transverse fissures were both prior to the quartz filling, and that the quartz along the transverse fault is contemporaneous and similar to that of the main vein. Often the recognition of such a possibility will have a practical bearing on the method of mining exploration. It will not be certain that the vein when found beyond the cross fault will be of the same width or value as at the point of apparent fracture, while on the usual hypothesis that conclusion would be inevitable.

It has been the writer's privilege to study in a practical way the characteristics of the quartz veins in a region where the andesite forms the country rock over a large area and is broken, as above described, without the intrusion of any other volcanic or igneous rock and at a distance from any known stratified rock. The region is gently rolling and has escaped even the moderate erosion of the mountainous parts of New Mexico. The quartz veins at a depth of over 200 feet are massive and homogeneous, and fill the space of the vein from wall to wall without gangue or clay. The wall selvage is narrow and obviously a reaction product between andesite and quartz. Values are chiefly oxidized at this depth, though covered by 100 feet of surface water, which is obviously in circulation or movement toward the drainage axes.

Ascending to a point 100 feet below the surface, the vein preserves the same (or greater) width, but the quartz is reduced to one-half, and the space remaining is filled with a mixture of decomposed quartz and clay or gangue. The loose part of the vein often carries values, but the occurrence of gold is sporadic. On the whole, the value in the vein where it is all quartz and where it is half gangue may remain the same, with such exceptions as will be noted beyond. At or near the present water level, and for some distance below, there is some concentration of value. Above the water level to the surface there is a tendency for cross fissures and fault planes to make shoots of richer ore in the vein, and the surface is often better value than 50 feet lower.

At the line separating the loose upper zone from the compact lower quartz there is frequently a belt of spongy quartz of high value running many hundreds of dollars per ton. The work has not been carried to such a depth as to explore the unoxidized zone, though there are some bunches of sulphides in the lower quartz. On the other hand, the country rock adjacent to veins and at fault planes is often densely impregnated with pyrites of small value.

It may be noted that this region has suffered little denudation. In central New Mexico only one locality has yielded any evidence of small local glaciers. The erosion has been by way of atmospheric disintegration and surface erosion by local waters. The area is one uncompromised by mixed intrusives, and the conditions have been simple.

Water obtained access to the fissured quartz of the veins and the ores have been oxidized to an unknown depth. The water, being in movement, has conveyed air to the deepest portions yet seen. The contact action between acid vein matter and basic country rock has been profound, and resulted in extracting kaolin and decomposing feldspars from the andesite. The lime from the feldspar has been collected in fissures not filled by quartz, and the result is that the more recent fissures are filled with lime, quartz and iron carrying very good but variable gold values.

The quartz has suffered to a considerable extent and has been fissured and honeycombed. By this double process the vein has been widened and part of the fissure filled with gangue of the mixture just described. In this more or less of the gold from the decomposed quartz remains. At and near the surface is a zone of enrichment, due to the infiltration of heavier materials from above. The iron has largely been changed to red oxides or entered into ochraceous combinations. In the quartz the change has proceeded no further than magnetite.

It seems reasonable to suppose that from the upper zone of enrichment down to the less altered zone of massive quartz there would be an impoverishment by which this quartz would be robbed to supply rich pockets or belts at the point where the free circulation is checked.

Thus simply are all the phenomena described to be explained. The processes here illustrated may have occupied a very long time, and the only effect of the glacial period is the indirect one, in so far as it may be true that the differential strains due to unequal weight of ice gave rise to the fissuring producing the recent basaltic flows.

The period of basaltic overflow was one of profound faulting, and it is very possible that even in districts not in immediate contact with basaltic flows or volcanoes the effect was felt in fracturing by shearing strains so produced. In the locality here alluded to there are basaltic necks and sheets at no great distance.

Contrasting such conditions as are here described with those in a region of glacial denudation or excessive erosion from other causes, the difference is very apparent. In most of the latter instances all that has so far been brought to view in our region is absent, and there remains but a zone of superficial enrichment, immediately following which is the sulphide zone. In some cases the sulphide zone is covered by "cap," in no way comparable to our surface zone.

The practical question then remains: Is it probable that the unoxidized zone will prove to have values sufficient to pay for the cost of sinking as much as 1000 feet? Each investor will answer according to his own light. If he is convinced that the massive quartz carries the equivalent of the value of the sulphide quartz below it, he will be governed by this value. He may believe that the oxidized quartz has all suffered impoverishment, as part of it has demonstrably done. In any event, he is justified in assuming that veins of good size and constancy will go down as far as he is able to follow them, and that sooner or later he will reach a region where he can expect uniformity and permanence of value. The ore will be concentrating material, and in most New Mexico camps will have few detrimental elements.

It is to be hoped that some one will be found with courage and means to explore these attractive depths, who will not be turned aside by the easier dollars in the surface pockets of the same veins.

Considerations Favorable to Hot Blast Smelting.*

In blast furnace smelting of gold, silver, lead and copper ores, conditions at the incandescent zone above the tuyeres for oxidation and reduction are controlled by volume, temperature and pressure of blast with reference to cross section of the furnace at the tuyeres, character of the material being operated upon, and end results to be accomplished. In the use of hot air, provision must be made in tuyere area to accommodate and allow the passage of its vastly expanded volume. If the air pipes and tuyeres are not proportioned to it, then necessarily at a given pressure of blast there may occur a localization of combustion simply by reason of the limited amount of oxygen supplied through them, which at once combines with the first carbon or other fuel with which it comes in contact, leaving less or none for other fuel in the same zone and above.

Heating air blast by reason of its increased volume tends to facility of distribution and not to localization of combustion. Pure oxygen blown in at the tuyeres would produce most violent local combustion and intensest heat. Nature attenuates oxygen by the admixture of a trifle more than four times its volume of nitrogen and the product becomes air and is susceptible, physically, by well-known means, of a much wider distribution and contact with the material and a corresponding distribution of resulting combustion in the tuyere zone. Increasing heat invests it with the property of accelerating energy and intensity which would tend, if blown in hot, to violence of reaction with carbon, sulphur, iron, etc., concentration or localization of combustion and resultant excessively high temperature, were it not for the counteracting factor that nature again provides in the expansibility of gases under heat which has the same material effect of an attenuating or thinning down of the air by increasing its volume by expansion, components remaining unchanged, the increased energy of its oxygen by reason of heat being counteracted or compensated for by reason of its attenuated condition in expanded volume, and hence facility of distribution prevents undue local action. The reactions peculiar to the zone of fusion do not, however, occur until the air blown has reached the temperature of that zone and the oxygen has hence acquired its extreme energy, therefore the effect of heating the blast on the action of the furnace is to make uniform action possible where it enters the furnace, by eliminating much of the cold otherwise carried in by the air blast and circulated or distributed irregularly and without control. A given amount of air expanded by heat to three times or four times its original volume is distributed throughout the tuyere zone through the pressure imparted to it by the blowing engine, with facility and certainty proportional to its expanded volume.

Hot wind does not necessarily tend to concentration of temperature and rapid smelting, though it makes either the one or the other, or both possible, when pressure, temperature and volume are under control to adapt all to size and to shape of furnace and charater of ore being smelted. Intense heat is a necessary condition of smelting zone of a furnace. Cold, purely as cold in the air blast introduced for the purpose of producing any useful modifying effect on a zone of the furnace where incandescence is a normal and necessary condition, is an absurdity. The effect of such cold can only have a retarding and unfavorable influence in that zone.

A part of the air sent to a blast furnace is for the purpose of generating heat by the burning of fuel to raise the temperature of material within the furnace to a point at which it is possible for the desired chemical reactions to take place rapidly, and further to melt such material when it reaches the tuyere zone, while another part is required for the oxidizing of fuel necessary for those reactions, or else for its oxidizing effect higher up in the furnace on ores carrying sulphur, iron, etc. There are large proportional areas, especially in the neighborhood of the tuyeres, in every cold blast furnace, in which the desired reactions cannot take place because the blast of cold air keeps these areas too cool to admit of them. Proportionally as the air is sent hot into the furnace these cool areas are reduced in size and in far greater proportion is the capacity and efficiency of the furnace increased. Zinc crusts and other accretions of kindred nature obtrude less difficulties to combat when not complicated by the presence of cold inactive spots produced by the cold of the air blast.

*Abstract from pamphlet issued by the Colorado Iron Works Co., Denver, Colo., entitled "Some Details as to Smelting Practice and Equipment."

A pound of carbon requires 11.6 pounds of air for its consumption, and conversely for each pound of carbon that is saved from burning it in the furnace by burning it in contact with the blast before it reaches the furnace, the cooling influence of 11.6 pounds of cold air is kept out of the zone of intensest heat, as much cold in the air blast to be overcome by heat to be developed from each pound of carbon as would be required to melt thirty-two pounds of pig iron from atmospheric temperature, and it is by far better to relieve the furnace of at least a part of the duty of heating in its most vital part such enormous quantities of cold air to burn fuel for the production of heat that may more efficiently and cheaply be produced outside and carried in with the air blast.

If the current of cold air could be kept constantly impinging on the glowing coke, then to overcome its cooling influence would be only a question of fuel added; but it is not so, because such incandescent fuel as a sharp blast of cold air is caused to impinge against is at once cooled, blown out as it were, and it is only after the blast of cold air has passed through the heated mass of material and becomes heated thereby that it may impinge directly upon incandescent fuel without deadening or cooling it. This is plainly seen in the operation of any cold blast furnace, for on looking into the tuyeres they are generally seen to be black and to look cold throughout, except that far in an occasional bright spot may be seen, but such bright spots are always protected from the direction of the cold blast by the cooled or partially cooled material at the tuyeres against which the air impinges on its entrance to the furnace, and thence finds its way around through the heated mass of furnace material and becomes itself heated and thus prepared to perform its functions in the necessary reactions.

And so it turns out that in the absence of a heating stove outside the blast furnace in which the air blast may be heated, the furnace itself at its most vital and most sensitive part—the tuyere zone—must be utilized as a stove for that purpose primarily and at the expense of its efficiency for its other duties and functions.

In cold blast furnaces there is a constant tendency to burn too high up above the tuyere zone, which is caused by the cold air cooling relatively all material at the tuyeres, while itself is being heated up to the temperature at which it is possible for the air to become a factor in the reactions to which it is necessary.

If in any particular zone of the furnace a given condition of temperature, oxidation of fuel and incandescence is necessary, then that condition is desirable in the whole of that zone, and the cooling in spots and patches by forcing a blast of cold air into it curtails the area and the efficiency of that zone, not only by the amount in relative proportion of those abnormally cooled spots or patches to the whole zone under consideration, but by far more than this, for they lie there in the way of the blast, obstructing and preventing it from circulating freely throughout the incandescent zone, which it necessarily should do, for the requisite supply of oxygen to each and every individual inch in that section. Not only is the room that such cooled areas occupy lost absolutely, and to be deducted from value of cross section, but their adverse effect on its operation by deflecting the blast upward or downward anywhere away from where it is needed to where it is not needed is still more serious, for no possible good, but much harm, must come as a result of blast blown against cooled masses of furnace material and deflected thence upward or downward or athwart into material from which heat is obstructed by the cool areas. Whenever the furnace is so large that blast pressure must be increased to several pounds in order to permeate to the center of the whole mass of furnace material at the tuyere zone to maintain combustion there, then the excess of cold extinguishes the fire, blows it out, as it were, in continually widening areas in the neighborhood of the tuyeres where it is introduced and for distances inward greater and greater as blast pressure is increased, but in patches or spots only, of greater or less area until the center is reached and cooled so much as to stop the smelting operation all along the center line. The half melted mass of unsmelted material cools more and more, growing larger and larger until it is finally connected here and there with the cold patches between the center and the sides, and now excessive irregularities are culminating in a frozen up furnace, often solid at the center, while yet partially open along the sides.

Air is delivered into a blast furnace at its hottest part—the zone of fusion—the tuyere zone. It follows that to perform its functions its temperature must first become the same as the temperature of that zone, possibly 4000° or more, oxidizing rapidly any reduced lead with which it may come in contact. Another part landing against some cold dark spot and deflected thence against some other cold dark area, thence dodging around until it does get into the heat somewhere, often far above the proper smelting zone, and having finally acquired the heat necessary, it performs its offices in conjunction with fuel at that point, producing heat and setting up a temporary smelting area above the normal one. Thus is the proper smelting zone robbed of a part of the air necessary to its appropriate reactions and further chilling ensues, while the smelting zone is extended upward and rendered inefficient throughout its whole extent.

Hot blast contributes to support the combustion of carbonaceous and other fuel, as sulphur, etc., with a minimum of oxygen supplied, i. e., the hot blast and fuel are drawn upon most for the necessary smelting reactions, and least possible for heating per se. Heating the blast promotes regularity of heat and of chemical reaction by promoting uniformity of conditions throughout each individual section of the furnace, especially in the zones of incandescence and fusion where the most active changes are taking place, reduction or oxidation predominating, as the case may be, both in that zone and above. Because the blast is heated it does not follow that the furnace need be, or would be run hotter than is common or desirable. Hot blast does not necessarily involve increased temperature in any one zone of the furnace. Incandescence at the tuyere zone, where the air blast enters, is a necessary condition of every blast furnace; but the temperature of the heated blast being always below that of incandescence, the heat of that zone and of the whole furnace is within easy and accurate control.

In matte smelting of sulphide ores that require previous partial roasting, and where carbonaceous fuel is used, the tendency is to reduce iron oxide and sulphurous acid gas by excess of carbon monoxide and to produce poor matte, because carbon monoxide in the first instance robs the FeO of its oxygen to form carbon dioxide, thus robbing the slag of the iron needed there and sending it to the crucible to burden the matte, and in the second instance the sulphurous acid gas, which would otherwise escape by the chimney, is robbed of a part of its oxygen, thus producing sulphur and sending that also to the matte. The less carbonaceous fuel necessary to be burned in the furnace, and the less carbon monoxide generated there (other conditions being right), the less imminent become these undesirable reactions, and hence the more of the necessary heat that is generated outside of the furnace and sent in with the air blast, and so the less carbonaceous fuel necessary, the more favorable are the conditions in this view of the case to a higher percentage of concentration of valuable products in the matte, and the suggestion points significantly to pyritic smelting.

To the application of hot blast is due the great economy and efficiency realized in modern iron smelting practice, for it is the application of heated blast that has made the great iron furnaces of to-day possible. Blown with cold blast, not one of them could run a week. Heated blast, making uniform conditions of combustion and of consequent reactions possible in each individual cross section of the furnace, has made high blast pressure possible, without which furnaces of large cross-section area could not be blown.

The air blast in iron smelting is heated by the inflammable gases, chiefly the carbon monoxide which is evolved. Little or no such gases escape from furnaces smelting the ores of copper, lead, silver and gold, and hence to heat the air blast for these other means must be resorted to.

The importance of this feature is manifest when it is considered that 11.6 pounds of air is consumed in burning one pound of carbon, as coal or coke. More than one and one-half ton of air must be heated to the smelting temperature either in the blast furnace or both in the stove and in the blast furnace for each ton of ore and fluxes smelted.

As indicated by the above explanation, the greater proportion by far of the heat involved in the smelting of ores is expended in heating the air necessary to the operation, either within the blast furnace, as when cold blast is used, or partly by the stove and partly within the smelting furnace, as when hot blast is applied.

Desulphurizing Slimes by Heap Roasting.*

NUMBER II.—CONCLUDED.

Written by E. J. HORWOOD.

The width found most suitable is 22 feet at the base, the sides sloping up rather flatter than one to one, with a flat section on top reaching 7 feet in height. As there is always 6 inches of the outer crust imperfectly roasted, it is advisable to make the length as great as possible, thus minimizing the surface exposed. The company is building heaps up to 200 feet long.

During roasting, care is required to regulate the air supply, the object being to avoid too fierce a roast, which tends to sinter and partially fuse the material on the outer portions of the lumps, while inside there is raw slime. By extending the roast over a longer period this is avoided and a more complete desulphurization is effected. Experiments conducted by Mr. Bradford, chief assayer, demonstrated that, at a temperature of 400° C., the sulphide slime is converted into basic sulphate, while at a temperature of 800° C. the material becomes sintered, owing to the decomposition of the basic sulphate and the formation of fusible silicate of lead.

In practice, the sulphur contents of the material, which originally are about 14%, become reduced from 6.5% to 8.5%—half in the form of basic sulphate and half as sulphides; much of the material sinters and becomes matted together in a fairly solid mass. The heaps are built without chimneys of any kind; a strip about 5 feet wide along the crest of the pile is left uncovered by plastered slime, and this, together with the open way in which the lumps are built in, allows a natural draught to be set up, which can be regulated by partly closing the open ends of the flues at the base of the pile. Masonry kilns were used in the earlier stages with good results, which, however, were not so much better than those obtained by the heap method as to justify the expense of building, taking into consideration, too, the extra cost of handling the roasted material in the necessarily more confined space.

Much interest has been taken in the chemical reactions which take place in the operation of desulphurization of these slimes, it being contended on the one hand that the unexpectedly rapid roast which takes place may be due to the sulphide being in a very fine state of subdivision, and more or less porous, thus allowing the air ready access to the sulphur, producing sulphurous acid gas (SO_2). On the other hand, others, of whom Mr. Carmichael is the chief exponent, claim that several reactions take place during the operation, connected with the rhodonite and lime compounds present in the slimes, which he describes as follows:

"The temperature of the kilns having reached a dull red heat, the rhodonite (silicate of manganese) is converted into manganous oxide and silica; at a rather higher temperature the calcium compounds are also split up, with formation of calcium sulphide, the sulphur being provided by the slimes. The air permeating the mass oxidizes the manganese oxide and calcium sulphide into manganese tetroxide and calcium sulphate, respectively, as shown as follows:

$$3\,MNO + O = MN_3O_4$$
$$CaS + {}_4O = CaSO_4$$

And, as such, are carriers of a form of concentrated oxygen to the sulphide slimes, with a corresponding reduction to manganous oxide and calcium sulphide, as shown by the following equation, in the case of lead:

$$PbS + 4\,Mn_3O_4 = PbSO_4 + 12\,MnO$$
$$PbS + CaSO_4 = PbSO_4 + CaS.$$

The oxidation of the manganous oxide and calcium sulphide is repeated, and these alternate reactions recur until the desulphurization ceases, or the kiln cools down to a temperature below which oxidation can not occur. These reactions, being heat-producing, provide part of the heat necessary for desulphurization, which is brought about by the following concurrent reactions between metallic sulphates and sulphide:

"The first that probably occurs is that in which two equivalents of the metallic sulphide react on one of the metallic sulphate with reduction to the metal, metallic sulphide and sulphurous acid, as shown by the following equation in the form of lead:

$$2\,PbS + PbSO_4 = 2\,Pb + PbS + 2\,SO_2.$$

"The metal so formed, in the presence of air, is oxidized, and in this state reacts on a further portion of the produced metallic sulphide with an increased formation of metal and evolution of sulphurous acid, according to the following equation, in the case of lead:

$$2\,PbO + PbS = Pb + SO_2.$$

The metal so produced in this reaction is wholly reoxidized from the oxygen of the air current, and, being free to react on still further portion of the metallic sulphide, repeats the reaction, and becomes an important factor in the desulphurizing of the undecomposed portion of the material. As the desulphurization proceeds, and the sulphate of metal accumulates, reactions are set up between the metallic sulphide and different multiple proportions of the metallic sulphate, with the formation of metal, metallic oxide, and evolution of sulphurous acid, as follows:

"With two equivalents of metallic sulphate to one equivalent of metallic sulphide, in the case of lead, according to the following equation:

$$PbS + PbSO_4 = 2\,PbO + Pb + 3\,SO_2$$

"With three equivalents of metallic sulphate to one of metallic sulphide in the case of lead, according to the following equation:

$$PbS + 3\,PbSO_4 = 4\,PbO + 4\,SO_2."$$

The volatility of sulphide of lead—especially in the presence of an inert gas such as sulphuric acid—being greater than that of the sulphate, oxide or the metal itself, it might be thought the conditions are conducive to a serious loss of lead. This, however, is reduced to a minimum, owing to the easily volatilized sulphide being trapped as non-volatile sulphate, by small portions of sulphuric anhydride (SO_3), which is formed by a calalytic reaction set up between the hot ore, sulphuric acid and the air which is passing through the mass. Owing to the non-volatility of the silver compounds in the slimes, the loss of this metal has been found to be inappreciable. The zinc contents of the slime are reduced appreciably, thus rendering the material more suitable for smelting. After

*Abstract Trans. Australian Inst. Min. Engrs.

desulphurization ceases, a few days are allowed for cooling off. On the breaking up of the mass for despatch to the smelters, as much of the lower portion of the walls is left intact as possihle, so that it can be utilized for the next roast, thus avoiding the rebuilding of the whole of the walls.

Before concluding, I wish to acknowledge my indebtedness to Mr. Carmichael for his assistance in the technical portion of this paper, which I trust will prove to he not without interest.

Drying of Peat.

Written by C. O. BARTLETT.

The question of drying very many different kinds of materials, such as concentrates, coal, sand, clay, marl and all similar suhstances is getting to he a very important factor in the manufacture of products using two different materials; for instance, the manufacturer of cement first wishes to reduce his clay or even crushed stone to an even moisture, so that he may know exactly what he is using. He wishes to dry to a certain degree or per cent of moisture so that the material is always the same. For instance, clay will vary all the way from 15% to 30%, according to weather conditions; coal will vary according to weather conditions from 5% to 15%; the same may he said of sand. It is very seldom that sand or coal will contain 15%, hut there are times after a very severe rain storm that the rain will get frozen into ice after having impregnated the coal, causing an excessive degree of moisture as high as 15%, and the same can be said of sand.

Almost any kind of material can he dried. The question is, What will it cost to do it? For instance, we have an inquiry to-day for the necessary machinery for drying distillery slops. Now, this material contains at least 90% moisture. That it can be dried there is no question, but the cost of drying it will be more than the worth of the material after it is dried. For instance, you commence with ten tons and take out nine tons of water, which leaves one ton, and the result is that the cost will he more than the material is worth.

We lately had an inquiry for drying peat in large quantities. In fact, we are getting these inquiries right along. A person wants a dryer for drying 100 tons of peat an hour, containing 80% moisture and reduced to 5% or 10% moisture. Now, this means that starting in with 100 tons of peat you have a finished product, after taking out at least 75% moisture, of twenty-five tons of dried peat, and the cost of drying depends almost entirely upon the amount of water to be evaporated, and peat being a cheap material, the cost of taking out 80% will amount to about all the finished product is worth. This is especially true of peat, for the reason that it being of a combustible nature, must he handled with care and will not allow too great a heat, which means a greater cost of drying.

We generally calculate that one pound of good hituminous coal, or its equivalent used for fueling, will evaporate from eight to ten pounds moisture. Therefore, to dry 100 tons of peat, containing 75% moisture, means to dry out seventy-five tons of water, and allowing one pound of coal for each ten pounds of peat. equals no less than 7500 pounds of coal to dry it. Of course, the peat is an exception; that is, heing of a spongy nature, contains a very large amount of water. Taking sand or concentrates, the amount of moisture would run on an average from 8% to 10%, and in drying five tons an hour and allowing one pound of coal for every ten pounds of water evaporated would mean 1000 pounds of water, which would require only about 100 pounds of coal, and the cost of drying is very small. Same may be said of drying coal. But whatever is dried, the cost of drying it will depend largely upon the amount of water to he evaporated. Now comes the different kinds of driers, which we will class into three kinds:

First—Direct heat. What we mean by direct heat driers is where the heat or fire is applied directly under material to be dried, and the rotary drier is usually used for this purpose. The material to be dried is placed in at one end of the drier and a fire similar to a fire under a boiler is made directly under it which heats the product to an intense heat, causing it to dry rapidly. If the products of combustion will not injure the material to he dried by coming in contact with it, they can be passed first underneath and around the drier and afterwards through the material being dried, reducing somewhat the cost of drying, for the reason that you get a little hetter results; that is, you get all the heat that there is in the coal you are using. On the other hand, materials like peat and some kinds of clay and sand would not allow the product of combustion to pass through the material, then the drying must all be done from the outside, and the cost of drying increased accordingly.

Second—The next style of drying is to first heat the air, either with a coil of steam pipe or with direct heat, and then pass this heated air through the material to he dried. This method is frequently used in drying salt. I distinctly remember of fitting up a small cheap drier like this for a certain chemical company for drying what I call epsom salts. They were having great trouhle in drying them and had put in a large amount of steam pipe with shelving over the pipes, and then placed the salt on these shelves to be dried, but with very poor results, for to dry economically it is necessary to keep the material moving, and I simply took a large common stove, encased it with a sheet iron casing, leaving a place open for firing and taking out the ashes. The common stove made a great deal of heat, which was radiated into the chamber or oven, as you might say. The material to be dried was placed in a common wooden cylinder ahout 36 inches in diameter and 16 or 18 feet long, with rihs for elevating the material up and dropping it down. The heat was taken from this oven with a fan and passed through the cylinder in which the salt was placed. It was a great success and they are using this same system to-day.

Third—Steam drier. The steam driers are very essential in some places, although not so economical as direct heat, for the reason that steam pressure of seventy-five pounds gives only about 300° heat, and 100 pounds gives 330° of heat, and this is inside of the cylinder, which means considerahle less temperature on the outside, where the material to he dried must necessarily he. Therefore, steam pressure cannot he as economical as direct heat. Another great danger in steam driers is that the least particle of a leak is a very serious ohjection, as it is somewhat difficult to make a steam drier hut what is liahle to leak somewhere, especially after years of constant use. The continual contraction and expansion of steam chamhers of all kinds and makes is very severe on joints, rivets, etc., and only with the very hest and most careful care can slight leaks he avoided.

Chlorine Smelting, With Electrolysis.*

NUMBER II—CONCLUDED.

Written by JAMES SWINBURNE.

As to cost of the process, the first thing to realize is that it smelts for all the metallic contents of the ore, not for one only; that all the metals are completely extracted. There is no waste hy fumes or imperfect extraction, and there is no slag. The gangue looks like river sand. There is no room for loss. All that comes into the works is ore and electrical energy; all that goes out is pig metal, sulphur, gangue and oxides. The chlorine goes round and round. There is no room for appreciahle waste of chlorine either. A leak that would show in the halance sheet would make the works uninhahitahle. There is, however, a trace of chlorine in the iron oxide, as it is apt to contain a little oxychloride. There is also a loss in collecting the hydrochloric acid from the hoiling down of the zinc chloride. A little chlorine must therefore he added to the stock. This can be done hy buying crude zinc chloride, or galvanizing pickle, or precipitating calcium chloride with zinc sulphate. In out-of-the-way places it is much simpler to huy zinc chloride, as it is more portahle than hydrochloric acid.

It may he said that a process for such a prohlem must he a maze of chemical operations. This is not the case here at all. The process has only three simple stages: Transforming sulphides into metallic chlorides and sulphur; substituting zinc for all the other metals in the metallic chlorides; electrolyzing out the zinc and recovering the chlorine.

Compare this with ordinary metallurgy. To describe the metallurgy of a single metal at all adequately requires a book. Try and explain even most superficially the metallurgy and refining of argentiferous lead, zinc and copper to anyone quite new to the suhject in the few pages here devoted to description, and it will he seen how simple the new process is. Add to the description of the metallurgy of these metals an account of the refining of copper and zinc and refining and desilverization of lead, and even then you have only half done. To make the comparisons equable, you must give an account of the concentration and separation of refractory ores, and give a description of methods for dealing with a mixed ore of lead, zinc, silver, iron and copper. There can he no doubt that though the steps in the new process sound unfamiliar to ordinarily trained metallurgists, it is in comparison ludicrously simple. But there is even more than this: The new process treats ores, whose smelting by ordinary processes cannot be described, even with unlimited complications, because they are at present untreatahle.

As to costs, everything depends on what ore is used and where it is used. The most ohvious course is to work on refractory ores which are otherwise valueless, but leave large metal contents. The cost of the ore delivered at the works is then known. Thus even in England blue-stone ore can be hought and delivered at from £2 10s to £3 a ton, ready for running into the transformer. The metal content is £8 16s, taking zinc at £20, lead at £12, and silver at 2s. If higher prices can be maintained for pure metals, of course the content must be taken at a higher value. This figure includes all valuahle contents.

The cost of the intermediate process is difficult to state, as it is a question of locality and labor. The capital in this part of the process is small, hut in the estimates heavy allowance has heen made for deterioration and all other contingencies. On the other hand the conversion, which alone is a new sort of chemical experience, is extremely simple and easy. The intermediate processes depend on the ore. Thus, if there is no copper, part is cut out altogether. If there is no iron, hy which I mean not even enough to hurt the zinc, the transformer product would not he dealt with in the wet way at all. The wet way is to get rid of iron and manganese, and to get out copper. Lead and silver can he got out by suhstitution in the fused state with great ease, hut copper has too high a melting point, and is therefore taken out hy the wet process.

To make a very safe estimate, the cost of all the process except the energy for electrolysis may he taken at a rough figure of 30s per ton of ore. This will easily cover all depreciation, a small percentage on capital, all lahor and management. As the process uses ores with ahout half the contents metallic, though it can work with half sulphides, this means ahout 30s per ton of chloride of zinc handled. Most of this work is pure circulation, agitation and filtration, all cheap processes. The solution is not hulky, as it is used as strong as the filter press cloths will stand. Evaporating down and preliminary electrolysis are the most expensive parts of the process, and they are not serious. The loss of chlorine, which has not yet heen determined, may he taken as costing about 1s a ton of ore for every 1% of chlorine wasted, if it is made up by huying chloride of zinc. If it is made up by hydrochloric acid or calcium chloride, which is far cheaper where there is no carriage difficulty, the cost is ahout half that of zinc chloride. This loss of chlorine is included in the 30s a ton of ore, and in the estimates to follow, as power is taken at prices in England where it is not cheap, we may assume we can get calcium chloride cheap. This does not complicate the estimate hy showing a zinc output a little higher than the intake in the ore.

The cost of energy is very easily determined. If it is generated hy steam engines of high grade in this country in a convenient district it may he taken as 0.25 per kilowatt-hour, including depreciation, coal, oil, repairs, lahor and management, and a small interest on capital. This is a close estimate, hut one which can he realized on large plants running day and night on uniform full loads. The cost hy producer gas and gas engines is somewhat uncertain; it may be taken at 0.125, though that is probahly a very tight figure. Water power in a favorahle situation may he taken at 0.085. This refers to water powers such as on the way down from the American lakes to the sea. It is for a works planted close to the generators, and does not cover rotary transformers or step-down plant.

As to capital cost, it is difficult to say how much the plant for any particular case will cost, as it depends on the ore to he smelted, and local conditions. It is therefore wise to allow a large margin on all the plant of a new description, and a large margin is left in the 30s a ton for depreciation, repairs, etc. The electrical generating plant is a different matter, however. A large installation may be taken at an outside figure of £25 per kilowatt, including buildings and spares. In this case there is no accidental overloading, as in light and power distrihution stations, so that £25 a kilowatt includes spares hy overloading and separate plant.

The idea of risk profits is this: Any new process such as this, however satisfactory the results so far, involves risks of failure. There are many chances of difficulties in working on a still larger scale, and chances of new and better processes coming out. The last chance is prohahly small, because the various problems of smelting copper, lead, zinc, antimony, tin, etc., have all heen before the world for many years, and a new process that hids fair to solve all of them in a new way is not likely to be superseded as regards many of them by something else, though it might be as regards one of them. The only risk is that of all new processes—unforeseen difficulties or expenses. The present process is too far advanced to leave many loopholes, but even then experience of other industries shows that it is not wise to emhark in a new scheme unless, after the most searching criticism, the profits on paper are so large as to leave a very wide margin. But to get a fair idea, it is ohvious that capital in steam generating plant, or in sites, must not all be counted in as expecting what are here called risk profits.

When treating ore having very little gangue, it might he worth while to dilute it with poor copper ore, especially if the copper ore contains some other metal, such as zinc, antimony, nickel or precious metal. Thus if the ore has only 10% of gangue, and a low-grade copper with 3% of copper, 5% of zinc, and 5% of iron, has some 80% of rock; for every ton of the rich ore more than a ton of this poor ore could he run through too. The works would then deal with 100,000 tons of this poor ore with very little extra capital cost or expense, as it is nearly all rock, which is eliminated near the beginning of the process. A little more than £1 10s a ton for the process should have been allowed for the rich ore, and a poor ore takes a great deal less.

Discussing the different metals in order:

Antimony.—This metal is easily extracted from

*Abstract from Trans. Faraday Society.

the sulphide either as brown sulphide or as oxide, preferably as oxide. It can also be got out as regulus by reduction. It does not matter whether the antimony is mixed up with other metals or alone.

Arsenic.—This is essentially the same as antimony. Like it, its sulphide is easily converted into chloride. It can be equally easily treated when it is an arsenide of other metals. The chief difficulty of antimony and arsenic arises from the poisonous nature of their volatile chlorides. We have done little with arsenic.

Bismuth.—This is a small question. Bismuth would be easy to deal with, as it falls out of solution as oxychloride.

Cobalt.—This comes out as oxide; if nickel is also present, the nickel and cobalt and iron, and perhaps manganese, have to be separated in the wet way. There is nothing special about the problem.

Copper.—This comes out of the transformer as cuprous chloride, which is soluble in the other chlorides. It is deposited as cement copper by zinc, not iron. The process will handle ordinary high-grade copper ores successfully, as any other metal, except iron or manganese, is extracted separately as metal too. The copper is, of course, free from sulphur, arsenic, iron, antimony, phosphorus, silver, etc. Copper can be equally cheaply extracted from arsenical or antimonial ores, in fact the ores may have arsenic, antimony, zinc, lead, iron, nickel, gold, silver, cobalt, or anything else, and they are all separately extracted without appreciable extra cost. Poor copper ores will either be concentrated, or run in with other richer stuff.

Gold.—When present in copper, lead or other such ores, the gold comes out with the silver. Gold in conjunction with antimony, arsenic, tellurium, and small quantities (per ton) of common metals, can be treated as a low-grade ore and run in with any rich mixed or other sulphide, such as lead, zinc, or even rich copper ore or matte. It is largely a question of carriage, and what ores are near each other and near the works.

Iron.—This metal occurs in zinc and copper ores, and comes out as oxide. This oxide is reckoned as £2 a ton, and is useful as a paint. The value depends on the tint, and this depends on the way it is worked up, a matter we have not studied. Good oxide fetches high prices, up to £15 or £20 per ton, but the sale is very limited. Assuming the lowest price, £2 is not too much to count upon for paint for preserving iron structures where color is not an object. The extraction of iron itself is a different question. It would come down as a powder from the fused chloride, and would have to be fused together. It would probably cost something under £10 a ton. It may prove that chemically pure iron, with no trace of phosphorus, sulphur, silicon, or manganese, or other impurity, is well worth £10 a ton for making special steels.

Manganese.—This metal, like iron, is a drawback in an ore, as it comes out as dioxide, which is not valuable, though the sale of the manganese from such an ore as Broken Hill slimes is worth considering.

Nickel.—This is much the same as cobalt as far as the process goes. It comes out of the transformer as nickel chloride.

Silver.—The silver comes out separately—that is to say, it is extracted from a lead ore as a rich lead-silver alloy. From copper ores it is precipitated by cement copper from the solution of the chloride. Or it may be thrown down by the Claudet method.

Tin.—Tin ores can be added to the charge of the transformer, or treated alone. There is nothing peculiar about it.

Zinc.—Has been fully discussed. Zinc need not exist in the ore worked.

As it is not possible to give a series of estimates for all the innumerable complex ores, it may be well to give an approximate rule which can be applied to any ore.

RULE FOR CAPITAL REQUIRED.—For each ton of ore per annum to be treated allow:

Zinc	£0.1 per unit.
Copper	0.05 " "
Lead	0.03 " "

And for other metals which are extracted in the metallic state, in proportion, inversely as their equivalents. Metals like iron and manganese or antimony, which are extracted as oxides, do not count. This gives a very rough idea of capital necessary for process plant and working capital. If steam or gas generating plant is to be put down, double this capital.

MINING offers more attractive and better opportunities for investment than any other industry, for mining is not yet controlled by a trust.

Electricity in Placer Mining.

Written by J. E JOHNSTON.

The development of the mineral resources of Colorado has been very materially aided in many instances by the utilization of the energy of her mountain streams, electricity being the main medium of application. The intermittent character of the flow of those streams, however, has been a serious drawback to the extended use of water power in this section of the Rocky mountains. Still, for some purposes, this is not so great an obstacle as might at first seem. This is especially so in the case of placer mining, which can only be prosecuted during the summer months, at which time even the most insignificant of these streams becomes a torrent.

The Goldpan M. Co. of Breckenridge, Colo., is said to have the largest placer mining plant in the State. This plant, outside of the direct application of water under pressure to the washing of the gravel, and elevating the same from the pit, is largely operated by electricity.

Spruce creek, 5 miles above the present scene of operations, is the source of power. This is diverted from its natural channel and conveyed to the pressure box by means of a ditch some 2 miles long. From the pressure box to the generating station the water is conveyed in a steel pipe of varying diameter and thickness to suit requirements. The total effective head is 425 feet, and the working pressure about 206 pounds.

The generating plant consists of two 200 K.W., alternating current, Westinghouse generators, delivering 2-phase current at 440 volts, and direct connected to two Pelton water wheels.

The arrangement of these generators and wheels is novel. The wheels are set as closely together as possible to allow their extended shafts to pass each other. The shafts are thus parallel, and of the same length and 4 feet apart. On one end of each shaft is mounted a half of a flexible coupling of the leather-link type. At each end of this arrangement is placed a generator which by a tension screw and guides can be placed so that its half coupling can engage with either shaft. Normally one generator will be used on each wheel, but the plan allows either wheel to be operated with either generator, and provides for emergencies that otherwise could not be met.



Sub-station of Goldpan Mining Co., Breckenridge, Colo.

Two exciters, each of capacity sufficient to excite both generators, are provided. They are direct connected each to a suitable Pelton wheel.

As a portion of the current generated is used in lighting the town of Breckenridge, and the remainder is applied to motor work of an intermittent nature, the switchboard is provided with two sets of bushars, which allows of either multiple or separate running. This board is of blue Vermont marble, provided with a full line of measuring instruments of the long scale type.

The raising transformers are located in a separate building. The line pressure is 10,000 volts, 3-phase, it being the intention to ultimately cover greater transmission distances than now used.

The line is of No. 5 copper, two circuits of three wires each, of one set of poles. Glass insulators are used.

The principal use in mining to which the power is applied is the driving of pumps, lighting the pit, etc. Two electrically driven portable cranes are used in moving larger boulders. These cranes are of the boom type, and are equipped with variable speed alternating current motors capable of exerting 30 H. P. One 150 H. P. constant speed motor is used to drive a centrifugal pump and assists in keeping the pit dry. There is also a well-equipped machine shop driven by a 50 H. P. constant speed motor. In this shop were made the large wrought steel water mains used in the placer system.

Distribution of current is made to these motors in 220 or 440 volts, according to location, from a sub-station at Breckenridge. The lighting of the town is from 2200-volt mains from the same sub-station.

Placer Mining in Southern Oregon.*

Written for the MINING AND SCIENTIFIC PRESS by DENNIS H. STOVALL, B.S.

Placer mining in southern Oregon several years ago passed the romantic stage, and has resolved itself to a conservative industry, and the many large hydraulic mines that are now robbing the old channels and auriferous hills in the southern Oregon placer fields of their gold are conducted on business methods. The numerous auriferous deposits in the many streams, the mild winters, and the absence of restricting mining laws, make southern Oregon an ideal mining region. Beds of ancient channels are found along the rivers and streams. It is in the gravel of these ancient channels that the hydraulic mines are located. The dirt, the gravel and the decomposed matter of these old channels are all auriferous in depth from 8 to 200 feet.

It requires capital, skill and much labor to properly equip a southern Oregon hydraulic mine. After the diggings have been successfully tested by thorough prospecting, the next important problem is the water supply. (See illustration, front page .) From the headwaters of the nearest stream the water is conveyed around steep mountain sides in ditches that require in places as much work to construct as would a railroad. Long flumes, trestled high, lead the water across deep canyons and gulches, and in many instances long tunnels are driven through mountains. After 10, 20 or 30 winding miles the water is brought to the reservoir on a hilltop several hundred feet above the diggings. The steel pipes lead down to the diggings from the reservoir and, forking, branch off in smaler pipes to the several giants.

As the amount of mining done is dependent upon the water supply—other things being equal—that miner who has the best supply for the longest season is the most fortunate. This fact, and the recognition of it, has brought about many important improvements in the matter of hydraulic mining equipment in southern Oregon in recent years. Placer miners are enlarging their ditches, building bigger and better reservoirs, and doing all possible to keep up a "pipe head" as late in the summer as possible. Formerly a large number—in fact, nearly all—of the placers were obliged to close down early in March or April. Now many of the larger ones operate their giants night and day till June and July, and a few during the day throughout the summer. One mining company, operating on Galice creek, is now at work building two storage reservoirs at the head of their ditch, that the giants may be supplied a steady and constant flow all summer.

As the amount of placer ground which a majority of the mines possess is very large, the question of getting the greatest returns for the labor and capital invested resolves itself to the matter of keeping the giants turned on the gravel banks continually. Closely allied with this is the saving of the gold after the gravel is disintegrated, and sluices are so constructed that with a system of undercurrents not only the coarse gold is caught, but also the flour gold, only a very small percentage of the dust-like particles escaping. Hungarian riffles, block riffles, crosshar riffles, pole riffles and the ordinary bedrock riffles are employed in the sluices to catch the gold. The natural rock riffle in the bedrock race proves to be one of the best for catching gold, and it is here that nearly all of the nuggets and much of the finer gold are found. The sluice boxes are arranged at the end of the bedrock race. Specially prepared crosshar riffles, made of steel, fit in the bottom of the sluices, and are the most used by the hydraulic miners of this section. Farther on, down toward the dump, the last opportunity of catching the gold is utilized by block and pole riffles. The undercurrents are placed alongside the sluice boxes and so arranged that the water, black sand and finer particles are drawn off and spread out over a broad riffle table, where the sand and fine gold particles settle.

For night work the larger mines have a score or more of arc lights suspended over the diggings. These are run by the mine's electric light plant. Others use locomotive headlights, stationed conveniently about the grounds.

After the first expense of buying and equipping the mine, it costs at the most favorably situated mines from 1½ to 5 cents a yard to hydraulic in southern Oregon. The gravel generally pays from 6 to 20 cents a yard. The average is between 8 and 12 cents. Giants pay from $75 to $100 a day each.

All placer ground in this section is what the miner calls "spotted"—the values are not regularly distributed. All, however, are possessed of the same characteristics. On the bottom, next the bedrock, are the boulders, the nuggets and coarse gold. Above this is the finer gravel and dirt, lying in strata of

*See illustrations on front page.

blue and gray. Still above this is the capping of red clay, which carries values in flour gold.

"Clean-up," as the miners term it, usually comes at the end of the season, when there is no longer sufficient water to supply the giants with a full pipe head. The bedrock race is first swept clean and every particle of the precious metal gathered up. The riffles are then lifted from the sluices, thoroughly rinsed and laid aside. With a small stream of water flowing through, the mass of gold and dirt on the sluice floor is swept gently to and fro with a brush broom. The dirt and refuse are carried away by water and flow off over the dump, revealing the black sand and the gold particles in the bottom. The gold is held as an amalgam by the quicksilver that is sprinkled frequently into the sluices during the process of mining. The coarser pieces are first gathered up and the remaining mass swept into piles, scooped up and put into strong bags or glass jars. This done, the gold is ready for the refinery and mint.

Notes on the Metallurgy of Copper of Montana.*

NUMBER III.

Written by H. O. HOFMAN.

The 36-foot furnace does better work than the first one built, which has the same width of hearth (viz., 6 feet) but is only 30 feet in diameter. If, nevertheless, the tonnage appears to be comparatively low, and the percentage of sulphur left in the roasted ore somewhat high, this must be attributed to the large amount of zinc present.

In the double-deck furnaces in which the ore, fed on the upper hearth, drops through a slot in the roof onto the lower hearth, the floor of the upper hearth and the roof of the lower hearth are separated by an air space 2 feet high. A furnace with a 6-foot hearth (area 1010 square feet) treats in twenty-four hours 30 tons of concentrates (59 pounds per square foot of hearth area) containing Cu 12%, Zn 8%, S 35%, Fe 25%, As 3%, SiO_2 16%, Ag 20 ounces per ton, with a reduction of the sulphur to 6% to 7%, 400 pounds of coal being burned per ton of ore.

A furnace with a 7-foot hearth (area 121,829 square feet) treats 42 tons (69 pounds per square foot hearth area) with a similar elimination of the sulphur and a fuel consumption of 182 pounds per ton of ore treated.

Comparing the pounds of ore roasted per square foot of hearth area in the two furnaces (59 and 69 pounds), an improvement of 15% in favor of the 7-foot hearth is seen. The degree of desulphurization is about the same in the two furnaces. The consumption of fuel, however, has been reduced from 400 to 182 pounds, or 55%. The labor required to fire a single-deck furnace is the same as with the double-deck, and that for supplying ore and fuel and removing roasted ore and ashes from one double-deck furnace is, of course, smaller than from two furnaces with single hearths. Thus the double-deck furnace is a decided improvement over the single hearth as long, be it understood, as ores are treated which do not frit or form accretions on the hearth.

The six-deck furnace resembles the double-deck furnace in the stirring mechanism, and with it the passage of ore and gases. It has one fireplace (3 feet by 3 feet 2 inches) on the top hearth, and one 4 feet 3 inches by 3 feet 2 inches on the bottom hearth.

It differs from the double-deck furnace in the number of hearths, six vs. two; in the fact that there are no air spaces between the superimposed hearths, the roof of one forming the floor of the next one above, and that the portions of the inner wall above the horizontal slots of hearths one to five have cantilever supports, with trussed cords projecting from the central column. This makes rather a complicated structure, requiring a large number of iron parts of various sizes, some of considerable weight. The iron parts of the furnace weigh 165 tons. The furnace is 32 feet in diameter and 20 feet 9 inches high. The hearths, 7 feet wide, are 2 feet 9½ inches from roof to roof, which is 4½ inches thick. The sand filling forming the working hearth is 5 inches thick at the crown of the roof and 12 inches at the sides. The distance from the working hearth to the inner slot (protected by 1-inch castings) is 6 inches, and to the springings of the arch 16 inches. The rise of the arch is 8 inches. A hearth has four stirring arms, making one revolution in sixty-five seconds. The horizontal flues in the outer walls are omitted, through which air passes in the older furnaces, in order to be warmed and admitted to the surface of the roasting ore. Around the furnaces are platforms to facilitate access to the hearths. The moist concentrates, dumped into the shoe of a bucket elevator, are raised to the top of the furnaces and discharged into a hopper, partly closed at the bottom, by a corrugated roller feed. This delivers into a slot, 8 inches wide by 7 feet long, in the roof of the top hearth. The furnace roasts 56 tons of ore in twenty hours, or 38 pounds per square foot of hearth area. It makes 4% of flue dust on the weight of the ore charged, and requires 28.5 pounds of slack coal per ton of ore. The quality of the work is similar to that of the double-deck furnace. The amount of ore roasted per square foot of hearth is a great deal smaller, but the saving of fuel is much larger. The low fuel consumption brings out in a striking way the benefits that are derived by diminishing the loss of heat by radiation.

The MacDougall furnace is a vertical cylindrical furnace with arched horizontal hearths having discharge openings alternately near the center and periphery, and a central revolving shaft with horizontal radial stirring arms, which are provided with teeth placed at an angle to the arm. The teeth of the arms on the even-numbered hearths are set in a direction opposite to that of the odd-numbered. Thus on the odd-numbered hearths they push the ore toward the center, and on the even-numbered toward the side. The ore, fed mechanically onto the furnace, is delivered continuously onto the outer edge of the first hearth, when the teeth of the stirring arm turn it over and work it toward the center, where it drops through an annular opening onto the second hearth. The arms of this, turning the ore over and over, will convey it slowly to the openings near the periphery, through which it drops onto the third hearth, and so on until it arrives on the closed bottom, where it falls through drop holes into a hopper.

The ore, spread evenly over the hearth, thus travels in zigzag through the furnace, passing from periphery to center, and vice versa. It is warmed at the top of the furnace; it then ignites and burns freely, and, lastly, most of the sulphates formed are decomposed lower down. The air necessary for oxidation is admitted through doors in the side, most of it entering on the bottom hearth. The gases, and with them the dust, pass upward through the ore-discharge openings and are drawn off through pipes in the roof. In starting, the furnace has to be heated up to the kindling temperature of the ore, which, if rich enough in sulphur, will burn of its own accord, without the use of any carbonaceous fuel. If too low in sulphur, the heat necessary for successful roasting has to be supplied by one or more external fireplaces.

Three kinds of MacDougall furnaces interest us here—the original MacDougall, the Herreshoff and the Evans-Klepetko.

The original MacDougall furnace was patented by MacDougall Bros. in the beginning of the seventies, and was in operation in Liverpool, England, burning pyrites to furnish sulphurous gases for the manufacture of sulphuric acid. It had to be abandoned on account of the large amount of flue dust formed and the many mechanical difficulties encountered. The furnace, 6 feet diameter and 12 feet high, was built of seven cast iron cylinders bolted together and had six closed chambers. A 2 H. P. engine was sufficient to drive the mechanism. The furnace roasted in twenty-four hours 3½ tons of pyrites, or 0.020 ton per square foot of hearth area, reducing the sulphur to 2%.

The Herreshoff furnaces in operation at Butte have a ¼-inch steel casing. They are 10 feet 10 inches in diameter and 11 feet 6 inches in height, and are lined with a full course of red brick. A few furnaces built of two full courses of brick and only hooped with iron bands are doing better work in cold weather than the furnaces sheeted and lined with a single course, thus showing that with ores running low in sulphur, when heat has to be husbanded, an 18-inch side wall has its advantages. A furnace has five arched brick hearths, 4½ inches thick and 12 and 13 inches apart. The pitch of the arch is 4½ inches. A current of air passes through the hollow central revolving shaft, which is 14 inches in diameter. The hollow horizontal cast iron stirring arms, two to a hearth, have seven and eight teeth, respectively. They are easily exchanged when worn out.

The top hearth acts as a drier; the second starts the roasting; on the third the ore roasts freely—innumerable sparks are seen; on the fourth there are no sparks, and on the fifth floor the ore looks dark. A furnace, with its shaft making fifty revolutions per hour, roasts in twenty-four hours 5 to 6 tons of wet concentrates with about 35% of sulphur, or 0.015 ton per square foot of hearth area, reducing the sulphur to 6%. Seventy furnaces make 4 to 5 tons, or 6.4%, of flue dust.

Shortly after the Herreshoff furnace had proved a success a larger furnace, 16 feet in diameter, was constructed on the same general lines. It had eight hearths, an air-cooled shaft and eight solid cast iron arms. The heat generated was sufficient to cause the arms to bend under their own weight. Air cooling having proved unsatisfactory, water cooling was substituted, and the number of hearths reduced from eight to six. The leading differences, then, between the Evans-Klepetko and the Herreshoff furnaces are the size and the water-cooling of the central shaft and the stirring arms. The furnace is 18 feet 3½ inches high and 15 feet 10 inches in diameter. It is sheathed with ⅜-inch boiler iron and lined with a full course of red brick. It has six arched hearths, with a 9-inch spring and 3 feet apart. Each hearth has two stirring arms making sixty circuits per hour. The furnace stands on columns 12 feet high, to allow the roasted ore to be collected in hoppers and discharged into cars. Six furnaces form a battery. They are placed, from center to center, 18 feet apart in one direction and 21 feet 3 inches in the other. Each furnace has two gas flues, 2 feet in diameter and 12 feet apart, passing out of the roof. The flues from three furnaces lead into one main 6 feet in diameter, having openings along the top and bottom for removing the flue dust. The bottom openings have vertical pipes, which are connected directly with the calcine hoppers. The central shaft of a furnace is driven from below. Three furnaces receive their motive power from one main shaft, with which they are connected by friction clutches. A clutch can be thrown in or out from each of the six platforms surrounding a furnace. The cooling water is forced down to near the bottom of the revolving hollow shaft (9 inches inner diameter) through a 3-inch pipe and out to the ends of the horizontal stirring arms through 1-inch horizontal pipes. In its upward passage between shaft and pipe it takes up the return water from the stirring arms and discharges at the top through two spouts into a stationary launder. Shaft and arms are made up of flanged sections to permit easy exchange. Running the overflow water at 80° C., twenty gallons of cooling water per minute are required by a furnace. Forty-eight furnaces are supplied with the necessary draft by a steel stack 200 feet high and 23 feet 6 inches inner diameter, the lower 20 feet being lined. A 30 H. P. motor is provided to run the machinery. Tests have since shown that 10 H. P. is required for six furnaces. When ore too low in sulphur to be self-burning—i. e., about 28%—is to be roasted, one auxiliary fireplace for two furnaces, placed on the level of the bottom floor and delivering the flame onto the fourth floor, furnishes the additional heat required.

(TO BE CONTINUED.)

*Trans. Am. Inst. Min. Engs. (Condensed).

Tiburon Island and the Seri.*

TO THE EDITOR:—It is about time that something was being said concerning the truth in regard to the Tiburon Island and the man-eating Seri. Our daily papers are continually publishing interesting fiction in regard to Tiburon Island, thereby causing numerous men to venture there in search of the precious metals and to explore an unknown land. To a number of American prospectors here in Sonora it is all a good joke when they read of a party coming down to explore the Tiburon.

The island has been prospected a number of times by both Americans and Mexicans since 1884. The writer was engaged last year, by parties having a mineral concession and an option on the island, to report on the mineral resources and the Seri Indians. This expedition left Guaymas on Nov. 19, 1902, in the gasoline launch Lollita, with a total of twenty-three men aboard. The next day we landed on the southeast end of Tiburon Island and immediately began our search for the minerals said to be there.

The party was divided and sub-divided many times, and seven days were spent in ceaseless prospecting all over the island, which is about 15 miles wide and 28 miles long. Needless to say, there was no mineral found nor any indications of any, as the island is composed mostly of lavas, volcanic conglomerates, tufas and eruptive rocks. At the southwest end the hills rise very precipitously and show plainly their formations and various strata. Inland, near the bottom of a deep canyon, granite was noted; a flow of basalt makes a direct contact with the granite, which apparently is the first of the lava flows on this end of the island. Above this are volcanic conglomerates and tufas. Near the central portion there are great flows of rhyolite, capped by andesite, which forms the higher portions of the mountains.

Obsidian was noted in some hills on the eastern side in large masses. The northeast end is composed of low, rolling hills, consisting mostly of coarse granite, some of which is iron-stained, giving a reddish color to the hills.

An irregular belt of micaceous rock, separating the granite from the volcanic formation, here was found—the only quartz on the island, but in small pieces no larger than a man's hand, coming from small stringers and seams in the mica schist, but very white and barren.

Some lime and a deposit of fine marble were seen.

The northwestern and western portions are made up entirely of eruptive rocks and lavas and are devoid of all mineral indications. The hills and mountains are pitted with small caves and pockets, caused by the erosion of the soft material which was encased in harder ones.

I should judge there to be an uplift of the entire island of 200 feet on the south end to 300 feet on the north end, as shown by ancient beaches, sea shells and fossils embedded in the conglomerate at that height above the present sea level.

Very little water was found—in fact, there is not sufficient to supply the needs of the Indians who make the island their home.

A stunted growth of brush and cacti covers the valleys and slopes from the water's edge to the hills.

THE SERI INDIANS.—Our experience with the Seri Indians was of a very friendly nature, although the introduction was slow and backward, owing to the precautions taken by both parties. As the fear gradually wore away, much trading and talking were indulged in. The chief, who has the name of Juan Tomas, is quite an intelligent man of about 50 years, speaks Spanish and is a good diplomat. There were

* See illustration on front page.

twenty-six men and boys in their party, and I have no doubt that number constituted all the able-bodied male Seri on the island. They were all in good health and form, but only partially clothed. Some have very fine physique—in fact, the best I have ever seen. Their features and hair are decidedly of the Indian type; but all are very filthy and dirty in their habits.

The principal food is fish and turtles, which abound in the waters that surround the island.

For weapons they have bows and fierce-looking arrows. I saw three old-style Remington rifles among them.

Most of them speak the Spanish language, having learned it when trading and working on the mainland.

Very little attention is paid to the building of their houses; a few small sticks stuck in the ground with the tops bent in, some brush around the sides, is "home sweet home" to the Seri.

I most certainly believe that when these Indians are not aggravated, or forced to defend themselves, they will not harm any one.

They have no ambition—desiring nothing but the necessities of life, peace, and to be left alone by daring explorers and fierce conquerors—and the Tiburon Island is the one and only place for them.

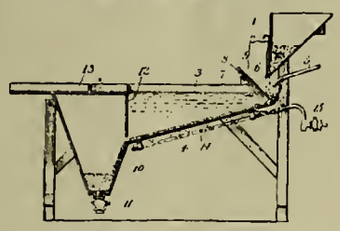
H. GORDON GLORE.

Mining and Metallurgical Patents.

PATENTS ISSUED AUGUST 8, 1903.

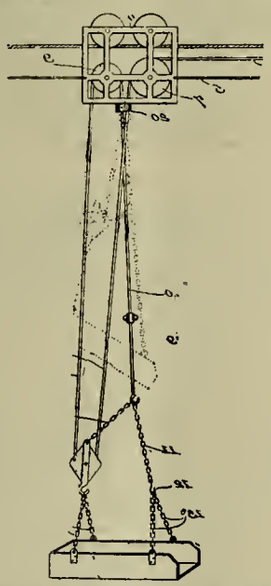
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

EXTRACTION OF ZINC, LEAD AND SILVER SULPHIDES FROM THEIR ORES.—No. 735,071; G. D. Delprat, Broken Hill, New South Wales, Australia.



Method of separating ore from gangue by forming bath containing nitric acid, feeding finely ground ore thereto, whereby gas bubbles formed on ore particles to raise them to surface of solution, and removing particles of ore so lifted to surface.

DUMPING APPARATUS.—No. 735,139; A. E. Norris, Cambridge, Mass.

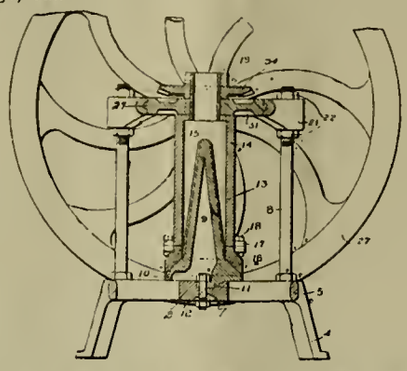


In apparatus support, fall rope depending therefrom, fall block supported in bight of fall rope, fall block and end of fall rope having means to which load supporting device may be detachably secured, and means to arrest movement of end of fall rope as load lifted whereby load is discharged.

PROCESS OF OBTAINING LEAD OR OTHER METALS FROM ORES OR MATTES.—No. 735,098; C. Hoepfner, Frankfort-on-the-Main, Germany.

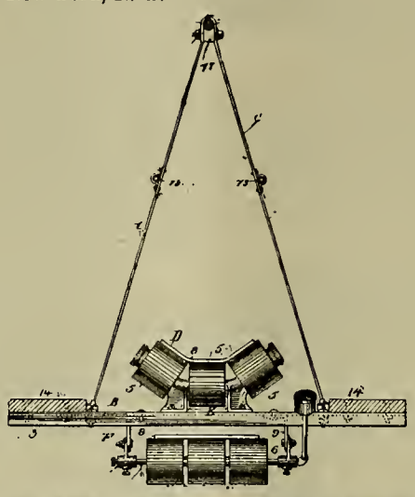
Leaching compounds containing lead, silver, iron and zinc, with solution of cupric chloride concentrated in sodium chloride, removing silver by copper in contact with mercury, precipitating iron by oxychloride copper, removing lead as sulphite by monosulphite of zinc, precipitating copper from resulting zinc-chloride solution by zinc, decomposing resulting zinc-chloride solution to recover zinc, and returning resulting solution and free chlorine from decomposition of zinc to leach fresh quantities of ore.

QUARTZ MILL.—No. 735,234; J. F. Forward, San Diego, Cal.



Combination with base having non-circular recess, of grinding member composed of hollow cone having frustum-shaped lower end and non-circular lug extending inwardly from lower edge thereof, lug engaging non-circular recess in base and connecting detachably therewith by means of fastening member extending through aligning perforations in lug and base.

CONVEYOR APPARATUS.—No. 735,301; T. Robins, Jr., New York, N. Y.



A suspension bridge for conveyors consisting of cable, platform, diverging hangers between cable and platform and belt supports above and below platform.

MINING TOOL.—No. 735,356; T. M. Fisher, Montgomery, Ind.

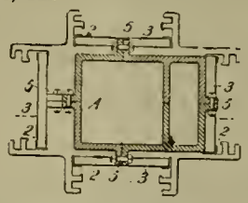


Combination, in tool, of handle, disk centrally pivoted to handle, means for limiting inward movement of disk to position such that plane of disk inclined to handle, means limiting outward movement of disk to position perpendicular to handle, means for locking disk in such position.

TREATMENT OF ORES CONTAINING GOLD, SILVER, COPPER, NICKEL AND ZINC.—No. 735,512; H. Hirsching, San Francisco, Cal.

Process of treating roasted ore and tailings by washing with water, leaching with ammonia, or ammonium sulphate, chloride or nitrate, adding water or boiled-out solution obtained by operation of process, and recovering therefrom metal or metals separately and ammonia.

STAMP MILL MORTAR.—No. 735,374; J. H. Hendy, San Francisco, Cal.



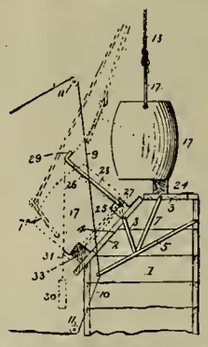
In stamp battery, series independent mortars each adapted for single stamp and divided vertically to form separable sections, sections having abutting flanges, means detachably securing sections each mortar, sections having screen discharge openings, sole plate common to series mortars, receiving trough rigid with sides of mortar below screen openings, inner sides of outer mortars of series and both sides of intermediate mortars being devoid of troughs, supplemental troughs receiving output of inner sides of outer mortars and both sides of intermediate mortars.

BUMPING SCREEN.—No. 735,525; H. L. King, Denver, Colo.



In bumping screen, combination with main frame, including crossbar 2, operating shaft, cam C mounted thereon, and bumpers 20 20, of screen frame, members 10 10 secured to front end of screen frame and projected below screen frame, brackets pendently secured on main frame to which lower end of members 10 10 are secured, central guide and support for rear end of screen frame, upon which frame has sliding movement, and springbars 11 11 secured at upper end to rear end of screen frame, lower ends being free to extend in close proximity to crossbar 2.

AUTOMATIC DUMPING DEVICE FOR ORE BUCKETS.—No. 735,571; R. Nye, Moline, Ill.



In device for dumping buckets, combination of incline, yoke-shaped inclined carrier pivoted to upper end of incline and bearing feet for engaging rim of bucket, counterpoise weight connected to carrier to retard tilting movement of bucket, and heel block located to engage one side of bucket to tilt it into embrace of carrier.

PROCESS OF EXTRACTING GOLD AND SILVER FROM ORES.—No. 735,501; C. A. Harp and J. F. Starkweather, Sr., Stockton, Cal.

Process treating ores, containing precious metal, consists pulverizing ores, adding thereto kaolin, brick dust, unburned limestone, sawdust and charcoal, agitating mass and subjecting same to proper degree heat, and when added ingredients have performed their functions adding saltpeter.

Mining Summary.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ARKANSAS.

BOONE COUNTY.

The Bear Hill Co., at the head of George creek, near Harrison, where a sawmill was operated several years ago, is preparing to put in heavier machinery.

NEWTON COUNTY.

Manager E. F. Bickert of the Ponca City M. Co. is putting in additional mill machinery at his mine in west Newton county, near Harrison, Boone county. He he has elght men doing development work.——The prospecting drill for the Manhattan M. Co. is on the ground at the the company's mine, 4 miles southwest of Marble City, says Manager Anderson of Harrison.

ALASKA.

At the Alaska-Juneau M. Co. mines in Silver Bow basin, near Juneau, development work will be increased and the company's surveyors are running lines to ascertain the most advantageous route for a tunnel at tide water. Two more tunnels are being driven to open the lower levels. It is intended to build a mill, but Gold creek, it is claimed, will not furnish over five months power for a large stamp mill. However, a tunnel will go in from tidewater and a stamp mill go into the hasin, pending the completion of the tunnel and the construction of larger mills on the heach, says the Alaska Dispatch.

Prospecting and development work is showing on Kodiak island some free gold properties, says Sargent, collector of customs at Kodiak, who is working a group 4 miles from there. Wander & McIntyre have a showing of copper ore on Uganuk island, near Kodiak. On Yuak hay, 40 miles distant, a 5-stamp mill is operating. On Red river four men took out $4000 in three months from placers this season.

R. B. Day of the Mansfield G. M. Co. on McGinnis creek, near Juneau, says they have their 1000-foot flume in operation and the ground is showing up well. They have heretofore heen taking water from Quartz creek. Day is arranging to put up additional huildings and will get out lumber for the 700-foot tunnel that he will put in next season so that they can use all the water from McGinnis creek.

M. J. Sullivan reports finding gold-hearing quartz on Trilby mountain, in Nome district. Trilby mountain is near junction of Solomon river and Hurrah creek. A shaft has heen sunk on the foot wall 28 feet ln free milling ore.

There are tin ledges along Behring sea at Cape York, north of Cape Nome, says Manager W. C. J. Bartels of a company organized in New York to exploit the tin resources of that region. A crushing plant is heing set up at a new town called Tin City, 15 miles ahove Cape York and 10 miles from Cape Prince of Wales. An experimental plant, to he operated by gasoline and electricity, is going in. It includes three electric drills to he used in prospecting and a tin stamp mlll will follow.

ARIZONA.

GILA COUNTY.

The July production of the Old Dominion mine at Globe amounted to 700,000 pounds of copper, or 100,000 pounds more than for June, the running of two furnaces securing this increase, says President Smith.

A third interest in the Oxbow group, north of Payson, has heen sold to J. B. Newman. It is in the Green Valley mining district and consists of ten claims. There is a 10-stamp mill in operation.

GRAHAM COUNTY.

The tramway for the Standard copper mines, near Morencl, is on the ground and is being set up. When the tramway is in operation the output of the company will he increased, and the cost of transportation is expected to be reduced by $2 per ton.

MARICOPA COUNTY.

J. K. Truman, superintendent of the Climax G. M. Co., operating at Quartz mountain, near Phœnix, says he has been putting ln machinery on the Orizaha group, being operated hy the Orizaba M. Co., of which he is manager. The property is 45 miles north of Phœnix. The machinery consists of a 25 H. P. boiler and a 15 H. P. hoist, which will give them a capacity for sinking 500 feet. The ore is iron and copper sulphides, carrying 10% copper and $3 in gold. The shaft was started in the canyon, which is 300 feet from the top of the mountain.

MOHAVE COUNTY.

(Special Correspondence).—The Tennessee mine, near Chloride, has ceased all work, except one engineer to keep water out of lower workings, the reason for which has not been given.——J. Kenney and L. Lapping report a strike of gold ore on their Larna mine, near the Century and Altata mines. The vein is 20 inches wide near the surface.

Shaft No. 2 on the Century mine is reported also in good ore ln the work down 80 feet. At 100 feet drifting on the north end of the vein is to he started.——The Samoa mine is in another hody of ore in the 400-foot drift of the 350-foot shaft. This is the catching up of the 1000-ounce silver ore that gave out last spring.——J. H. Boaks of Los Angeles, Cal., is negotiating for a bond and lease on a group of eight claims, of which the Century, Larna and Altata mines are the principal.

The St. Charles Bros. & Babcock continue driving the east drift on the 250-foot level of the Midnight mine. A large hody of low-grade ore is showing.

The Pastime mine, at Mineral Park, is being opened up again after an idleness of four years. The ores carry values in silver. Sinking will continue.——The Tintic mine, which was recently taken over hy Hawks & Shaefer, has the whim in operation and the lower workings are heing unwatered. This finished, further sinkiug will he done in the 90-foot sbaft and drifting started both ways on the vein.

Chloride, Aug. 9.

Ten men are at work on the Paymaster mine, north of Cerbat, and ore is being shlpped to the smelter. The ore carries values in gold and silver.——J. Barry has men at work on the Gold Nugget mine, near Cerbat, and is getting out ore.

It is reported the Minnesota-Connor mines, near Chloride, will he started up about Sept. I, and the main shaft will be sunk to depth of 1000 feet.

PIMA COUNTY.

F. Brownell, superintendent of the Producer Copper Co., whose mines are 54 miles south of Casa Grande, in Quijotoa section, says the crosscut in the Century mine is in 30 feet from the 200-foot level and near the lead. The country rock shows sulphides. Some trouble was experienced with water. The fifty-ton smelter is in place.

PINAL COUNTY.

C. McCully and J. W. Benzie of Denver have bought the Christmas Gift mines for the Plata Cobre M. Co. of Denver, Colo. The mines will be equipped and operated on a large scale. They are 60 miles northwest of Tucson, Pima county. When first discovered $200,000 was taken out of one pocket.

YAVAPAI COUNTY.

The Yavapai Oil & Development Co. has been incorporated at Jerome hy J. C. & H. L. Heslet, A. D. Coover, J. Page and J. S. Waughtel. This company proposes to put an outfit on the ground near Del Rio and start drilling for oil.

Work on the Iron King smelter, south of Jerome, is nearing completion. The ore roast pile will he ready for firing next week. Fifty men are at work.

CALIFORNIA.

BUTTE COUNTY.

A. D. Bonham of Chico reports finding gold-bearing quartz 30 miles from Chico which has yielded good returns. He has made two shipments to the smelter.

CALAVERAS COUNTY.

The Independence gravel mine, east of Angels, has again started up and sinking the shaft is under way. Superintendent McIntosh says he intends putting the shaft down ln the rimrock to depth equal with that of the bedrock of the channel, and drift into the channel.

C. H. Blake, superintendent of the Fanny Marie mine at Glencoe, says it is intention of the company to resume on both the Fanny Marie and the Bluejay mines.

EL DORADO COUNTY.

The El Dorado C. M. Co. continues arrangements toward beginning heavy development work on the Eureka and Woodside mines near Georgetown.

FRESNO COUNTY.

There is a total of twenty-one companies operating in the West Side section of the Coalinga field, with twenty-nine completed wells and a number of others drilling.

INYO COUNTY.

At Millspaugh, at the head of Shepherd's canyon in the Argus Range, half way hetween Ballarat and Darwin, the Millspaugh M. & M. Co. is arranging to rebuild its mill and also to put up a cyanide plant.——Doningue, Etcharren and J. Carricart, who own the Red Star and Bryan mines near Millspaugh, report taking out free gold ore.——Tin ores are reported in certain ores of the camp.

KERN COUNTY.

The East Puente Oil Co., in Kern River district, near Bakersfield, has completed its sixth well and will drill a seventh.——The Southwestern Refining Co.'s plant is expected to be ready for operation hy October 1. The stills are heing set up.——The Con. Copper Oil Co., which has leased a portion of the Monarch's ground, is drilling its second well and has one finished.——The Alma Oil Co., W. E. Stevenson manager, will drill six additional wells. It now has two in operation.

The Veteran Oil Co. has heen organized with C. T. Deane as manager and will drill a number of wells on its holdings of twenty acres in the Kern river field, near Bakersfield.

The Peerless Oil Co. is pumping 5000 barrels a day. This will be increased, as the deepening of two of the wells first drilled hy the company will be completed and a new well, No. 25, will be finished next week. The drilling of new wells will be continued.

The Monarch of California Oil Co., at Sunset, struck oil last week in its third well at depth of 500 feet. The work is heing continued.——The Con. Copper Oil Co., which has leased a part of the Monarch ground, is drilling its second well and has one finished, says the Californian.

The Nevada County Oil Co, near Bakersfield, is drilling wells numbers 13 and 14, the first twelve wells being completed.

Wickard & Saunders are leasing on the Baltic mine, near Randsburg, and have bonded an adjoining claim for $2500.

Development work is reported progressing at the coal mine near Garlock.

Superintendent Bouchard at White's Camp, near Randshurg, says the main shaft is down 100 feet and two drifts are being run on the 100-feet level. They are drifting on good ore. At 175 feet from the main shaft a shaft is being sunk to connect with the stope on the 70-foot level, which will give circulation of air.

The Petroleum Center Co., near Bakersfield, will put in a pipe line from its property to the railroad. This company is resuming operations after being shut down for several months, and it is putting in a pumping plant ——The Eastern Con. Oil Co. has put in its hoiler at the refinery near the railroad, and the plant is expected to he in operation next week. A pipe line will he put in from the company's wells to the plant.

MONO COUNTY.

W. & C. E. Loose, of Provo, Utah, are reported to have hought the interests of their associates in the Sunshine, Coarse Gold, Hillside, Arthur and University groups of gold-bearing mines at Bodie, for $75,000. The equipment of the mines will be increased and further development done.

NEVADA COUNTY.

At the Huron mine, near Nevada City, the mill is in operation.

The work of pumping out the Le Compton mine in Willow Valley, near Nevada City, is finlshed and the mill will be started up this week.

The ten new stamps put in at the Union Blue Gravel mine, above North Bloomfield, hegan crushing gravel this week, says Superintendent Gassaway. This gives the Union Blue a 20-stamp mill of double-discharge capacity, and it is expected to require seventy-five miners underground to keep them dropping.

G. Lezlnsky of San Francisco, manager of the Gold Tunnel mine, near Nevada City, says the canvas plant was put ln operation last week.

The Mountain Maid mine, near Nevada City, will resume operations this month, says C. Pusheck of Chicago, Ill., manager.

This week operations will he resumed in gravel mining on the Middle Yuha, near Nevada City, by Root & Heisner. They expect to have 100 men at work shoveling gravel into the sluice. The sluice is 500 feet long, 20 feet wide at beginning and 18 at the lower end, with a continuous depth of 5 feet. A wing dam has also heen built to furnish water. They expect to have a continuous run of at least sixty days before the heavy rains set in, which will stop work for the winter, unless the ground can be worked out by that time, says the Union.

G. Snyder of Salt Lake City, Utah, part owner of the Red Cross mine near Omega, and S. E. Robbins, superintendent, are arranging to increase development. Prospecting operations have been carried on by tunnel, and a mill has been run by steam power. They will run a drain tunnel at depth of 1400 feet, and the mill is to be removed to a lower site, which will permit of water power being substituted for steam.

The Sierra Queen mine, near Nevada City, was closed down last week for an indefinite period. The mine has been operated hy its present owners for a year and a half. It is intended on reopening to put in a Cornish pump and sink deeper. The south side of the shaft has not heen prospected for fear that, on getting under Deer creek, the pumps could not handle the water. There is a 10-stamp mill.

A strike of gold ore has heen made in the Central Con. mine, on Little Greenhorn, near Grass Valley, says Superintendent Coffin.

The Pilgrim mine at American Hill, near Nevada City, was closed down last week by orders from Superintendent T. A. Patterson, who is in New York City.

PLUMAS COUNTY.

The Claybank mine, at La Porte, is able to run hut three or four shifts a week, owing to scarcity of water to drive the compressor, says the Bulletin.

SAN BENITO COUNTY.

(Special Correspondence).—At the Bradford quicksilver mine, 18 miles south of Tres Pinos, development work is being continued. The lowest workings are down 175 feet vertical, and the vein dips at 58°. A winze is heing sunk from the drift, near the shoot, which shows workable values in cinnabar. C. P. Bradford is manager. It is claimed they are on the same vein system which is being worked at New Idria, further south.

Tres Pinos, August 12.

SANTA BARBARA COUNTY.

At Summerland, J. F. Miller, who recently bought the property of the Mineral Oil Co., has renewed the lease of the M. F. Bishop ground and has five wells pumping. West of the Treadwell wharf four more wells, jointly owned hy Miller and J. L. Bryson, are heing placed in working order.

SHASTA COUNTY.

Preparations are being made to double the capacity of the DaLamar smelter at Winthrop. At present the smelter has one furnace of a daily capacity of 150 tons of ore. The new furnace will he huilt west of Furnace No. 1 and under the same roof. The Bully Hill Co. has already prepared for treatment of greater quantities of ore, as since the beginning of the year it has huilt more stall roasters and is beginning ta roast in the open air. It is also enlarging Tunnel No. 3, so as to allow for a double-track tramway. The tunnel is 1100 feet in length. The Anchor shaft is producing large quantities of black copper ore.

The Liberty group of mines near Copley, formerly under bond to the Great Western G. Co., has heen bonded to J. B. Wattermann, W. H. Dry and T. F. Gates of Philadelphia, Pa., for $150,000. There are 3000 feet of tunnels.

At French Gulch seventy-five miners at the Gladstone mine are reported out on a strike, due to poor boarding-house fare and the refusal of the company to decrease the working hours.

SIERRA COUNTY.

The Los Angeles Co., reopening the Kenton mine, near Allegheny, has twenty men at work under Superintendent A. Fitzgerald. Ore is being taken out and the 12-stamp mill is running steadily.

The Lecompton mine, in Willow Valley, near Nevada City, is again in operation, the work of unwatering having been finished last week. During the unwatering the mill was enlarged and the hoist also. New ground has been cleared for development.

SISKIYOU COUNTY.

P. Clark, of Spokane, Wash., has suspended operations on the Blue Ledge copper mine, near the Oregon line, on which he has a hond for $250,000, the reason given being that development is not satisfactory for the price asked. Clark had men at work driving a lower tunnel, and had also heen doing some extensive diamond drilling.

The Milwaukee M. Co., John Barth, manager, who bought the McKinley, New Discovery and Mountain Lily quartz mines on Humhug creek, near Yreka, last week, has also bonded the Golden Juhilee and other ledges in same section, says the News. Work is going ahead in the McKinley mine, with twelve men under Superintendent L. B. Jamieson, and a tunnel 300 feet in length has been run to the 12-inch ledge at lower depth. Later on the company intends putting up a mill.——P. S. Gallagher sold two of his claims on Cherry creek last week to C. Paige, and intends sinking a shaft on his McCormick mine in same district.

STANISLAUS COUNTY.

The supervisors of Stanislaus county have apportioned $12,000 as a honus to a combination of mining companies of the Coast Range mountains to build a road from the mines to Westley, and to put up reduction works and firehrick and tiling factories at Westley. The combination is composed of the Martel M. Co., owner of the Red Mountain district magnesite quarries; the James Manganese M. Co., and the Phœnix Quicksilver M. Co., owned hy E. P. Newhall and A. Hayward of San Francisco. The companies are said to have agreed to build the road and erect the works and factories at cost of $100,000.

TRINITY COUNTY.

The Senger and Hughes placer mines, near Weaverville, have been bonded to E. F. Burrill of Berkeley for $30,000. The Senger and Hughes properties comprise 420 acres of auriferous gravel and are between West Weaver creek and McKenzie gulch. Burrill has overcome the water question by leasing the West Weaver ditch and water rights from the La Grange Hydraulic Co.

E. G. Gould of the Rush Creek M. Co. of Oakland reports development work progressing at their mine, 1½ mile above junction of Minersville and Weaverville road. The ore is showing 4 feet in width, and averaging $20 a ton in gold. Two tunnels are being run in on the ledge.

The Hupp placer mine, at Weaverville, has closed down for the season, and the final cleanup showed satisfactory returns for the year's run. W. I. and J. Hupp, owners.

At Deadwood, the Brown Bear mill is crushing ore from the Lambert mine and also custom rock for the Lappin.——I. W. Zent, M. Carter and J. Thorne are putting in a ditch to take water from the Brown Bear tunnel. A good stream comes from the tunnel and will be flumed to the Three Brothers group to furnish power to the additional arrastra that is to be built.

At Hay Fork, the Hallstone prospect is being developed. The vein averages 18 inches wide of high-grade ore.

Superintendent T. Chambers of the Lappin mine, under bond to the J. J. Chambers Co. of Redding, reports a gold-bearing ore body found in the "Winze level," the lowest level in the Lappin. It is a 2-foot ledge. A milling and drilling plant will be put up, to be operated by electricity.

Superintendent J. S. Olds of the Chonchilulu Gold Reef M. Co., operating the Miner's Dream mine, on Chonchilulu mountain, at Bullychoop, says preparations are being made to put up a stamp mill, which is expected to be in operation by Oct. 1.

TUOLUMNE COUNTY.

The Dutch mine, at Quartz, is down 1400 feet, and drifting on the south level is in 80 feet. It is expected to cut the shoot that has been worked in the upper levels. A raise has been driven from the 1250-foot level to the 600-foot level, and a winze will be sunk to connect the 1250 with the 1400. The vein is 12 feet in width. The 20-stamp mill is running on full time and oil is used as fuel.

J. W. Stephens has bought the Union quartz mine, which adjoins the Rough & Ready mine, near Sonora, says the Independent.

The Vivian mine is being operated by W. S. Wilhelm of Sonora under bond, says the Independent, and a tunnel is in 160 feet to tap the vein.——The Georgiana mine (formerly the Garfield), on the East Belt, near Carters, has been bonded to C. Holland et al. of Sonora.——At the Mount Jefferson mine, at Groveland, the main shaft is down 520 feet, and they are sinking to get another level, says Superintendent J. Meighan. Fifty men are employed in mine and mill. Twenty stamps are dropping.

The Mayflower tunnel, 1 mile north of the Kanaka mine, near Groveland, is in 400 feet in limestone, and a raise is being put up, expecting to cut the gravel channel once worked at Corcoran Flat.

Development work is going on at the Longfellow mine, at Big Oak Flat, with seven men, and drifting is in progress on the 500-foot level.

The cyanide plant at the Rawhide mine, near Jamestown, is being doubled in capacity from 50 to 100 tons per day.

The Morris tunnel, near Columbia, has been completed to a point 15 feet inside the Bald Mt. and the Grant, Wainwright and Thomasson claims, says the Banner, and work is going on in a raise in the vein. They are up 40 feet and expect to cut the Austrian shoot.

A new air compressor and a 85 H. P. boiler have been added to the equipment at the Mohican mine, near Groveland.

YUBA COUNTY.

The New Blue Point mine, southeast of Smartsville, has been sold to East St. Louis, Mo., men, represented by J. Weisben. A permit to work the mine by hydraulic process has been obtained from the California Debris Commission.

COLORADO.

(Special Correspondence.)—During the past few months mining in Colorado has been rather slow. The conditions existing throughout the State have been detrimental. The labor question seems to have been the main cause. The operator did not know when his men would be called out in sympathy, therefore the new plant of machinery he was figuring on purchasing he did not buy, and no improvements were made. Conditions have changed somewhat for the better and the mining industry is improving. The machinary houses in Denver report a decided change for the better during the past few weeks. The labor difficulties are by no means settled, but it is the opinion of a good many that strikes have been checked. The union was unsuccessful in getting the men to go out at the Pueblo, Durango and Leadville plants, but in the Cripple Creek district they have called out about 3000 men in sympathy with the Colorado City smeltermen.

Denver, Aug. 10.

BOULDER COUNTY.

W. G. Shapcott, of Colorado Springs, treasuror of the Upper Ten M. & Oil Co, says increased development work is planned on a number of the thirty-two claims which they own near Eldora. Nearly 2000 feet of development work has been done on the thirty-two claims.

R. G. Mullen of Colorado Springs, of the Montgomery M. & R. Co., operating near Boulder, says the management has decided to double the capacity of the mill, which is twenty-five tons per day at present. The additions will include five cyanide tanks, three of which will have capacity of 100 tons each. Development work is progressing at depth of 240 feet. Two tunnels are being driven.

At Wallstreet the crusher for the Wallstreet mill was set up last week and operations started.

H. J. Newman and C. P. Campbell of Colorado Springs have bought the Lottie claim on Lee hill, near Sunshine, for $40,000, says the Telegraph. They will open and develop the mine and have cleaned out the shaft for retimbering. The pay streak is 15 inches wide.

CLEAR CREEK COUNTY.

The contractors in the Central tunnel of the Big Five Co., near Idaho Springs, report driving 115 feet in the first twenty days, working but one shift per day. The contract calls for 5000 feet of driving; $10 a foot is to be paid and the power is furnished by the Big Five from its power house near the mouth of the tunnel. The first 1797 feet of the tunnel was driven by the company prior to the erection of its power house. It costs $24 a foet, the size of the tunnel being then 8½x9 feet and double track. This contract calls for 5x8 and single track.

E. A. Eaton and F. G. Shaffer of Idaho Springs have located six claims on Santa Fe mountain along the mica vein that shows on the surface, says the Times, and will determine its commercial value. They claim about half of the product will produce sheets 2x4 inches and 40% of the product would have to be ground up if used, while 10% would produce sheets 8x12 inches in size. The owners are negotiating with the Crosson Bros. to merge the Starlight tunnel with the mica proposition. By driving this tunnel an additional 150 feet they would open the dyke at a depth of 800 feet.

The machinery at the Baltimore mine, near Georgetown, was put in operation last week and work in the tunnel started. Part of the tunnel will be enlarged to double track size and then continued to cut the Shively and other lodes which have been secured by the Hazleton Co.

FREMONT COUNTY.

C. M. McNeill, vice-president of the United States R. & R. Co., says the plants owned and operated by the company at Colorado City and at Florence, including the Standard mill at the former place and the Union plant at the latter, will be closed down within ten days (or as soon as supply of ore on hand is exhausted) on account of the strike in Cripple Creek district, inaugurated expressly to cut off the supply of ore from the company's mills. This will throw 500 men out of employment, all of whom are to receive one-third of their present wages for six months, in accordance with a promise made with the so-called mill trust last winter to those who stayed by the company at the time of the first trouble with the Western Federation of Miners. The two plants at Canyon City will continue work, McNeill claiming that there is enough ore on hand to keep the latter running for at least nine months.

During the last month in the Florence oil field four wells have gone into oil. The determined area and the oil production are increasing and new wells are continually being opened.

GILPIN COUNTY.

The Ideal G. M. Co. has resumed operations on its shaft on Tip Top mountain, near Perigo, and is down 110 feet and crosscutting to the vein. In sinking they went through the vein at 40 feet. The company intends putting in machinery. G. Waite is superintendent.

The Onoko Gold Mines Co., operating in Leavenworth gulch, near Central City, has cleaned out the shaft on the Paola mine to a depth of 228 feet. Drifting and stoping is being done in the 120 west level, where Superintendent Shull reports they have 12 to 18 inches of copper ore. A carload will be sent to the smelters. The company will erect a shaft building and install a plant of machinery.

G. R. Markey of Denver and J. Farland of Pittsburg, Pa., are reported negotiating to operate a group in Phœnix district, near Rollinsville, consisting of the Spar, Edwards and Attract lodes. Sinking and other developments will be started next week.

A. M. Hurd of Denver has a three-years' lease and bond on the Mountain Chief mine, thought to be the western extension of the Perigo vein, in the Tip Top section, near Perigo. Superintendent E. Stephenson of Phœnix will take out the water and sink the shaft another hundred feet.

The mill at the junction of Elk and Pine creeks, near Central City, is in operation, says Superintendent L. J. Mountz of Apex. It is of fifteen tons daily capacity and built to treat the ores of the Mackey and Sarah Jane mines, owned by Palmer & Mountz. They have decided to add two more mills, each of a capacity of fifteen tons.

The Nevada Con. M. Co. has a lease on the Pozo mine in Nevadaville, near Central City. This mine has not been worked the last few months, owing to the ore containing zinc. The new company has built a plant to treat zinc ores, says Superintendent Rucker. T. Marx is manager.

GUNNISON COUNTY.

Arrangements have been made to operate the Eureka mine at Crested Butte and zinc, lead, copper and silver ore will be produced.

S. Day of Gunnison is putting a whim on his mine at Elko and will take out ore for the Scofield mill.

HINSDALE COUNTY.

The holster at the Isolde mine, near Lake City, is in operation and unwatering the shaft on No. 1 vein. Shipments will begin this week.——The final transfer of the Pelican group on Henson creek, near Lake City, was made last week. The new owners will develop the ore bodies at greater depth.——It is reported the Dolly Varden mine in Engineer district, near Lake City, will have men at work next week.

Manager O. W. Pierce of the Tobasco mine, near Lake City, says operations at the mill and mine were resumed last week.——The hoist and pump for the Isolde mine is in position and work resumed in the winze to determine the size and value of the ore body.

The Hanna M. Co. will put in additional machinery and enlarge the capacity and change the concentrating system at its mill near Lake City. A. G. Ellis is superintendent.

HUERFANO COUNTY.

W. G. Shapcott, of Colorado Springs, of the Upper Ten M. & Oil Co., says they will develop their oil lands between Huerfano butte and the Pictou coal lands, northwest of Walsenburg.

LAKE COUNTY.

The buildings on the Sequin shaft at Leadville are up and the machinery is being set up.

There are four shafts of the Morning Star Con. M. Co, near Leadville, in operation at the present time; and while no new work is being carried on, the lessees are working through the Upper and Lower Waterloo, the McHarg, the Ladder and Porter No. 3 shafts, and are taking out seventy-five tons per day. A part of the tonnage is manganese coming from the Porter territory, while the McHarg shaft is opening up a manganese body. From the Evening Star ground twenty tons per day are being shipped from the old workings, says the Carbonate Chronicle.

LA PLATA COUNTY.

The holdings of the Devau M. Co. have been sold to the Expansion M. & L. Co. of Pueblo for $25,000. The Bay City group is 16 miles from Durango and 2 miles from the railroad. Coal, timber and water are available. The ore shows values of $20 per ton. W. L. Knight of Pueblo is president, with H. C. Landran as manager.

MINERAL COUNTY.

The Humphreys mill, near Creede, has resumed operations after a temporary shut-down for overhauling and repairs, says Manager Fitzgerald.

The Corsair mine at Sunnyside, near Creede, has increased its output and is shipping twenty-five tons of ore a week.

MONTEZUMA COUNTY.

(Special Correspondence.) — The East Mancos G. M. Co., Mancos, Colo., will install an aerial tramway from the mine to the summit between Montezuma and La Plata counties, and the ore hauled from there by teams to the railroad in Hesperus.

Mancos, Aug. 10.

OURAY COUNTY.

It is reported that the Humboldt mine, near Ouray, will be tapped by a mile-long tunnel within the next year. The tunnel, which will start near the Revenue tunnel's portal, will cut the veins of the Humboldt group from 2000 to 2500 feet from the surface, and a mill will be built at its mouth to concentrate the ore.

A strike of free milling gold ore is reported in the Bobtail mine, owned by the Barstow M. Co. and in Red Mountain district, 3 miles west of Ironton. The strike was made 2300 feet from the mouth of the tunnel at a depth of 2000 feet from the surface. The ore body is 14 feet in width. Superintendent J. Geisel says the tunnel was driven into the mountain on a low-grade body of ore 3 feet in width, but for the past year the ground has been wet and hard to hold. Finally it was decided to drive across to the opposite wall of the vein, in the hope of bettering the situation, with the result that this shoot was found. Preparations are being made to build a 100-ton mill.

PARK COUNTY.

At Tarryall the Richmond stamp mill has been improved and will be in full operation by September 1. The Wolverine M. Co. has ore on the dump ready for treatment. Others are also prepared for delivery of ore to the mill.

SAN JUAN COUNTY.

Work has been resumed on the Silverton Girl, an extension of the Ridgway in Maggie gulch, near Silverton, by H. Sherman and A. S. Sturgeon.

T. Boyle and L. W. Russell of Durango have bought a half interest in the Crystal group of claims at Bear creek, near Silverton.

J. Gordon and A. Sturgeon have been given another lease on the North Star, this time between the third and fourth levels.

SAN MIGUEL COUNTY.

Five pack trains of eighteen mules each and three six-horse wagons are required to transport the product from the Tomboy mills, near Telluride, to the railroad, says the San Miguel Examiner. The concentrates average shipments of twenty-five cars (300 tons) per week. In both mines and mills 400 men are employed. The company is increasing its holdings, both in Telluride and Savage basin, says Manager Herron. A block of ground was bought last week in East Telluride, and the shipping station at Pandora will be moved there, the railroad company building a switch for use of the Tomboy Co.

J. H. Litchfield, manager of the Double Eagle group, in Bridal Veil basin, near Ophir, says driving the tunnel is progressing. Several veins have been cut by the bore, which is being driven on the Atlanta vein. When the Double Eagle vein has been cut, more men will be put on development and the ground opened up. The company proposes building a small mill this fall for the treatment of ore on the dump.

The Tidal Wave M. Co. reports work progressing on its properties above Ophir, near Champlin gulch. G. Pickett is superintendent.

TELLER COUNTY.

G. E. Righter, operating on southwest slope of Squaw mountain, near Cripple Creek, reports opening a 4 foot vein near the surface which assays $8. He is arranging to build a cyanide mill.

The Big Twenty M. Co., owning and operating ground on Grouse mountain, near Cripple Creek, is equipping its tunnel with a plant of machinery for development work. The tunnel will be driven ahead to cut at depth of 1000 feet a number of veins that have been opened in shallow workings on the hill and which show good values.

Manager A. Wagner of the Pharmacist Con. M. Co. of Cripple Creek, in his annual report says the inauguration of the leasing system has been very satisfactory, and that its operation through another year will leave them in a position to start work on company account. The lessees on the north end, blocks 1 and 2, have done 600 feet of drifting, crosscutting and stoping, producing high-grade ore. Crosscutting is in progress to cut the east and west vein. The management through the operation of this lease has been able to sink the Helm shaft 200 feet deeper, a total of 400 feet. The lessees on blocks 3 and 4, on the south end of the claim (the old workings), have done 400 feet of drifting and stoping and a large amount of ore has been shipped. The main shaft is down 660 feet, and it is intended to secure a lessee for this portion of the mine who will sink at least 200 feet more.

Superintendent G. Jordan started operations at Gillett on the Summit tailings dump last week. The material is said to run $7 per ton and the cyanide plant will treat forty tons per day.

Superintendent F. R. Davis of the new cyanide mill on the Ingham mine, near

Cripple Creek, started operations last week. The lessees expect to get returns of $6 in gold per ton.

W. E. Driscoll of Goldfield has a lease on the Black Diamond No. 2 and the Snowbank claims of the Ross-Lewin-McIntyre ground, on east slope of Big Bull hill, near Cripple Creek. The shaft on the Black Diamond is 200 feet deep, where a vein 4 feet wide was cut during sinking. It is low-grade oxidized ore and considered that it can be readily treated by the cyanide process. It is intended to build a cyanide mill capable of treating thirty-five tons per day.

The official measurements of the Cripple Creek drainage tunnel for July show 782 feet driven, which is 100 feet more than was made in June; 2'7 feet were driven from the southwest heading from the El Paso main shaft at 600 feet, 148 feet from the east heading of No. 2 shaft and 132 feet from the west heading of the same shaft, and 286 feet from the portal heading northward. The remaining ground to be traversed amounts to several hundred feet, which is expected to be broken out by August 15th.

The output of Cripple Creek district for July reached a total of $1,886,900. The smelters, while not treating as much as during other months, had a higher general average than ever before, says the Cripple Creek Times. The Dorcas mill also treated a high grade of ore. An added feature was the treatment of cyaniding ores. There were treated 2800 tons by this process, the total amount realized being $13,200. The following figures show details of the output:

	Tons.	Aver. Value.	Total Value.
Smelters	11,000	$65	$715,000
U. S. R. & R. Co.	21,000	24	504,000
Telluride	6,100	27	164,700
Economic	3,600	26	93,600
Portland	9,000	30	270,000
Dorcas	2,800	38	106,400
Globe	2,000	5	10,000
Gillett	400	3	1,200
Cyanide plants	400	5	2,000
Totals	56,300	$26	$1,866,900

At Cripple Creek, on the 10th inst., 3000 miners went out on strike. All the principal mines except the Portland, C. K. & N., El Paso, Strong and Gold King are closed down. It is expected that all union miners in the district will be called out in order to stop shipments, not only to the United States R. & R. Co. mills, but also to the smelters operated by the American S. & R. Co. because of its refusal to grant an eight-hour day at its Denver smelter.

J. F. Burns of Colorado Springs, president of the Portland G. M. Co., says the 100-drill compressor has been set up in shaft No. 2 at Independence. They will resume sinking in all the shafts. No. 1 shaft is 1130 feet deep; No. 2 shaft, 1290 feet, and No. 3 shaft is 1300 feet deep. Levels will be run out every 100 feet. The production of the Portland in July was 8000 tons of a grade of ore running from $25 to $30 a ton. As to the leasing of the Morse group, Burns stated the company had divided the north thirty-five acres into twelve blocks, which would be leased only to depth of 250 feet; all ground below that point being reserved to the company. The ground to be let out extends to the south line of the Vanadium claim and takes in No. 3 shaft, which, however, will not be leased. There is one shaft 150 feet deep on the Hawkeye and three of like depth on the Wisconsin claim, which will be given over to the lessees.

S. S. Bernard of Colorado Springs, president of the El Paso Con. G. M. Co., operating on Beacon hill, Cripple Creek, says the drainage tunnel is progressing and the drainage of the mine will begin soon. The mine produced 1200 tons of ore in July, the ore coming from above the water level.

The Cripple Creek Con. M. & M. Co. has been incorporated by Boston, Mass., men, and they have acquired twenty acres of patented ground on Gold hill and Howell hill, southeast of Victor, and a lease on the Rocky Mountain mine, on the west slope of Beacon hill.

IDAHO.

BLAINE COUNTY.

The Minnie Moore M. Co., near Hailey, has been retarded because of the strike of smeltermen at Denver, Colo., to which smelter shipments were being made. All the bins at the smelters being full of ore no more can be accepted until the bins are emptied.

BOISE COUNTY.

The Gold Coin M. Co., J. H. Emery of Idaho City, president, will put up a 5-stamp mill this fall at their mines near the Washington mine, and put a 100 H. P. dynamo on More creek, 1¾ mile from the mine, next spring. Work in the shaft, which is down 50 feet, will be resumed this month. When it reaches depth of 150 feet stoping will begin and the shaft continued down. Work will also be started in a 1500-foot tunnel to cut the Blue Bell at depth of 648 feet vertical and 700 feet on the dip of the ledge. It will be started as soon as the mill is up, says the Idaho World. The mill and machine drills will be run by electric power as soon as the plant is in.

CANYON COUNTY.

A one half interest in the U. H. Clark coal mine near Marsh, above Emmett, has been sold to J. Smith, J. C. Hayes, H. H. Quarles and H. W. Hart, who have put on men and started taking out coal. One crew will work in the tunnel to supply immediate demands for the coal, while another will drive a new tunnel 7 feet lower than the old workings, in which a fair quality of coal has been found at depth of 15 feet from the surface. The first tunnel will be abandoned as soon as the latter has been opened up, on account of poor timbering and improper drainage; the two will be connected, however, in order to furnish a circulation of air.

Manager M. M. Gibson says he will resume work on the Grant and Globe groups, near Idaho City, this week. The ore will be treated by cyanide process. The Globe tunnel will be extended 100 feet to cut the ledge. The Globe carries gold but no copper. The Grant tunnel is in the foot wall of the ledge. The Grant carries gold, copper, lead and silver.

CUSTER COUNTY.

Five miles from the mouth of Jordon creek, near Custer, a group of fourteen claims are being developed by the Bismark Mountain M. Co. A mill will be in operation this fall. Adjoining the Bismark on the east, the Sunset M. Co. is developing a group. A 100-ton mill is being put up, which is expected to be in operation by Sept. 1. The ore can be delivered from the mine to mill through a tunnel. The company also intends to put in an electric power plant for lighting purposes.

The air compressor at the mines of the White Knob C. Co., near Mackay, was started up this week, and it is expected to drive ten machine drills at an altitude of 8000 feet. The 900-ton smelter will be ready to "blow in" by Sept. 1st.

IDAHO COUNTY.

At Roosevelt, Moore & Campbell, owners of the Wisdom group, with Finch & Campbell of Spokane, Wash., have bought the Root & Fanburg group, between the Sunnyside and the Lightning Peak. They have put men to work on a 700-foot tunnel.

R. W. Purdum, manager of the Sunnyside mine, near Roosevelt, reports the ore bodies being blocked out in the mine. He has bought several pieces of adjoining property, the Wayland fraction, joining the Sunnyside, being among the number. Superintendent Abbott also has men preparing the ditch and ground for the installation of the 40-stamp mill.

Manager H. D. Rankin of the Rankin M. Co., on Rapid river, near Warren, reports the reduction works began operations this week. The electric plant is in operation.

The Big Creek G. M. Co. has bought two groups of mining claims in Big creek section of Thunder Mountain district, near Roosevelt. The headquarters of the company are at St. Louis, Mo.; W. M. Lucas, president. On the Logan Creek group, 200 feet of tunnel work has been done, and a body of ore that averages $15 per ton has been opened.

LEMHI COUNTY.

The machinery for the Gold Dust M. Co., of which R. A. Hasbrouck of Salt Lake City is manager, is being set up. It includes a 10-stamp mill with steam power and an electric light plant. Hasbrouck says the mill will crush forty tons per day, the stamps weighing 900 pounds each. The capacity of the mill will be enlarged as rapidly as development will justify. The mine is near Salmon City.

SHOSHONE COUNTY.

F. W. Bradley of San Francisco, Cal., consulting engineer of the Bunker Hill & Sullivan mines at Wardner, says, by reason of the recent decree of Judge Beatty, that portion of the extralateral rights of the Bunker Hill claim that has been tied up in litigation with the Last Chance claim was liberated and the mine opened. That portion of the mine opened by the Kellogg tunnel showed good ore. One hundred additional workmen will be placed in, making a total employed of 500. Added to this increase in the mines, they are preparing to make improvements at the Tacoma smelter. A bag house, at cost of $75,000, will be built, and a roaster, to cost $25,000.

It is reported that the Rockefeller interests, with C. Sweeny of Spokane, Wash., have formed the Federal M. & S. Co. to control the Cœur d'Alene lead mines and engage in the smelting business. J. A. Finch of the Standard and Mammoth mines, which will go into the combine, is interested. The deal will take place in the Rockefeller mines (the Monte Cristo) and the Everett, Wash., smelter, which are owned by them.

The Standard M. Co. owns a three-eighths interest in the Mammoth and the adjacent property, which is also under option to the Sweeny-Rockefeller interests. The consolidation would include also the Tiger-Poorman group at Burke and the Last Chance group at Wardner, owned by the Empire State-Idaho Co. The three properties combined are said to be producing about 60% of the argentiferous lead mined in the United States.

W. E. Snyder's Cow Creek placer claims, near Pierce City, have been sold to the Gold Creek M. Co.

The 10-stamp mill of the New Jersey G. M. Co. on the O. R. & N, 2 miles above Kellogg, is nearing completion, says the Spokesman-Review, and the machinery is being set up. The mill will be run by water power, and the 8300-foot flume is finished. The mill is but a short distance from the mine and a tramway will convey the ore. The mine is opened with a tunnel, which struck the ore body at depth of 200 feet. The ore is free milling, and a cyanide plant will treat the mill tailings.

INDIAN TERRITORY.

The Ketoowah M. Co. has been organized at Muskogee to develop mining property in the Ketoowah country, by J. C. Welch, T. P. Smith and W. T. Hutchings.

KANSAS.

CHEROKEE COUNTY.

The Badger M. Co., on Spring river, near the Missouri line, near Joplin, Mo., resumed operations this week after some delay in emptying its ground of water from the heavy floods of last spring. The company has two shafts, with 27 feet of ore developed in one and 14 feet in another.

MICHIGAN.

HOUGHTON COUNTY.

Houghton reports say it is expected the Wolverine mine, near Calumet, will yield 9,500,000 pounds of refined copper for the year, which began July 1. Last year construction cost $38,000.

Rock shipments from the Baltic mine, north of Painesdale, for month of July were 1500 tons more than for June and yielded a total of 797 tons of refined copper. Baltic No. 4 hoist is in operation.

Product for the Champion mine at Painesdale for the month of July was 734 tons of copper; and the Franklin mine at Hancock produced 376½ tons. At the Champion mill, another jig has been put in.

July output of Lake mines are reported as follows: Atlantic mine, at Atlantic, 311 tons 285 pounds; Trimountain mine, north of Painesdale, 425 tons; Winona mine, at Winona, 57 tons.

The beginning of surface work by the Calumet & Hecla management at the end of the property nearest the Centennial is thought to indicate that the company is to turn its attention to the Kearsarge lode, upon which it possesses an extensive outcrop north of Calumet, says the News.

MISSOURI.

JASPER COUNTY.

Joplin reports state that for the thirty-one weeks of 1903 ended August 1 the zinc output of the district amounted to 292,742,280 pounds, which has been sold for $5,010,285. The output of lead during the same period has been 54,910,140 pounds, which was sold for $442,220. The output of zinc is 37,983,000 pounds less than for the corresponding period of 1902, and the lead output 2,430,000 pounds below that 1902. Notwithstanding this decreased production, the output so far for 1903 has brought $405,991 more than was realized for all ore sold during the corresponding period of 1902, owing to the higher prices which have been obtained. As compared to last year the market is $2 per ton higher for zinc and $5 per ton higher for lead.

The Broken Four Co. started its new mill on the Aylor land at Alba this week. ——The New England mill is being moved to the Boston Get There ground, where Horning & Sapp will work the tailings piles.——The Acme L. & Z. Co. will prospect its tract of land south of Webb City by drilling.

The Anderson and Star mines on the Granby land at Joplin have been consolidated with the B. & H. M. Co.——Hohenshell & Co. report having struck a good run of lead on the American Bull Pup lease in 'Possum Hollow.

J. T. and W. S. Owen have a lease on twelve acres of the Consolidated M. Co. ground, north of Joplin. The company has drilled three prospect holes, two of which struck ore at depth of 60 feet and going to depth of 90 feet, and the company last week started to sink a shaft on one of their drill holes.

Gates, Nail & Martin have started their zinc mill on the Mitchell land, near Joplin, and are making thirty tons per week. Ore was found in two shafts at the 110-foot level. —— G. Brader, J. Marrs, C. Kier, E. Hansford and C. McGavern have a lease on twenty acres of the Rusk farm, north of Joplin, and are opening up their ground.

H. C. Holland of Indianapolis, Ind, has bought the Mulberry lease of the B. F. Horton land near Duenweg for $40,000.

C. D. Pratt of Joplin is sinking a new shaft at the Sassafras on the Midway tract. Pratt, by putting in heavier pumps, has succeeded in handling the water. —— T. Jones of Joplin and B. Collins of Bradford, Pa., are operating the Cottonwood Hollow mines near Joplin, and are sinking two new shafts. One is down 54 feet and the other 50 feet, expecting to reach ore at 70 feet ——Four drill holes have been put down on nine lots of the Connor land, west of the Lucky Budge, by J. B. W. Amsden, T. Sayer and J. Madeira et al. of Joplin. Three of the drill holes showed ore from 140 to 200 feet. The fourth hole showed 16 feet of sheet ground. A shaft is being sunk.—— N. B. Lichliter of Joplin reports drilling through ore from 45 to 95 feet on the Eclipse lease of the Aylor land near Neck City.

C. M. Christmas of Joplin, manager of the Missouri mine on Center creek, near Carterville, says a company has been organized to take hold of the Rush and Nebraska mines at Jackson Hollow, and they are repairing the Rush mill and will put up a new mill on the Nebraska ground.

The following companies were incorporated at Joplin last week: The Carrie Z. Lead & Zinc Co. by W. S. Zehrung, I. M. Bransfield, C. N. Crisman and H. S. Hurst; the Mamie B. M. Co. by I. M. Bransfield, C. Martin, W. S. Zehrung and J. N. Doty; the Chapman M. Co. by F. Nicholson, T. Chapman, C. and R. Burnes and B. Hurst.

LAWRENCE COUNTY.

At Stotts City the Keystone, C. C. C. and McFarlane mines report operations resumed last week. —— N. Larkin has moved a hoist from the Jack Davis mine on the Underwood, north of Stotts City, to the Small Hope, and says he will begin operations this week.

The output of mineral from the mines of Aurora for last week was reported the best in several months, but only two cars were shipped, on account of a car famine, which, if it continues, may close down some of the mines. —— Sinking has been suspended at the Sand Ridge mine at Aurora and drifting at depth of 330 feet started.

NEWTON COUNTY.

Woodcock & Sons, who bought the Cannonball mine at Granby, have put in hoisting machinery and are taking out zinc silicate.——Smith & Co. have cleaned out a shaft northeast of the Cannonball, naming it the Big Gun, and will develop it.——The 80 ton mill at the Globe M. Co., 1 mile west of Diamond, on the Ellis land, was started last week.

STONE COUNTY.

Elder & Co. have leased the Prince mill on the New York Zinc Co. ground at Galena and have begun active work.——The Battlefield mine has been drained and work resumed in several of the drifts.

MONTANA.

The report of the United States assay office at Helena shows total receipts for the month of July to have been $214,152.08, as compared with $217.760.46 for July, 1902. From Montana gold to the amount of $180,546 32 was received, against $172.501.95 for July, 1902, the principal producers being as follows: Fergus county, $68,740; Jefferson county, $10,818; Lewis and Clarke, $17,395; Madison, $28,081; Park, $19,639. This does not show the entire production of gold in the various counties, for, while the Fergus county product, which is principally cyanide, nearly all goes to the assay office, there are many mines in Lewis and Clarke and other counties that send most of their products to the smelters and none to the assay office.

FERGUS COUNTY.

In development of the mine of the Alder Gulch M. Co. in the Little Rockies, near Lewistown, high-grade shipping ore is being taken out. Twelve tons sent out last week netted the owners—Zortman, Putnam & King—$4000. The Alder Gulch mill is in operation, says Manager King.

FLATHEAD COUNTY.

Superintendent D. P. Bowers reports work at the Snowshoe mine, near Libby, going ahead. The concentrator is running steadily, the rains of last week having added to the reserve water which is stored to tide the mill over the dry season. At the mill there are 900 tons of

concentrates, partly sacked, to be shipped to the railroad at Libby. All work so far this season has been at the 200-foot level. The working shaft is 300 feet deep and that portion below the 200 is filled with water. Their equipment includes an electric lighting plant.

The Mustang Con. M. Co., operating in West Fisher district, on Great Northern mountain, near Libby, is running a tunnel to cut five veins which outcrop in its group and carry gold values. The tunnel is in 255 feet and within the next 100 feet the first vein is expected to be struck. The second vein will be cut at 560 feet on the Enterprise, and the fifth will require a depth of 1400 feet. J. Cameron is superintendent.

GRANITE COUNTY.

In Henderson gulch, near Phillipsburg, a dredger is to be installed to work old placer grounds, says Manager C. E. Van Barneveld of a Minneapolis, Minn, company. Of late years the Henderson placers have been worked in a small way by leasers, operating with sluice boxes and rockers. The fields are on the side of a long bar.

JEFFERSON COUNTY.

C. M. Hewett, at the High Ore mine, near Basin, reports a strike of ore. The tunnel was continued and the lead cut at a depth of 800 feet. Forty-three feet of concontrating ore is shown, and the width of the shipping ore in the face is not yet determined. The tunnel is in 2150 feet and a drift is being run west.

A gold strike is reported from one of the claims taken over by the Rose G. M. Co., near Jefferson City.

LEWIS AND CLARKE COUNTY.

(Special Correspondence)—The Argo Copper M. Co. is developing a group of copper claims 26 miles north of Helena, says Consulting Engineer F. L. Sizor. A concentrator with a capacity of forty tons per day has been built, and it is expected to be in operation this week.

Helena, Aug. 10.

The Jay Gould mines, under bond to the Standard Ore Co. of Helena, will be further developed. The Jay Gould is in Canyon Creek range, 20 miles north of Helena, and carries gold and silver. There is a large amount of tailings which, it is said, are amenable to cyanide, and these will be treated.

W. A. Simmons and A. Berquist of Basin have leased ground on the corner of Third and Chaucer streets, in Helena, for the purpose of sinking a shaft and following a lead of gold ore which is claimed to run northeast from the lime quarries, 300 feet distant, on Chaucer street.

MADISON COUNTY.

The Damours M. & M. Co. has been incorporated under South Dakota laws, with J. B. Woodburn, L. H. Bearse, W. C. Bennett, E. T. Howes, A. P. Bassett and M. Speight of Springfield, Mass, as directors, and C. E. Damours of Virginia City, Mont., as manager. The properties of the company are at Summit, 8 miles south of Virginia City, and comprise fifteen claims, including the Ptomey, Damours and Bryson lodes, which are said to contain good bodies of milling ore.

NEVADA.

ESMERALDA COUNTY.

(Special Correspondence.)—S. R. Wasson and E. A. Montgomery are reported to have located a large deposit of native alum about 12 miles north of Silver Peak and 4 miles from the proposed railroad from Sodaville to Tonopah. The deposit has been exposed for 1000 feet in width, and it is said that the indications are that it is much wider. The deposit also contains native sulphur.

Silver Peak, Aug. 10.

LINCOLN COUNTY.

In Crescent district, 18 miles west of Searchlight and 14 miles northeasterly from the Ivanpah terminus of the Barnwell branch of the Santa Fe Railroad, G. Simmons, who owns the turquoise mines, has bought the Tiger gold claim and is having a shaft sunk by contract, says the Searchlight. There is a body of $8 ore opened.——R. D. Kinney has done several hundred feet of work on a ledge northeast of Crossman Springs that assays well in silver, with some gold.

The Mohile and Copper Chief mines, in Yellow Pine district, have been bonded to O'Meara & Lynch of Tonopah, Nye county. The two claims adjoin and are 3 miles northeast of Sandy. They contain copper values.

A new shaft is being sunk on the coal deposits 40 miles from Pioche.

STOREY COUNTY.

At the Con. Cal. & Virginia, at Virginia City, the superintendent's report for week ending August 8th shows on 2150-foot level, the southerly drift from end of east crosscut from winze from 1950 level was advanced 8 feet in quartz, of low assay value, and porphyry; over the seventh floor northeasterly drift from three-compartment raise from this level, worked on the twelfth, thirteenth and fourteenth floors in the north stope and extracted ore of second grade. In the main shaft, have taken out the discharge column of No. 2 elevator between the 1750 and 2150-foot levels, as it is no longer needed between these levels. No. 1 elevator and the three Reidler pumps were, on the 5th inst., put in successful operation of lowering the water, which is now down to 2250-foot level station. The Cornish pumping system is being taken out below the 2150-foot level, and the shaft compartments are being cleaned. Total extraction of ore for week, fifty-seven cars, assaying on basis of gold value $10 04 per ton.

At the Seg. Belcher at Gold Hill, for week ending August 8th, on 1100-foot level, the east crosscut near the south line was continued 9 feet; total 675 feet; face in porphyry. The electric blower is running and furnishing a current of cool air. The work of enlarging the joint main drift from the Overman north line north of the Belcher incline is progressing.

A. C. Kyle, superintendent of the Alpha and Exchequer mines at Virginia City, says he is preparing to resume work there. Large bodies of low-grade gold-bearing rock are said to exist in the Alpha and Exchequer, which, with the reduced rates for mining and milling made possible by the introduction of electrict power, it is expected can be handled at a profit.

Arrangements have been made by the mining companies on the Comstock, near Virginia City, and President Leonard, of the Comstock Tunnel Co., in regard to putting the Sutro tunnel in repair.

WHITE PINE COUNTY.

It is reported the Grand Deposit C. M. Co. has taken a bond on the Victoria copper group of claims, in Granite Mountain mining district, near the Bimetallic and Jupiter groups, 40 miles northeast of Cherry Creek, says the Cherry Creek Miner.

The Wide West M. Co.'s mill near Cherry Creek is completed and in operation, says Superintendent Leishman.

The Pick & Gad M. & M. Co. was incorporated last week in New York City, to operate the Pick & Gad mine at Cherry Creek, by J. Howard, C. Wah and J. Callahan of Cherry Creek. The Pick & Gad carries free-milling gold, with average values $10 per ton, in a 4 foot ledge, on which a 155-foot shaft has been sunk.

NEW MEXICO.

GRANT COUNTY.

The owners of the Aztec group at Pinos Altos will build a 60-ton concentrator for use of Lessee W. McAllister. The concentrator will handle the low grade ores of the Aztec, which consist of silver sulphides and gold, says the New Mexican. The engine, boiler, timbers and other material of the Aztec mill, north of Silver City, will be removed to south of Pinos Altos. The concentrator will have rolls, screens, jigs and dry concentrating table. The plant is expected to be in operation by November.

The B. F. Copp half interest in the Virginia mine in the Burro mountains, near Silver City, has been sold to L. P. Deming of the Alessandro M. & M. Co. Deming has miners at work sinking a shaft to connect with a 30-foot winze which is in a drift off the main shaft.

GUADALUPE COUNTY.

South of Tucumcari several copper prospects are being developed, says the New Mexican.

OTERO COUNTY.

The Three Bears M. Co. is developing its holdings at Jarilla under Manager F. B. Schermerhorn. A 4-foot vein of ore has been cut at the 200-foot level that runs $20 per ton in gold and copper values. Philadelphia, Pa, men are interested. The shaft will be sunk to a depth of 1000 feet ——A well is being sunk to a depth of 909 feet at Jarilla to furnish water for the placers, and is down 200 feet. G. F. Moffit is superintendent.

SIERRA COUNTY.

Work will be resumed on the Confidence mine at Fairview, says Superintendent T. Scales, who is rebuilding the road to the mine.

SOCORRO COUNTY.

The Milling & Mining Dividend Co. will resume operations this month at Estey City. The company is reported negotiating for more claims in the district.

OREGON.

BAKER COUNTY.

The Taber Con. Fraction, on the lode between the end lines of the Eureka and the two fractions adjoining the Columbia mine near Sumpter, was bought last week by the Geiser-Hendryx I. Co. for $25,000.

The testing mill and sampler of McEwen, Arthur & McEwen, at Sumpter, is in operation.

It is proposed to put up a mill this fall, says Superintendent Cable of the Adelene mine in Rock Creek basin, near Sumpter.

GRANT COUNTY.

Work at the Black Jack mine, south of the Oregon Monarch mine, near Granite, is progressing, says Superintendent Sheedy. Last week work was started on a number of buildings. Lincoln, Neb, parties are interested.

G. W. Dart, who has leased the Humboldt ditch for placer mining, has had to suspend operations because of the lack of water. The bedrock has been washed and a satisfactory cleanup made, reports Dart.

JOSEPHINE COUNTY.

It is intended to place a 40-stamp mill on the Benton mine, on Whiskey creek, in the Mt. Reuhen district near Grant's Pass this fall, says the Courier. There is plenty of water power for the operation of mill and electric plant.

The Gold King mine, on Josephine creek near Grant's Pass, has been bought by a company composed of A. J. Roe, D. T. and J. A. Evans, of Fort Worth, Tex., and M. Marks, of Grant's Pass, who is superintendent. The new owners will put on a complete equipment of mining machinery, with stamp mill, pumping plant, etc. Men will be started to work on the main shaft.

MORROW COUNTY.

A coal mine is being opened up on the headwaters of Willow creek, 21 miles southeast of Heppner, by the Heppner Railroad & Coal Co. Bunkers that will contain forty-five tons have been built, and work is in progress on the railway track to connect with the O. R. & N. into Heppner.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The annual report of Manager Thompson of the Columbus Con. G. M. Co., operating northeast of Central City, shows that the amount of work done is 6089 feet and the total sum expended by the company in labor, tools, etc, totaled $191,923. On the Columbus claim the old shaft has been sunk to a depth of 300 feet; 1078 feet of crosscuts have been run from the 200-foot level, which shows four veins which assay from $1 to $8. The Columbus shaft house has been rebuilt and enlarged and a 12-drill air compressor and double-drum hoist put in. On the Dalton group 1730 feet of drifts, tunnels and crosscuts have been run, blocking out ore. On the L. & F. Claims 2461 feet of tunnels and drifts have been run. There have been run 625 feet of tunnels and cuts on other of the company's properties. In addition the company has built wagon roads and made other improvements. They have added to the original purchase the Portland mill, which has been rebuilt and enlarged to treat seventy tons of ore per day. The mill is saving 80% of the values of the ore. It is proposed to increase their treating capacity by building an amalgamation and cyanide mill of 1000 tons daily capacity.

UTAH.

In the ore and bullion market the month of July closed on settlements aggregating $1,829,250 (this independent of the product from the furnaces of the copper smelters). Compared with the corresponding month of 1902, this shows an increase of 20%, though the producers are sending out only such ores as are necessary to maintain the payroll and providing for dividends while waiting for a better metal market. However, the tonnage of every camp shows an increase over July, 1902. The most noticeable increase has been in the tonnage of copper-bearing rock. The output of copper bullion carrying gold and silver at the furnaces of the "independent plants" during the month of July was reduced to 2,511,984 pounds (from 2 546,686 pounds for June), the shrinkage due largely to an interruption at the Highland Boy, during which a number of changes were made, says the Salt Lake Tribune.

	Pounds.
Bingham Con	759,544
Highland Boy	1,020,680
United States	731,760
American S. & R. Co	1,200,000
Total	3,711,984

Of this class of bullion a material increase is expected during the last half of the year. It is said that at the Bingham Con. the fourth furnace will be blown in before Sept. 1. The Highland Boy will increase its capacity to 750 tons of ore daily. The United States Co. will put in a sixth furnace, and it is expected the Tintic M. Co. will have its furnaces under fire before the first of the year.

BEAVER COUNTY.

Two of the gasoline hoists for the Royal C. Co.—one 15 H. P. and the other 40 H. P.—are on the ground to be set up at the Montreal group, near Milford.

JUAB COUNTY.

Shipments for the month of July from Tintic district amounted, in cars of ore, to:

Bullion-Beck	41
Carisa	10
Centennial-Eureka	121
Eureka Hill	10
Gemini	29
Grand Central	86
Mammoth	10
Star Con	12
Uncle Sam Con	17
Victor	12
Yankee Con	20
Seven others	16
Total	384
Iron ores:	
Black Jack	59
Dragon Iron mine	74
Noon Iron mine	13
Total	146
Concentrates:	
May Day	4
South Swansea jigs	1

SALT LAKE COUNTY.

The Cluster M. Co. holdings at Bingham have been taken over by W. M. Ferry and M. H. Walker. The Cluster group lies between the United States M. Co. ground on the west and the Bingham Con. Dalton & Lark group on the east. The ores show values in lead, gold and silver. To tap the ore bodies at vertical depth of 600 feet, a tunnel is being driven a distance of 1100 feet by Superintendent C. A. Falco, of Bingham.

The management of the Mystic Shrine mine of Bingham has bought the St. Elmo, a patented location adjoining the company's territory on the south. Within the next 125 feet it is expected the main tunnel, in 725 feet, will reach the main ore body, says Manager E. W. Young. The equipment has been increased.

SUMMIT COUNTY.

At Park City it is reported work will be resumed at the Constellation mine, of which H. Sutton is superintendent. It is claimed that the Constellation carries an extension of the Ontario veins. It is intended to do development work on the 350-foot level.

Work has been started on the Donovan group, recently incorporated. The mines are northwest of Park City, near the Keith & Fluelling group; the company is composed of Iowa and Utah men.

Superintendent C. L. Rood of the Ontario mine, near Park City, says preparations are being made to build a concentrating mill. On the 2000-foot level of the Ontario a compound duplex pump is being set up, which will be in readiness in case of emergency, should a large volume of water be cut. The pump was formerly on the 1300-foot level and has a capacity of 1000 gallons a minute.

TOOELE COUNTY.

Work has been suspended at the Old Colony mine, near Stockton, for an indefinite period, says the Mammoth Record.——Work at the Manhattan mine, which has been suspended for a few weeks, has been resumed by T. Fairchild under a contract to sink another 100 feet.

UINTA COUNTY.

Work is reported progressing at the twelve wells now drilling near Evanston, and two or three are expected to strike oil this week. The Atlantic & Pacific Co. has completed well No. 2, estimated to yield fifty barrels per day. None of the wells in the field have been shot as yet, owing to lack of storage capacity. Six 1000-barrel tanks are on the ground at Spring Valley for the Atlantic & Pacific Co, and a test will be made of No. 1 and No. 2 wells.——The American Con. Co. are nearing the sand in their well No. 3, and have drilled 200 feet on No. 1 well. Another derrick is being built on the same section.——Work at the Jager well No 2 has been suspended. About 1000 barrels of oil was pumped from their well No. 1, which is a twenty-five-barrel well. ——The Bettys Oil & Dev. Co. has been shut down for six weeks waiting for casing ——The Michigan-Wyoming Oil Co. has reached a depth of 1200-feet, but is having trouble with the water.

WASHINGTON.

OKANOGAN COUNTY.

J. M. Hagerty, principal owner of the Ruby mine, Okanogan district, near Loomis, has bought the Golden Zone concentrator and will put it on the Ruby and expects to be treating ore before Sept. 1. While the upper workings are supplying ore it is the intention to start a main tunnel at the base of the mountain, several hundred feet below the other tunnel. There is a quantity of low-grade ore on the dump that can be concentrated.

Work was started last week at the

Crystal Butte mine on Copper mountain, near Chesaw. Several buildings are being put up, and when these are finished men will be put to work in the mine taking out ore. The concentrating plant is being overhauled and repaired, says the Spokesman-Review. Men are at work on the Delate, owned by the Interstate M. Co., and the number will be increased. They will take out ore for treatment in the mill, which will also do custom work. Several other properties are starting up and will furnish ore at the mill. O. P. Anderson is vice-president and manager of the company and H. Thompson superintendent. The Crystal Butte is leased by the Interstate Co. from the Crystal Butte M. Co. of Spokane.

M. A. Smalley, manager of the Wyandot M. Co., says arrangements are being made to again start work on the Oregon mine, 7 miles west of Chesaw. There are three claims in the group.

STEVENS COUNTY.

The month of July showed considerable activity in the marble industry in Stevens county, says the Spokesman-Review. Two new plants have been installed, one including a channeler now in operation on the Standard Marble Co.'s ground, 4 miles east of Colville, and a drilling plant on the properties bonded by J. A. Finch et al. of Spokane. The Finch group (the Queen of Sheba) is 16 miles north of Colville. The Crystal Marble Co., operating near Addy, shipped five carloads of rough stone to its works in Spokane during the past month. The Jefferson Marble Co., on Clugston creek, has men at work running its channeler and has twenty carloads of marble ready for shipment. They have shipped two carloads to Buffalo, N. Y. The United States Marble Co. has put out a carload of green marble for New York. A number of other smaller properties are doing development work. It is estimated that the marble industry of Stevens county is giving employment to 200 men.

In the injunction suit of M F. Gibson vs. Indian Agent Anderson, Judge Hanford of the United States Circuit Court at Spokane has rendered a decision upholding Agent Anderson in expelling Gibson from the Spokane Indian reservation, where the latter had located mining claims. Gibson contended that under the general law he could locate claims previous to the President's proclamation withdrawing the land and hold them in spite of that order.

WYOMING.

LANDER COUNTY.

C. Walter, manager and director of the Belgo-American Drilling Trust, says since buying the Henderson wells in the Popo Agie fields, near Lander, eight new gushers have been struck. The news was not made public, as the wells were plugged as soon as the oil flow was encountered, and will remain plugged until the completion of the proposed railroad into tbat section. The railroad will go west from Casper, instead of Guernsey, the Burlington terminus in Wyoming, the Northwestern railroad having entered into an agreement with the company. Estimates on the work have been made on the construction of the line, which will be 165 miles in length.

FOREIGN.

BRITISH COLUMBIA.

BOUNDARY DISTRICT.

This week the four furnaces at the Granby smelter at Grand Forks will be blown out, for the purpose of connecting up the two new furnaces, which will require about ten days, when all six will be operated. In the meantime ore shipments from the company's mines will be discontinued, says Superintendent Williams, but the miners will continue work, as there is storage room in the mines for a large amount of ore. When shipments are resumed they will be at the rate of 2,200 tons daily. The Granby smelter at Grand Forks, for the week ending Aug. 1st, treated 8832 tons, making a total of 186,307 tons for the year. Shipments were:

	Week.	Total.
Granby	8,295	197,780
Mother Lode	3,100	58,830
Snowshoe	1,560	33,772
B. C.	600	18,475
Emma	....	10,016
Sunset	256	8,481
Providence	....	634
Oro Denoro	320	620
Athelstan	60	435
Elkhorn	....	129
Totals	14,191	328,171

This makes the output for the month of July 57,492 tons.

Two more gold bars from the Waterloo mine in Camp McKinney were sent out last week, valued at $5,120, making $8000 produced in forty days' running. Operations were started June 16, and with five stamps the mill is treating twelve tons a day. In addition to the gold bullion the mine has received $3630 net on shipments of high grade ore to the smelter, and has another car which will be shipped this month, in addition to a carload of concentrates. Manager D. Clark is planning to add to the mill.

NELSON DISTRICT.

G. H. Barnhardt has leased the Porto Rico mine from the Canadian Pacific Ex. Co., Ltd., of London, England. He will start work this week. The mine is a free milling proposition at the head of Barret creek, near Ymir.

ROSSLAND DISTRICT.

The output from the mines of Rossland Camp for the week ending August 1st were slightly below normal, largely due to decreased consumption at Le Roi smelter, where the number of furnaces in operation have been reduced pending increased coke supplies from East Kootenay, says the Rossland Miner. Construction work at Le Roi 2 and the White Bear mines is reported progressing. Shipments from Rossland camp for week ending August 1st and for year to date are as follows:

	Week.	Year.
Le Roi	3,930	108,185
Centre Star	1,530	48,415
War Eagle	1,080	34,335
Kootenay	420	4,186
Le Roi No. 2	630	16,542
Velvet	....	3,376
Giant	....	698
Jumbo	150	542
I. X. L.	....	70
White Bear	....	297
O. K.	....	25
Homestake	....	90
Totals	7,770	216,762

This gives the output of the month of July at 21,340 tons, as compared with 36,360 tons for June.

The Velvet mine, near Rossland, has suspended operations indefinitely. Manager W. Gray says the Velvet is unfortunate in respect to transportation. The charges for transporting the ore from the mine to the railroad are excessive, owing to the distance and altitude, and the charges for bringing in supplies equally heavy. Under existing conditions ore is not payable that does not carry over $20 per ton. The Velvet has bodies of ore blocked out running from $12 to $20. During the past ten months the mine has shipped 5000 tons of high-grade ore.

SLOCAN DISTRICT.

The Comstock mine, near Slocan City, is being worked by W. Hunter with ten men. Ten inches of ore has been exposed on the surface between No. 4 and No. 5 tunnels. —— The concentrator at the Wakefield mine is being remodeled and when completed will have capacity of 150 tons per day.

The amount of silver-lead ore being shipped through Kalso from Slocan mines is reported daily increasing. Want of miners is hampering operations.

YALE DISTRICT.

H. Stanislawsky, manager of the Mount Baker & Yale M. Co., at Yale, says he will put a 60-stamp mill and concentrator on the company's property, 5 miles south of Yale. The ore is in a porphyry dike 80 feet wide. There are eighteen men on development work. There is a wagon road built down to the Fraser river and a cable line across it with sixty-four tons capacity.

CANADA.

ALBERTA.

Development work is progressing on the coal properties of the International Coal & Coke Co., 3 miles west of Blairmore, and extending from the railroad south a distance of 7 miles, says Manager A. R. Paulson. Two main entries have been started at this point, wagon roads built, the erection of tipples prepared for and surveys run for building side tracks, etc., to connect the mine with the railroad. The company has laid out yards for a large number of coke ovens and is building a few ovens in which to test the coking qualities of the coal from their various seams. Shipments of coal have begun and two carloads are being taken out daily in course of development work.

ONTARIO.

(Special Correspondence.)—The Black Bay M. Co., on a peninsula east of Port Arthur, are sinking on a copper prospect, which is reported to give very encouraging results, the ore running from $7 to over $60 per ton. The rock contains native copper. A shaft is being sunk, now down 118 feet, and a level started at 76 feet from the surface. The company is composed of Willmar, Minn., men, G. P. Karwand, president. Several of the directors recently visited the mine, and have decided to increase the plant by the addition of larger hoisting machinery and to continue developments to a greater depth.

Willmar, Aug. 9.

A. P. Coleman of the Bureau of Mines reports the Helen iron mine in Michipicoten district being opened up with satisfactory results. They are raising 1400 tons of ore daily.——At Sudbury and Copper Cliff, the nickel camps, operations are active. The Canadian Copper Co. is reconstructing its plant. For the present the Creighton mine, one of their most important nickel mines, is closed in order that all the men may be utilized in the reconstruction work. —— The Hutton iron mine range, north of Sudbury, is also being worked.

MEXICO.

CHIHUAHUA.

The Stilwell M. Co. has work started on its Germania mine, adjoining the Two Republics, near Parral. A general sample from the surface gives an average assay of sixteen ounce silver, says the Enterprise.

The Guazapares M. Co. has its mines at Guazapares under option of sale and is timbering its shaft. If the sale does not go through the company will start operations September 1. The leaching plant of forty tons daily capacity is reported to work satisfactorily in treating their gold-silver ores.

The Pittsburg-San Jose R. & R. Co. has two-thirds of the rails for its railroad from the Gavalana mines to the mill at San Jose del Sitio hauled out from Palomas station on the Mexican Central, about 90 miles, and track laying is progressing.

JALISCO.

The Tula Iron Co. has been organized under New Jersey laws to take over the Tula Fereria iron works and mines in Sayula district, 60 miles south from Guadalajara. The company will equip and develop the mine and improve the plant. It is proposed to build a hydraulic plant to operate the mill and mines, which are 20 miles apart. The first change will be to substitute traction engines for the mule pack trains.

MEXICO.

The El Oro M. & R. Co. at El Oro, owned by English parties, has a 100-stamp mill in operation, to which the directors of the company have decided to add another 100 stamps. Their principal operations are on the San Rafael vein.

At the northwest end the El Oro M. & R. Co.'s ground is adjoined by the Esperanza M. Co. The Esperanza is working on the same vein as the El Oro and has 120 stamps dropping.

MICHOACAN.

West of the Esperanza mine, in El Oro district, the Dos Estrellas mine at Tlalpujahua has forty stamps dropping. An 80-stamp mill is being added to the equipment. The Dos Estrellas veins carry high-grade values in gold and silver.

SONORA.

(Special Correspondence) —The new 40-stamp mill of the Zubiate M. Co. at Zubiate were dropped for the first time on the 6th inst. The stamps weigh 850 pounds each. The mill is equipped with six concentrators, ten pans and five settlers. A modification of the Washoe process is used. The mine is opened through a three-compartment shaft, down 650 feet.

Zubiate, Aug. 7.

The Caliche Mountain M. Co., Tener Bros. & Balch principal owners, is developing a gold property 6 miles from Cerro Prieto. It has sunk two shafts, 700 feet apart, one 90 feet deep, the other 60, both in ore their full width. A tunnel is being run in on the vein to cut the shafts. The ore averages $10 per ton in gold.

The San Blas M. Co., which has taken over the San Blas mine, 45 miles northwest from Caborca, in Altar district, has been incorporated in Massachusetts. The property is a gold-bearing mine, with five veins, tbree of which were opened and operated by the "antiguos." The directors of the company are D. J. Brown, L. R. Godfrey, E. H. Beer, G. N. Rich, G. H. Miner, E. F. Gibbs and J. H. Trayne of North Adams, Mass., with J. A. Singey of Caborca general manager.

PERSONAL.

H. L. FRANK has returned to Montana from Europe.

J. A. DEXTER is in San Francisco, Cal., from Nome, Alaska.

J. B. FARISH, E. M., of Denver, Colo., is in San Francisco, Cal.

W. L. AUSTIN of New York City is at Copperopolis, Calaveras county, Cal.

H. T. HENDERSON, general manager of the Animas Canal R. W. P. & I. Co., has returned to Durango, Colo., from Denver, Colo.

C. H. LINDEY of San Francisco, Cal., has returned from a business trip to Portland, Or.

H. NEWELL of Salt Lake City, Utah, interested in Utah mines, is in San Francisco, Cal.

S. E. ROBBINS is superintendent of the Red Cross mine, near Omega, Nevada county, Cal.

ARTHUR LAKES of Denver, Colo., is examining mining property in Idaho and British Columbia.

W. J. RULE has returned to Central City, Colo., from an extended visit to Grass Valley, Cal.

G. J. MCCARTY, a mining superintendent of Sonora, Mexico, is in San Francisco, Cal., on business.

P. L. YOUNG of San Francisco, Cal., has gone to Halifax, Nova Scotia, where he will do mining work.

O. HERLOCKER is manager of the Highland G. M. Co., operating the Highland mine, near Sumpter, Or.

R. W. RODDA is at Lillooet River, B. C., on mining business and returns to Seattle, Wash., next week.

F. R. DAVIS is superintendent of the cyanide plant operating at the Ingham mine, near Cripple Creek.

R. R. LESLIE has resigned as superintendent of the Le Roi mine at Rossland, B. C., to take effect Sept. 1.

J. A. FINCH of the Standard and Mammoth mines, at Wallace, Idaho, is in New York City on mining business.

L. TOVEY, a mining engineer of Tomsk, Siberia, is in Denver, Colo., and will visit tbe principal camps of the State.

PRESIDENT N. TREWEEK of the Wabash M. Co., returned to Salt Lake City, Utah, last week from a trip East.

W. E. THORNE, E. M., has gone from San Francisco, Cal., to Siskiyou county, Cal., to examine mines near Yreka.

JAMES DOYLE, president of the East Mancos G. M. Co., Colo., returned to Denver Colo., last week from the mines.

F. L. SIZER, E. M., consulting engineer of the Argo Copper Mfg. Co., near Helena, Mont., is in San Francisco, Cal.

SUPERINTENDENT T. A. PATTERSON of the Pilgrim mine, at American Hill, near Nevada City, Cal., is in New York.

F. W. BRADLEY of San Francisco, Cal., consulting engineer of the Bunker Hill & Sullivan mines, is at Wardner, Idaho.

R. D. SEYMOUR, western manager of the Trenton Iron Co., has returned to Denver from New York and other Eastern points.

T. DERBY, superintendent of the Quicksilver M. Co. at New Almaden, Santa Clara county, is in San Francisco, Cal., on business.

H. F. MCFARLANE, owner of the McFarlane mine at Stotts City, Lawrence county, Mo., returned last week from a trip to Chicago, Ill.

B. W. BEGEER has accepted a position as assayer and metallurgist with the Trinity County G. M. Co., near Dedrick, Trinity county, Cal.

G. E. NOLAN, manager of the Nevada Engineering Works, has returned to Reno, Nev., from an examination of Butte Co, Cal., mining property.

B. F. BROUGH, of Toledo, Ohio, secretary-treasurer of the Wyandot M. Co., operating near Chesaw, Okanogan Co., Wash., is at the mines.

D. L. PARHAM, formerly with the Yellow Aster M. Co. at Randsburg, Cal., is foreman of the Gold Hill M. Co. at Gold Hill, near Tonopah, Nev.

G. E. VOORHEES, Jr., of Santa Barbara, Cal., principal owner of the Las Vigas mine at Coyame, in eastern Chihuahua, Mex, is on a visit to the mine.

J. MACFARLANE, general superintendent of the Cerro de Pasco mines in Peru, is in Utah on a business trip from the East, after which he will return to Peru.

C. WALTER, manager of the Belgo-American Drilling trust, operating in Wyoming oil fields, returned last week to Cheyenne, Wyo., from a trip to Belgium.

L. G. CARLETON of Cripple Creek, Colo., is superintendent of the leasing department of the Doctor-Jack Pot Con. G. M. Co., operating on Raven Hill, Cripple Creek.

RAYMOND WHINNERAH, millwright and engineer, who has been superintending repairs of the Mountain Pride mill,

Breckenridge, Colo., has returned to Denver, Colo.

A. C. KYLE, superintendent of the Con. New York M. Co., at Gold Hill, Nev., has been appointed superintendent of the Alpha and Exchequer mines, also on the Comstock.

PRESIDENT W. B. MUCKLOW of the Majestic Copper Co., returned to Hartford, Conn., last week from a visit to the mines of the company at Milford, Beaver county, Utah.

T. FISHER, formerly operating in Joplin district, Missouri, and also manager of the Olympia mine in northern Arkansas, is superintendent of the North American Lead Co. at Fredericktown, Mo.

S. B. WELD, late of Ricketts & Banks, New York, has associated himself with H. C. Parmelee, under the firm name of Parmelee & Weld, 1755 Arapahoe street, assayors and chemists, Denver, Colo.

F. J. STANTON of the Denver School of Mines, Deover, Colo., has returned from an examination of a group of mines on the lake fork of the Gunnison river, near the Bowerman find, near Waunita, Colo.

R. H. ANDERSON, manager of the B. C. and Oro Denoro mines at Summit camp, B. C., will be superintendent of the Le Roi mine at Rossland, B C., vice R. R. Leslie, resigned, to take effect Sept. 1.

F. W. OLDFIELD, late of the Palmarejo and Mexican Gold Fields Co., Chinipas, Chihuahua, Mex., sails from New York on the 18th as assistant to the local manager of the South American Development Co. in Ecuador.

F. H. PROBERT, consulting engineer for the W. B. Thompson Co. and the Coronado M. Co., has returned to Los Angeles, Cal., from an investigation of the mineral resources of the Arispe, Moctezuma and Sahuaripa districts of Sonora, Mexico.

A. F. CRANK, of the Blaisdell Co, of Los Angeles, Cal., has gone to South Africa to manage the H. W. Blaisdell Co., Ltd, of London, Eng., which has the foreign agency for the construction of the H. W. Blaisdell cyanide vat excavating machinery. A. A. Talmage of Los Angeles will take Mr. Crank's place as manager of the American branch of the company, with headquarters at Los Angeles, Cal.

Catalogues Received.

Standard size (6x9) is the Standard Diamond Drill Co.'s 1903 catalogue, replete with interesting points regarding diamond prospecting core drills, giving a historical account of the business, descriptions of drills for surface or underground work, with details as to sizes and prices, illustrated specific description of diamond drill boring tools and supplementary chapters on "How to Select a Diamond Drill Outfit," "Instructions for Operating Diamond Drills," "Instructions for Setting Diamond Bits," etc. The catalogue is finely issued by the Standard Diamond Drill Co., 1644 Monadnock Blk., Chicago, U. S. A., and, like all similar trade treatises noticed herein, will be sent to any address on request.

"Excavation of Rock by Machinery" is the title of Catalogue No. 51, 1903, from the Sullivan Machinery Co., whose general office is at 135 Adams St., Chicago. It is copyrighted, and its technical contents are worth copyrighting for the information contained therein and its sumptuous illustrations. The rock drill is a great thing in modern mining, and this latest brochure from the Sullivan Machinery Co. is a notable addition to the sum total of knowledge thereon. To any one interested in drills the book is commended as worth early consideration. The fact that it is of standard size (6x9 inches) makes it convenient for filing and permanent preservation, and the high grade of its publication entitles it to a place in one's library. Viewed mechanically, it is a work of art, and is a good exemplification of the truism that "the best is none too good"—for those who want to know about the Sullivan Machinery Co. The illustrations on page 94 of the Sullivan patented flexible joint are splendid specimens of fine portraiture, as are many others scattered through the handsome book, which will be sent to any designated address.

Obituary.

MATTHEW BROWN, mechanical engineer for the South Geldenhuis Deep, Ltd., at Germiston, South Africa, died July 5th from heart disease, after an illness of one week. Deceased was a native of Glasgow, Scotland, and at one time was located in San Francisco, Cal. He is survived by a widow.

Commercial Paragraphs.

THE Redfield Drill Co., 1606 Blake St., Denver, Colo., reports the sale of its hand drills to the following parties: Rand Development Co.; Oroville, Cal.; Buckeye G. M. M. & T. Co., Idaho Springs, Colo.; Turk M. Co., Deertrail, Wash. The Utah agents, the Salt Lake Hardware Co., also report the sale of one.

THE Lagonda Mfg. Co. of Springfield, Ohio, is in receipt of the following letter: "Gentlemen: We used your Weinland No. 8 water-power cloaner to clean a battery of four Babcock & Wilcox boilers, with the result that we are now saving 20% on our fuel. We consider it a great machine. Yours truly, (Signed.) O. E. Randolph, Gen. Supt. Union Waxed & Parchment Paper Co., Franklin, Ohio."

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR WEEK ENDING AUGUST 4, 1903.

735,439.—BOTTLE—N. D. Asdell, Lakeview, Or.
735,462.—KILN—W. A. Butler, S. F.
735,207.—GAGE SQUARE—J. Campbell, Cascade, Or.
735,223.—RAIL JOINT—W. S. Dunagan, Everett, Wash.
735,234.—QUARTZ MILL—J. F. Forward, San Diego, Cal.
735,081.—CHECKBOOK—J. Franc, Pasadena, Cal.
735,497.—RANGE FINDER—G. Griffith, S. F.
735,248.—PUMP PISTON—J. Hahn, Los Angeles, Cal.
735,501.—EXTRACTING GOLD—Harp & Starkweather, Stockton, Cal.
735,374.—STAMP MILL MORTAR—J. H. Hendy, S. F.
735,512.—TREATMENT OF ORES—H. Hirschling, S. F.
735,257.—SCRAPER—J. R. Hodgins, Taeoma, Wash.
735,516.—HANDLE—J. M. Horton, Crescent City, Cal.
735,518.—MECHANICAL MOVEMENT—J. H. Hussey, Spokane, Wash.
735,388.—SWINGING SCRAPER—D. B James, S. F.
735,106.—SUCTION PIPE—J. Jorgensen, Seattle, Wash.
735,268.—ADZ—O. Keehme, B shee, Ariz
735 531.—ELECTRIC SWITCH—O. M. Lacey, Hanford, Cal.
735,545.—FLOATING FISH TRAP—L. Mahew, Whatcom, Wash
735,564.—CONVEYER—W. L. McCabe, Seattle, Wash.
735 280.—SPICE BOX TOP—E. B. Millar, Los Angeles, Cal.
735,576.—RAILWAY SWITCH—J. M. Payne, Spokane Wash
735,578.—CANDLESTICK—Peterson & Fielding, Grants Pass, Or.
735,146.—THRESHER—T. Powell, Newhope, Cal.
735,590.—STAMP MILL—G. C. Richards, Berkeley, Cal.
735,600.—COUCH FRAME—A. Shrock, S. F.
735,595.—LOCATING SHIPWRECK—R. Sato, S. F.
735,691.—FISH NET LIFTER—A. F. Sbadel, Lopez, Wash.
735,606.—SEWING MACHINE—D. M. Smyth, Pasadena, Cal.
735,321.—WATER HEATER—F. Walker, Los Angeles, Cal.
735,182.—ELECTRIC HEATER—D. M. Watson, Portland, Or.
735,323.—DIVING APPARATUS—J. L. Watson, Los Angeles, Cal.
735,638.—MOTOR BICYCLE—O. E. Waxel, Oakland, Cal.
735,636.—BRAKE BLOCK—O. Whitmore, San Diego, Cal.
735 638.—PACKACING LIQUIDS—G. O. Wickson, S. F.
735,642.—BOTTLE—P J. Wilson, Ben Lomond, Cal.

Notice of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

SWITCHES FOR SYSTEMS OF REMOTE CONTROL.—No. 735,531. Aug. 4, 1903. O. M. Lacey, Hanford, Cal. This invention relates to improvements in electric switches by which lamps, motors and the like may be conveniently controlled from a point remote from the installation. Its object is to provide a device of few parts and one which is economical in manufacture and simple and positive in operation. One advantage of this switch is that a single operating wire is sufficient where two are usually employed, the opening and closing being done by this one wire, which has its suitable return connection with a source of energy.

STAMP MILL.—No. 735,590. Aug. 4, 1903. G. C. Richards, Berkeley, Cal. This invention consists in a mechanism for actuating the stamp, a means for adjusting the stamp stem and shoe, means for regulating the position of the actuating lever to vary the drop of the stamp and adjusting each stamp and stem independently, and means for raising the stamp stems for the purpose of replacing the shoes when old and worn out.

STAMP MILL MORTAR.—No. 735,374. Aug. 4, 1903. J. H. Hendy, San Francisco, Cal. This invention consists of single independent sectional mortars for each individual stamp, said mortars being arranged side by side upon a sole-plate singly or common to a series of mortars and stamps. Mortars have commonly been made in a single piece and are very heavy; the object of this invention is to so construct the mortars that they may be taken to pieces and reduced to the smallest possible weight, so that they can be transported by pack animals.

DETACHABLE COLLAPSIBLE COUCH FRAME.—No. 735 600. Aug. 4, 1903. Amos Schrock, San Francisco, Cal. Sofas, couches, etc., are usually made with wooden frames or bases, so joined together that there can be little reduction in size for shipping purposes. The object of this invention is to provide a couch with a separable iron frame and means by which the frame can be folded into a small compass when desired.

Latest Market Reports.

SAN FRANCISCO, August 14, 1903.

METALS.

SILVER.—Per oz., Troy: London, 25 9/16d (standard ounce, 925 fine); New York, bar silver, 54¾c, refined (1000 fine); San Francisco, 54¾c; Mexican dollars, 42c San Francisco, 42c New York.

COPPER.—New York: Standard, $13.12½; Lake, 1 to 3 casks, $13.00@13 12½; Electrolytic, 1 to 3 casks, $13.62½@13.75; Casting, 1 to 3 casks, $12.75; San Francisco: $13.00. Mill copper plates, $17.00; bars, 18@24c. London: £58 5s spot per ton.

Calumet & Hecla Co. is evidently endeavoring to raise the price of copper or has none for sale at present prices.

It is reported that the Calumet & Hecla is offering no copper under 13¾c Having recently sold a large amount of copper for future delivery at 13c or a little better, is now apparently out of the market.

European consumers have followed the policy of buying from hand to mouth, and are said to be running on short supplies. Copper in England and France for the first half of 1903 is returned at 51,102 tons, against 70,969 tons for same period in 1902, and 54,818 tons for the first six months of 1901. The official German returns for the first months of this year show a consumption of foreign copper (pyrites excluded) of 31,848 tons against 30,223 tons in the same months of 1902 and 23,561 tons in 1901. A distinct improvement is thus evident in Germany.

LEAD.—New York, $4.20; Salt Lake City, $3.50; St. Louis, $4.00; San Francisco $4.50, carload lots; 4¾c 1000 to 4000 lbs.; pipe 5½, sheet 6, bar 5½c; pig, $4.75. London: £11 1s 6d per long ton=2.75c per lb.

SPELTER.—New York, $5.87½; St. Louis, $4.85; London, £20 5s per ton; San Francisco, ton lots, 6¼c; 100-lb lots, 7c.

ANTIMONY.—New York, Cookson's, 9¾c; Hallett's, 8½c; San Francisco, 1000-lb. lots, 7½c; 300 to 500 lbs., 7½c; 100-lb. lots, 10c.

TIN.—New York, pig, $28.25@28.70; San Francisco, ton lots, 28½c; 500 lbs., 29c; 200 lbs., 29½c; less, 30c; bar tin, ℔ lb, 30c @32½c. London, £128 5s spot.

PLATINUM.—San Francisco, orude, $18.00 ℔ oz.; New York, ingot, $19.00 per Troy oz. Platinum ware, 75@80c per gram.

QUICKSILVER.—New York, $44.50@46.00; large lots; London, £8 15s; San Francisco, local, $44.50 ℔ flask of 76½ lbs.; Denver, $49.50. Export, $43.50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 34c.

SOLDER.—Half-and-half, 100-lb. lots, 18.75c; San Francisco, Plumbers', 100-lb. lots, 15 50c.

NICKEL.—New York, 50@60c ℔ lb.; ton lots, 45@48c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, $18.85 @19.00; gray forge, $17.10; San Francisco, bar, 3c ℔ lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $27 00@29.00; open hearth billets, $28.00; San Francisco, bar, 7c to 12c per lb.

CHICAOO CURRENT QUOTATIONS.

Bessemer	$18.50@19.00
Foundry Northern 1	18.00@18.50
Northern 2	17.50@18.00
Northern 3	17.00@17.50
Southern 1	17.35@ ——
Southern 2	16.85@ ——
Southern 3	16.35@ ——
Forge	15.85@ ——
Charcoal	20.50@21.00
Billets, Bessemer	28.00@29.00
Bars, iron	1.65@ ——
Bars, steel	1.75@ 1.80
Ralls, standard	28.00@30.00
Ralls, light	34.00@40.00
Plates, boiler	1.90@ 2.00
Tank	1.75@ 1.80
Sheets, 26 store	2.90@ 3.00
No. 27	2.90@ 3.00
No. 28	3.00@ 3.10
Angles	1.75@ ——
Beams	1.75@ ——
Tees	1.80@ ——
Zees	1.75@ ——
Channels	1.75@ ——
Steel melting scrap	16.00@16.50
Relaying ralls	29.00@31.00
Dealers forge	13.50@14.50
No. 1 railroad wrought	14.50@15.00
No. 1 cast, net ton	14.50@15.50
Iron ralls	19.00@20.00
Car wheels	20.00@21.00
Cast borings	5.50@ 6.50
Turnings	11.00@12.00

LUMBER.—(Retail): Pine, ordinary sizes, $20.00@22.00; extra sizes higher; redwood, $22.00@23.00; lath, 4 feet, $4.25 @4.50; pickets, $19.50; shingles, $2.35 for No. 1 and $2.00 for No. 2; shakes, $13.50 for split and $14.50 for sawed; rustic, $26.00 @32.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, $3.25; Cut, $3.35; 10d to 16d, Wire, $3.35; Cut, $3.35; 8d, Wire, $3.40; Cut, $3.40; 6d and 7d, Wire, $3.50; Cut, $3.50; 4d and 5d, Wire, $3.60; Cut, $3.60; 3d, Wire, $3.75; Cut, $3.75; 2d, Wire, $4.00; Cut, $4.00. Special rates for carload lots.

LIME.—Santa Cruz, $2.25; Roche Harbor, $2.25 per bbl.

CEMENT.—Germania, $2.50 @ 2.75; Hewmoor, $2.90; Trowell, $2.90; Portland, $2.50@2.75 per bbl.

GENERAL SUPPLIES.

POWDER.—F. o. b. San Francisco: No 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10½c ℔ set; 14 oz., 40s., 9½c.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 24@25c ℔ lb.: carloads, 23@24½c; in tins, 35c; soda ash, $2.00 ℔ 100 lbs.; hyposulphite of soda, 2½@3½c ℔ lb.; caustic soda, in drums, 3@3½c ℔ lb; Cal. s. soda, bbls., $1.25@1.50 ℔ 100 lbs.; sks., $1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb tins; borax concentrated, 7@8c ℔ lb.; roll sulphur, 4@6c; powdered sulphur, 2@3c; flour sulphur, Fronch, 2@3c; alum, $2.00@2.25; California refined, 2@2½c; sulphide of iron, 9c ℔ lb.; copper sulphate, 5@7c; chloride of lime, spot, $2.50@2.75; sulphuric acid, in carboys, 66% B, 2½c ℔ lb.; nitric acid, in carboys, 8c ℔ lb.

OILS.—Linseed, boiled, bbl., 44c; cs., 49c; raw, bbl., 42c; cs., 47c; Lucol oil, boiled, bbl., 41c; cs, 49c; raw, bbl., 39c; cs, 49c. Kerosene—Pearl, per gal., 20½c; Astral, 20½c; Star, 20½c; Extra Star, 24½c; Eocene, 23½c; Elaine, 26½c; Water White, in bulk, 14½c; Mineral Seal, iron bbls., 18½c; wooden bbls., 21c; cs, 24c; Mineral Sperm, cs, 26½c; Deodorized Stove Gasoline, bulk, 17c; do., cs., 23½c; 86° Gasoline, bulk, 21c; do., cs., 27½c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 16c; do., in cs., 22½ c; Lard Oil, E. W. S., bbl., $1.00; cs., $1.05; Neats-foot Oil, pure, bbl., 75c; cs., 80c; Sperm, crude, 70@60c; Natural White, 65c; Bleached do, 50c; Whale Oil, cs, 50@55c.

COAL.—San Francisco, coast, yard prices: Wellington, $8.00; Seattle, $6.50; Coos Bay, $5.50; Southfield, $8.00. Cargo lots, Eastern and foreign: Wallsend, $6 .50 Brymbo, $7.50; Pennsylvania, bd., $14. 00 Scotch, $8; Cumberland, $12; Cannel, $9.00; Welsh Anthracite, $11.50; Rock Springs, $9.50, long ton; Colorado Anthracite, $14.00. Coke, $10.50 per ton in bulk, $13 in sacks; Sunnyside, $8.50, long ton.

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6c; less than 500 lbs., per lb., 6½c; in 25-lb. tin pails, ½c per lb. above keg price; in 1 and 5 lb. tin cans, 100 lbs. per case, ½c per lb. above keg price. Dry Lead—In bbls., 1 ton and over, 6c; do. in kegs, 6½c.

RED LEAD.—500 lbs. and over at one purchase, per lb., 6c; less than 500 lbs., 6½c.

LITHARGE.—Pure, in 25-lb. bags, 8 @9c per lb.

BONE ASH.—Extra No. 1, 5@6c per lb. No. 1, 4@5c.

BORAX.—Concentrated, 7@9c per lb powdered, 9@12c; fused, 25@30c.

BORAX.—Crystal, 7c; calcined, 25c.

MANGANESE.—Pure, ℔ lb., 60c.

SODIUM.—Metal, ℔ lb., $1.00.

MOLYBDENUM.—$2 per lb.

MERCURY.—Bichloride, ℔ lb., 90c.

PHOSPHORUS.—(American) ℔ lb., 75c.

SILVER.—Chloride, ℔ oz., 90c@$1.00; nitrate, 55c.

ALUMINUM.—No. 1, 99%, small lots, 37c ℔ lb.; 100 lbs., 35c; 1000 lbs., 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

URANIUM.—Oxide, ℔ lb., $3.50.

ZINC.—Metallic, chemically pure, ℔ lb., 50c; dust, ℔ lb., 10c; sulphate, ℔ lb., .04c.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

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Can be bought at 12c. on the $1. The machinery is of the highest type and in good condition.

One 200 h. p. Corliss Type Engine. Two Safety Tube Babcock & Wilcox Boilers, about 250 h. p. One 800-lb. High Mortar 40-etamp Mill, rapid drop. One 9x15 in. Blake Crusher. Eight Tullock Automatic Ore Feeders. Twelve Double-end 3-Compartment Hartz Jigs. One 4-Compartment Single Hartz Jig. Six Sets Revolving Screens, all housed in. Two Sets of Elevators, complete. All necessary Shafting, Pulleys, Boxes, Belting and most of the piping, etc. This plant has been used very little. It cost $100,000; if sold at once, will take $12,000 for it. Located on the D. & R. G. Ry.

S. S. MACHINERY COMPANY,
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HOISTING ENGINE AT HALF PRICE

Abeolutely new, in perfect condition, made on order but found to be not ae well euited to the peculiar conditione exieting at that mine as one of our other typee, which we built and shipped in ite place. Thie engine, which we offer at 50% of its first coet, ie one of our etandard double friction drum, link-reversing motion engines, with brake bands, 130 h. p., 14x24 cylinders and 64-inch drums. Dozens of thie type are in mining use. If desired, we will make changee in this engine to meet special needs. Write at once for illustration and full detaile, etating your requirements, or

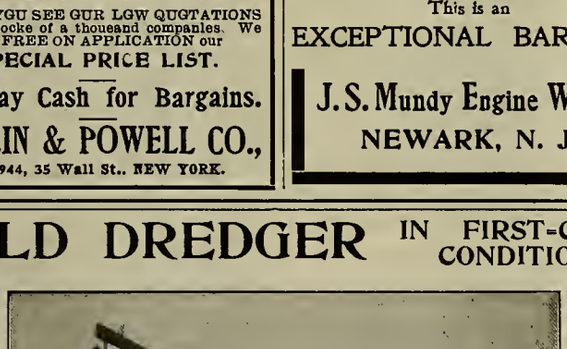
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OUR BARGAIN COLUMN.

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Four carloads of eecond hand wire holeting rope put up on reels; in first-class condition. Sizee 1, 1¼, 1⅜ and 1½-inch. Write for pricee.

PIPE.

Gor etock of good standard black eecond hand pipe, with gnaranteed threade and couplinge, as follows:

100,000 feet	1	inch, per foot	$ 03¼
200,000 "	1¼	" " "	04¼
50,000 "	2	" " "	07¾
200,000 "	2½	" " "	10
50,000 feet	1	inch EXTRA HEAVY, per foot	$ 04
55,000 "	1¼	" " " "	05½

800 feet	8	inch, with flangee, per foot	$ 70
400 "	10	" " " "	1 10
1,800 "	12	" " " "	1 45
1,400 "	14	" " " "	1 75
600 "	18	" " " "	2 00
200 "	18	" " " "	2 25

WROUGHT IRON CASING.

Second hand, THREADED ENDS AND SCREWED COUPLINGS:

3½-inch, per foot	$ 09
4 " " "	13

Fitted with EXPANDED CAST IRON FLANGES AND BOLTS:

2½-inch, per foot	$ 04½
3½ " " "	10
4 " " "	13

10,000 feet 3 inch GALVANIZED SPIRAL RIVETED, per foot $ 07

CURVED PIPE.

We have in etock two carloads of heavy etandard black pipe fitted with cast iron, riveted flanges, which is curved from ⅛ to ¼. Sizes 8, 10, 12 and 14-inch. It is in good condition and will be sold at low prices.

RADIATION.

100,000 feet eecond hand caet iron radiation, per foot..... $ 18

200,000 feet second hand wrought iron radiation, per foot..... 16

Also valvee, heaters and all necesear apparatus.

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8 and 12x10¼x10 Worthington compound duplex.
18x8½x10 Worthington etandard duplex.
7¾x8¼x8 Worthington.
14 and 20x6x18 Worthington compound.
8x5¼x5 Worthington
8x4x6 Worthington.
4½x2¾x4 Worthington.
5¼x3¼x8 Worthington.
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4 H. T. Davidson No 10 pumps, with Fleher governor; suction 7 in., discharge 8 in.
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Slisbe rotary fire pump
8x4x8 Knowles single acting.
8x6x10 Holly single.
7x4½x7 Crane
7x4½x7 Canton duplex.
14x7x12 Dean single.
12x8x18 Norwalk.
8x5¼x10 Gaskell.
7x4½x10 Smedley.
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No. 2 Buffalo jet condenser, complete with air pump and receiver, up to 250 H. P.
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No 4 Morris horizontal, with friction pulley.
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5x8 Clayton steam driven.
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24x12x24 steam driven

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3—3½-inch Ingereoll, for steam.
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1—Sullivan "M" diamond prospecting core drill, with complete outfit, boiler and pump.
1—Sullivan "E" diamond prospecting core drill, with complete outfit; bit eet with 8 pieces of carbon

ENGINES

12x30 Hamilton-Corliss.	10½x12 Armington&Sims
30x60 Fraser & Chalmers Corliee	9½x12 Armington & Sims
22x48 Allis-Corliee	18x16 Hendy.
22x48 Wheelock-Corliee.	18x18 Rice.
18x32 Allie-Corliss.	7½x10 Hendy.
18x36 left hand Corliss.	14x24x14 Westinghouse.
16x30 Buckeye.	13x30x16 Westinghouse.
15½x15 Armington&Sims	13x24x13 Westinghouse.
14x15 Armington & Sime.	11x19x11 Westinghouse.
14x20 Rice.	90 H. P. Otto gas engine
18x24 Atlae.	50 H. P. Lamhert gas engine
13x12 New York Safety.	50 H. P. Lewis gas engine.
14x13 Armington & Sime.	

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1—32x60, 700 H. P., Wetherel Corliss, R. H.
1—28x60, 500 H. P., Hamilton Corliss, R. H.
1—28x60, 500 H. P., Hamilton Corliss, L. H.
2—22x36x60, 500 H. P., Fraeer & Chalmere Cross-Compound Condensing.
1—18x34x18, 400 H. P., E. P. Allis Croee-Compound Corliss.
1—16½x25x30, 350 H. P., Buckeye Cross-Compound Corliss.
1—18x42, 225 H. P., Fraser & Chalmers Corliss.
1—16x42 185 H. P., Hamilton Corliss.
1—10x16, 50 H. P., Atlas Automatic.
1—10x12, 50 H. P., New York Safety Automatic.
1—10x11, 50 H. P., Westinghouse Automatic.
1—8½x10, 30 H. P., Armington Sims Automatic.
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1—14x18, 85 H. P., Bay State Slide Valve.
1—12x24, 60 H. P., Howard Iron Worke Slide Valve.
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1—9x12, 20 H. P., Colorado Iron Works Slide Valve.
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1—6x8, 8 H. P., Crow Slide Valve.
1—5x5, 6 H. P., Crow Slide Valve.
1—10x10, 30 H. P., Willard Ver. SlideValve.
1—8x8, 14 H. P., Nagle Ver. Slide Valve.
1—7x8, 12 H. P., Willard Ver. Slide Valve.
1—6x6, 7 H. P., Murray Ver Slide Valve.

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3—60 H. P., Horizontal Tubular.
2—50 H. P., Horizontal Tubular.
1—45 H. P., Horizontal Tubular.
2—40 H. P., Horizontal Tubular.
2—30 H. P., Horizontal Tubular.
4—25 H. P., Horizontal Tubular.
1—15 H. P., Horizontal Tubular.
1—15 H. P., Locomotive Type.
1—10 H. P., Locomotive Type.
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3—15 H. P., Vertical Tubular.
4—10 H. P., Vertical Tubular.
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MINING AND SCIENTIFIC PRESS

Whole No. 2248.—VOLUME LXXXVII. Number 8. SAN FRANCISCO, CAL., SATURDAY, AUGUST 22, 1903. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Variations in Construction.

Each mine superintendent has his own ideas about construction details of head-frames and other structures, and although these ideas, as represented in the various types of frames seen at shafts throughout the mining regions often vary considerably from the ideas of those of mechanical engineers, these frames generally answer fully all requirements. In some instances the frames are built with reference to the material available for their construction. In other cases, they are framed for strength, and are capable of sustaining twenty or even fifty times the load ever put upon them. In such instances the trained engineer would economize material and labor. It is no uncommon thing to see a massive head-frame of 12x12 timbers with a ⅝-inch rope over the sheave wheel. A two-post wheel is the most economical for capacity and general utility that can be built. The accompanying illustrations are of two frames in widely separated mining districts, one in Mexico, the other in Oregon. The latter, which is at the Gold Pan mine near Sumpter, Or., presents a most unusual arrangement at the top of the frame, and while no explanation is offered by the manager of the mine, it has the appearance of being an alteration from an original plan. By letting a tie into the main posts and setting two short upright posts between the cap and tie, between which the sheave could have been placed supported on post boxes, the "back framing" could have been dispensed with. This would throw the sheave forward, probably too far, but if this be the case it should have been anticipated and the main posts set back accordingly. The entire structure presents an interesting study in head-frame construction and the jointing appears to be all that could be desired. The bucket is dumped at the side into a chute, into which the waste or ore is delivered into a car. A "jack head" pump has been installed, run by belt from the engine within the hoist building.

In comparison, the frame illustrated in the smaller picture, one of those at Cananea, Mexico, shows the latter built from the surface of the ground, whereas the Oregon frame is supported on a superstructure of posts and sills. Apparently at the Mexican shaft the ore is dumped directly from the skip or bucket into the car, though the illustration does not show clearly how this is accomplished. This frame is provided with side braces to reduce vibration and secure safety, and the Oregon frame is supplied with guy wires for a similar purpose. All of the several types of construction shown herein from time to time are interesting and instructive to miners throughout the mining regions everywhere.



Head Frame at Gold Pan Mine, Near Sumpter, Oregon.



Head-Frame, Cananea, Mexico.



Cape York, Alaska. (See Page 117)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION.

United States, Mexico and Canada.....$3 00
All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

BRANCH OFFICES:

NEW YORK CITY, 720 Park Row Bldg. BOSTON, 42 Worcester Square.
CHICAGO, 1115 Monadnock Block. DENVER, 606 Mack Block.

J. F. HALLORAN..... Publisher

San Francisco, August 22, 1903.

TABLE OF CONTENTS.

ILLUSTRATIONS: Page.

Head Frame at Gold Pan Mine, Near Sumpter, Oregon.....109
Head Frame, Cananea, Mexico.....109
Cape York, Alaska 109
Quartz Cropping—The May Rock, Mariposa Co., Cal.....112
Electrolytic Generator.....114
Timber Stand for Six Series of Spitzkasten.....116-117
Mining and Metallurgical Patents..... 119

EDITORIAL:

Variations in Construction.....109
Specimen Stealing.....110
Labor Troubles Retarding Investment.....110
The Cheap Labor Problem.....110

MINING SUMMARY..... 120-121-122-123-124

LATEST MARKET REPORTS.....125

MISCELLANEOUS:

Concentrates.....111
Some Structural Features of the California Gold Belt..... 112
Tungsten, Molybdenum, Uranium and Vanadium.....112
Production of Quicksilver in 1902 112
Ore Grades in the Witwatersrand.....113
Some Experiences of a Working Miner.....114
Electrolytic Generator.....114
The Determination of Lead in Ores 114
Production of Borax in 1902.....114
Notes on the Metallurgy of Copper of Montana.....115
Modern Methods in Ore Treatment by Cyanidation..... 116
Petroleum Briquettes..... 117
Tin in the United States.....117
Flow of Water Over the Yosemite Falls.....118
Electric Manufacture of Ferrosilicon.....118
Jade in China.....118
Increasing Temperatures With Depth.....118
Miners' Unions and Miners' Wages.....118
Mining and Metallurgical Patents..... 119
Personal..... 124
Commercial Paragraphs..... 124
Catalogues Received.....124
Obituary.....124
New Patents..... 124
Notices of Recent Patents.....124

Specimen Stealing.

One of the perplexing problems of the Western Australia mine manager is that of preventing the theft of ore rich in gold from the telluride mines of the district. It is said hundreds of thousands of dollars have been stolen by miners within the past few years. This has been taken in the form of specimen ore from the various mines and sold by those taking the same to others who, it seems, have made a profitable business of this illicit gold buying.

Some of these dealers, it is said, have shipped regularly from $2000 to $5000 monthly in gold bars, which could only have come into their possession in the dishonest manner indicated. One curious phase of the affair is that at various times several companies have received through the mails and otherwise sums aggregating thousands of dollars, accompanied by anonymous letters, stating that the money was obtained by the sale of stolen gold specimens—conscience money, in fact—and the companies argue very reasonably, that if this large amount of money is voluntarily returned by those whose conscience pricks them for acts of dishonesty, there is a reasonable probability that a very much larger amount is still retained by others, whose conscience is less sensitive. It is proposed to organize an association similar to that existing in the South African diamond fields, to apprehend the diamond thieves and illicit diamond buyers, who are familiarly known as the "I. D. B.'s." Every mining district where very valuable ore or gems are produced has the same experience. In America about the only attemp, made to check this sort of thing is a careful searching of the men at the mine change houses, but this is not always effective.

THE cheap labor problem continues to be the one feature of interest in the mines of the Rand, South Africa. The latest reports show that the "receipts" of natives are slightly greater than the discharges and desertions. The mines have agents seeking natives throughout Africa who will voluntarily go to work in the mines; but there is objection to this in the countries from which it had been hoped to renew the supply. While there are many mine managers who are willing to employ Chinese, there is a popular sentiment against it. Not only the mines but the farms are short of the necessary laborers. From among the teeming millions reported to inhabit central Africa there should be no difficulty in recruiting sufficient laborers, but such seems not to be the case.

Labor Troubles Retarding Investment.

One of the most serious phases of the long continued labor disturbances is the effect it is having on capital usually available for mining investment. From various Eastern, as well as Western cities, comes the same expression of fear to invest in mining enterprises in either the United States or British Columbia. It has been clearly and repeatedly demonstrated that the development of the industry is being retarded by these frequent clashes between owner and operator and the Western Federation of Miners. Capital does not feel secure under such conditions and is withheld until the storm is past. Men of means are not accustomed to having their employes run their business entirely, preferring to have something to say in the matter themselves. The position taken by the unions — that of placing all men engaged in any particular branch on a parity has never been successful, and can never be so for any considerable length of time, as it is contrary, not only to custom, but to the dictates of common sense. All men may be created equal, but they do not long remain on this common plane. Some are sure to advance more rapidly and become superior to others, and this is true in every walk in life.

Investors ask, "is there anything good in Mexco?" A review of the mining situation the past few months shows that an enormous amount of capital has been diverted from investment in mining enterprises in the United States to Mexico, and the reason for it can be found in the repeated and long-continued troubles between labor and capital here. Gold mining is unlike any other business. The manufacturer may be obliged to submit to the dictation of his workmen, but not so the gold miner, and when the unions become too unreasonable in their demands, the mine owner simply closes his mine, locking up the gold in the unworked stopes of the mine, and quietly waits.

The principal feature of the week, or at least that which attracts most attention from miners of the West, is the renewal of trouble between the Western Federation of Miners and the mine and mill owners and United States Reduction and Refining Co. in Colorado. The difficulty was resumed at Colorado City two weeks ago and has been carried again into the Cripple Creek district, where there are now about 4000 miners, and other workers dependent upon the operation of the mines, out of employment.

For months past a state of unrest has existed throughout the mining regions of the West. Strikes have been numerous, but in most cases the differences have been adjusted, temporarily at least, and work has proceeded as before. In some instances the miners were successful, in others they lost, and scattered throughout the West. One of the managers of the Western Federation, having been worsted in his efforts in Arizona, hastened to California, where at Jamestown, Quartz and Stent, in Tuolumne county, he is said to have advised the men who are on strike there, who were single, to go at once to Clifton and Morenci, where they could take the place of the strikers who were refused employment, thus giving the resident miners in Tuolumne county "a chance to win." This is a single example of the manner in which these strikes are engineered.

In Amador county, California, the scene of a recent strike which ended to the advantage of the union, there is now trouble between the miners and the engineers, carpenters, and other topmen, who have organized themselves into a separate organization, and it is reported a strike is daily expected there in consequence.

In southern Nevada and southern California the strike, in which the principal mines of that region are involved, continues. Where there were about 400 miners in Randsburg district, there are now about twenty. At Searchlight, Nevada, a similar condition prevails. The mine operators who are organized there remain firm in their announced determination to keep the mines closed until they can operate them without interference from the organized miners.

In British Columbia the coal miners' strike on Vancouver island was lost. The threat of the owner, Dunsmuir, to put Chinese in the mines, together with the fact that the Western Federation did not supply the promised financial aid to the men who were out, resulted in the miners renouncing the Western Federation and returning to work, having gained nothing. On Texada island, above Vancouver, the miners of the Marble Bay Co. of Tacoma, Wash., associated themselves with the Western Federation, and demanded eight hours for miners and nine hours for topmen, at the same wages as was previously paid for ten hours. The owners refused to entertain the proposition and promptly closed the mines, which had been shipping steadily for the past three years.

In the case of the Cripple Creek strike, opinion is divided, as usual, but the consensus of opinion is that the miners had no grievance, and that the strike is purely of a sympathetic nature, intended to assist the striking mill and smelter men to win at Colorado City. The mine owners and reduction works managers are organized, and declare that the conditions under which the industry has been carried on the past year must terminate one way or another, and they have determined to shut down and continue closed until the miners come to their senses. In most of the largest mines of Cripple Creek district the union wages are paid, eight hours constitute a day's work, and all conditions demanded by the Western Federation have been practically complied with, excepting that some men are employed who are not members of the Federation, and that the Western Federation or its representatives are not officially recognized. The merchants and other business men are not generally in sympathy with the methods of the Federation, and have inaugurated a cash system in the stores, which means that the merchants do not intend to carry the strikers, and that the miners will be forced to receive financial support from the Federation or stand the expense of the strike individually, which a large percentage of them are unable to do. The miners of Cripple Creek are losing time, or money, at the rate of about $12,000 a day. The mine owners sustain a nominal loss, but the gold still remains in the veins, to be recovered at some subsequent time, when conditions are more favorable than at present. Merchants, railroads, and others with capital invested in the region must incidentally sustain more or less loss, though in no manner a party to either side of the dispute.

The Cripple Creek drainage tunnel is one of the most important undertakings in the district at the present time, and the mine owners are anxious to have this completed, in order that the mines underneath which it passes may be drained during the present trouble, there remaining but 90 feet unfinished when the strike began. Late dispatches announce that fifty miners have gone to work in the El Paso mine under armed guard. The drainage tunnel is being partly driven from the bottom of the El Paso shaft, and a portion of the men now at work there will advance the headings with all possible speed. It is stated that this attempt to operate under an armed guard is intended as a test of strength, and, if no interference results, other mines will follow the example of the El Paso Company.

That in the majority of cases the miners are being misled there seems little doubt. When the mines pay the wages and hours demanded, and otherwise comply with the wishes of the Federation, and the only excuse for a strike is the fact that mine managers refuse to recognize the Federation officially and deny the agents of the union permission to openly go into the mines and proselyte for membership, there is something radically wrong. Evidently this struggle will be "to a finish." It means complete victory for the Western Federation of Miners in the Cripple Creek region or their disorganization there and in many other places. Whichever way the tide of this battle may turn, it will doubtless have a direct and powerful influence on the labor situation throughout the mines of the West.

CONCENTRATES.

THE rubber sheets, known as sheet packing, may be more easily cut if the knife be dipped frequently in water during the process.

CARBONATE OF SODA will neutralize the acid water so hurtful to the boiler. It may be added in the proportion of one grain per gallon for each degree of acidity in the water.

THE Chilian mill is employed where it is necessary to grind ore very fine. The capacity varies with the size of the mill, weight of grinding wheels, power applied and screen used.

AT THE Broken Hill Proprietary mine, Broken Hill, New South Wales, 58,320 cubic yards of waste were broken in the open cuts for filling in underground stopes during the half year ending May 31, 1903.

CAREFUL experiments in sizing pulp from mill batteries before sending it to concentrating machines indicates that by proper arrangements in this direction in many instances canvas slimes plants may he dispensed with.

IN some canvas plants the grade is fixed at three-fourths of an inch to the foot, but experience has shown that to accomplish the most satisfactory results the grade should be adjustable, though few tables are so arranged.

TALC of good variety is worth in the Eastern markets at the place of production from $6 to $8 per ton. It is used largely in the manufacture of some kinds of paper, and in ornamenting wall paper, and also in the manufacture of tips for gas and acetylene burners.

THE greatest depth from which ore is being hoisted on the Rand, South Africa, is about 2500 feet, but there are deeper shafts than this which are sinking to reach the banket. Some of the latter approximate 4000 feet in vertical depth.

THE usual grade of a placer sluice box is 8 inches to the 12-foot box. If the gold be very fine a lighter grade may do better, though a longer line of sluices may be necessary. Twenty inches, or 30 cubic feet of water per minute, is usually considered a "sluice head" in placer mining.

THE limit of successful electrical power transmission does not seem to have been reached, and it would be difficult to even approximately indicate what that limit might be. In California, as a commercially profitable business proposition, 40,000 volts are transmitted over 200 miles.

THE San Roque placers are in Lower California, and were discovered in the summer of 1900. A large number of men stampeded to that section only to be disappointed—as usual the mines were not profitable—though gold actually did exist in small quantities in the alluvial of the district.

OCCASIONALLY gold ores are met with which are not "free" and which contain no sulphurets. Such ores usually contain also chloride of silver in addition to the gold. Some ores of this character after treatment with byposulphite of soda will yield a large percentage of gold by amalgamation.

THE rock specimen from Ibapah, Utah, is quartz with yellow scales of wulfenite (lead molybdate), and the green crystals are pyromorphite, a composition of lead, chlorine and phosphorous pentoxide. The phosphorous is sometimes replaced by arsenic, and with increasing arsenic it passes over to minette.

THE angle of inclination of a working shaft should not be changed if it is possible to avoid it. Hoisting can be more speedily and economically accomplished through a straight shaft than through one sunk at a variable angle. On no account should the alignment be changed, no matter what changes may be made in the angle of dip.

THE Western Federation of Miners originated in Montana in 1878. It has since extended its influence into every mining State of the West and into almost every camp, including British Columbia, and recently an attempt was made to carry the work of organization into Mexico, but as far as learned without marked success thus far.

THE number of holes to be drilled in a shaft to constitute what is known as a "round" must be determined by the size of the shaft and character of the rock. The proper depth of each hole must be judged by the miner himself or by the foreman. The direction of the holes is determined by the pitch of the formation and jointing planes.

ORDINARILY there is some loss and error in a fire assay. Such loss is an indeterminate quantity. With a gold ore going one-half ounce to the ton the loss will sometimes run as high as 3% to 5%; with an ore going one ounce to the ton the loss may vary from 2% to 3%; with a four-ounce ore, 1% to 2%. A one-ounce silver ore may lose 10% to 12% during an assay; a ten-ounce ore, 6% to 7%; a 100-ounce ore, 4% to 5%.

THE rock specimens from Terrazas, Mexico, are pitchstone porphyry, also known as vitrophyre. It is a variety of volcanic glass and commercially worthless. Pitchblende is a different mineral, having a sub-metallic to dull lustre; is grayish, greenish, brownish to velvet black. Not so hard as the pitchstone, which readily scratches glass.

THE cost of treating sulphides in California, as at other places, varies with the character of treatment, and to some extent with the value of the ore, particularly when the concentrates are shipped. The costs are: Concentrating and delivery to drying floor; sacking; cost and wear and tear of sacks; transportation, usually both by wagon and rail; treatment charges and discounts of smelter or mill treating the ore.

THE use of gold amalgam instead of quicksilver alone in pan amalgamation has proven very beneficial in working some gold ores by pan amalgamation, particularly if the ore be ground in arrastras instead of iron pans. It appears, according to Stetefeldt, who experimented along these lines in Mexico, that contact of iron during pan amalgamation is detrimental, though no satisfactory reason has been assigned for this.

THE roasting of ores as preliminary to chlorination has for its object the expulsion by burning or volatilization of the sulphur, arsenic, antimony and other volatile substances in the ore. This is usually accomplished in a reverberatory furnace. Wood or oil is usually employed as fuel—the latter is the better, as the flame can be regulated with more exactness and the sulphides can be completely roasted in less time than by the use of wood. The ordinary hand reverberatory (single hearth) has a capacity of 2½ to 5 tons in twenty-four hours, dependent somewhat upon the size of furnace, character of ore and kind of fuel used. The cost per ton ranks with size of furnace, cost and kind of fuel and cost of labor.

THE impact water wheels of high efficiency which are in use to-day are the outcome of long years of experiment. The original impact iron wheel was known as the "hurdy-gurdy." It was an imperfect device, as compared with the improved wheels of the present day, but it had a much higher efficiency than any form of wheel previously introduced. The force of the water exerted on the bucket of an impact wheel depends on the velocity of the water and the form of its path, and also on the extent to which it is deflected from its original course, and on the angles of entrance and exit from the bucket, and not largely on the form of the curve, assuming the latter to be continuous and the curvature not too abrupt.

SILVER PLATES would probably give better satisfaction for the purpose of amalgamating gold ores in stamp mills than silver-plated copper plates, but mill men and mine owners object to the outlay of money necessary to provide the silver plates, and yet silvered copper plates, or even raw copper plates, after a few years use on ore of medium grade become more valuable than the silver plates would be when new, by reason of absorption of gold. Plates have been known to absorb hundreds of dollars in gold, while presenting practically the same appearance as when new. The best amalgamating surface on a plate is a coating of gold amalgam, but most mill men are too anxious to secure a good cleanup to allow the gold to accumulate any more than absolutely necessary.

THE first attempt to extract gold from its ores by use of cyanide of potassium solutions was made in 1867 by J. H. Rae, who took out a patent on his process. This patent also included the use of electricity in the process. In 1880 J. W. Simpson obtained a patent for treating ores containing gold, silver and copper, by employing a solution of cyanide of potassium 3% and ammonium carbonate 0.19%. Copper was to be extracted with the gold. If silver were present sodium chloride was to be added to the solution. This process never came into use, as it was not based on sound reasoning, and the chemical reactions taking place in the solutions by the addition of ammonium carbonate were rather a detriment than an advantage, as it decomposed cyanide rapidly. The gold was precipitated on a plate of zinc.

A LEAKY JOINT on a pipe line under heavy pressure may usually be remedied by placing a broad steel band (4 to 6 inches wide, according to size of pipe) about the joint and drawing it up close with a suitable threaded clamp. The edges of the band should be turned upward slightly before placing on the pipe. When in place narrow strips of lead should be carefully caiked beneath the band entirely around the pipe. This will generally stop the leak, but great care is necessary. The blows of the hammer on the calking tool must be gauged with much care, as after getting the leak practically stopped an unnecessarily heavy blow may undo the careful work of an hour. Every pipe line should be provided with expansion joints to make allowance for expansion due to changes of temperature, and this whether the line be a conduit for water, air or oil.

THERE will always probably be two divisions into which will go those who discuss or study the genesis of ore deposits. In the one division will be found those who busy themselves with the natural phenomena found in the field and the mine; the other will confine their work mostly to the reproduction or analysis of the operations of nature in the laboratory. The former collects isolated facts; the latter assimilates them to later reproduce them in regular and concrete form. To attempt in the limits of a "concentrate" to discuss the genesis of ore deposits would be like an effort to compress the Sierras into a nutshell. Ores or ore deposits may be generally classified as of direct igneous origin, or as deposited by underground water, or the direct result of the process of sedimentation. Circulating underground waters constitute the source of many metalliferous deposits. The subject is a most interesting one and has been exhaustively discussed by many able writers.

IT is probable that the crust of the earth is solid to a depth of about 25 miles. Below that, under a pressure of 10,840 atmospheres and a temperature of 1200° C., the hitherto solid rocks begin to assume the liquid state, while at a depth of 200 miles the heat must be sufficiently great to raise most known substances to their "critical point." (The critical point of a substance is that temperature above which the substance remains gaseous, irrespective of the pressure to which it is subjected.) Below a zone bounded by the highest and lowest critical points of the substances present in that zone the whole interior of the earth must, therefore, be gaseous, but subjected to a pressure so inconceivably great as to become a highly viscous and incompressible mass, so rigid and so incompressible as to behave in all respects like a ball of steel.

THE term "porphyry" is one applied by miners indiscriminately to light colored rocks for which they know no better name. These rocks are usually of igneous origin, though not always so. The word porphyry means purple, and was applied to the purple porphyry of Egypt, a rock from which many monuments and obelisks were made. The term now has a structural significance only and is applied to rocks in which distinct crystals of mineral occur in a finer-grained mass. This ground mass (or back ground, as it might be called) may be coarse or fine, but the porphyritic crystals must be relatively larger. There is quartz-porphyry, feldspar-porphyry, hornblende-porphyry, granite-porphyry, etc., the prefix always indicating the character of the large crystals or phenocrysts. Dark colored basic rocks, with porphyritic structure, are called porphyrite, as diorite-porphyrite, diabase-porphyrite, etc.

THE thickness of a slime cake in a filter press would be determined largely by local conditions, the kind of ore, the fineness of crushing, etc. A 3-inch cake is usually considered none too thick. In treating slimes by filter presses there are two methods in ordinary use. In one the slimes, having been separated from the sands by means of spitzlutten and afterwards settled in V boxes and settling vats, are agitated with weak cyanide solution of requisite strength, and when the solution of the gold is complete the pulp is forced into the presses to separate the gold-bearing solution from the slimes, weak wash solution or water being subsequently forced through the cakes to displace the remaining gold-bearing solution. In the second method the solution of the gold is effected entirely in the filter presses, without previous agitation with KCy solution, by first charging the press with slimes and then forcing cyanide solution through the slime cakes until the maximum possible amount of gold is obtained, then displacing the gold solution by weak wash or water. The cost of single-filter pressing would run about $1.50 per ton of dry slimes.

THE linings of copper converters is one of the most important matters in converter practice. During the process of "blowing up" the copper in the converter the ferrous oxide, which forms during the combustion of the matte, robs the lining of the converter of the silica it contains to form slag. As the lining is destroyed during the converting process it has to be frequently renewed. The material from which converter linings is made is quartz and clay, the latter acting merely as a cementing medium to hold the grains of quartz together, as it must stand the force of the blast and the surging of the molten metal. The quartz must be pure silica, but experience has demonstrated that white barren quartz is preferable to siliceous ores. No quartz containing less than 98% silica is satisfactory. Many experiments have been made on the size of quartz grains to determine which was the best for use in converters, and it has been found that the quartz rock crushed in rolls so that it will pass a ⅝-inch punched trommel is satisfactory—the coarse and fine being mixed together. Linings made of this sort of material have been found more enduring than those of material screened to a uniform size either coarser or finer. Almost any clay of plastic nature is considered sufficiently good for the purpose of linings, fine clay not being absolutely essential. Quartz and clay are dumped in large bins, the clay having been run through a Chile mill and the quartz through breakers and rolls. Two mixtures are used. The lower sections of the converter are tamped with a mixture of two shovels of clay to ten or twelve shovels of quartz, mixed rather dry. The upper portion is lined with a softer mixture, consisting of old crushed linings, to each ten or twelve shovels of which are added two shovels of clay. The linings are rammed in with heated bars. It requires much experience and skill to properly line a converter so it will give the best and most lasting results.

Some Structural Features of the California Gold Belt.

Written for the MINING AND SCIENTIFIC PRESS by W. H. STORMS.

A great deal has been written about the general geology, the veins, and methods of mining and milling on the California gold belt, but comparatively little has been said of some of its interesting structural features, though these often have an important bearing on the economic value and operation of the mines, where unusual geological disturbances occur. That section of the gold belt popularly known as the Mother Lode has its southern terminus near the old village of Bridgeport, in southern Mariposa county, and thence extends northerly, though not absolutely continuously through the counties of Mariposa, Tuolumne, Calaveras and Amador into El Dorado, where it splits up into a series of great vein systems, the outer limits of which are several miles apart, and the characteristic features which distinguish the lode southward are eventually lost, and the Mother Lode practically ends, though in the same general direction—N. W.–S. E.; the gold belt extends northerly, through the counties of Placer, Nevada, Butte, Sierra, Plumas and Shasta, but the vein systems of those northern counties are unlike those of the Mother Lode. The gold belt also extends southward from Mariposa county, but not with those distinctive features that characterize the Mother Lode.

The impression which has been created in the minds of those who never visited and traveled along the



Quartz Cropping—The May Rock, Mariposa County, Cal.

so-called Mother Lode, is, that it is a large and continuous vein 20 to 100 feet or more in width, and extending in a N. W.–S. E. direction for 120 miles, as indicated on the maps. Such, however, is not the case. The lode or, more properly, belt consists of a series of veins, branching, overlapping, and at places disappearing entirely, for considerable distances. Along different parts of the belt the mines are entirely dissimilar from those elsewhere, and usually the character of the inclosing rock has a material influence on the structure, if not the value, of the vein. In the two southern counties of the belt, Mariposa and Tuolumne, and extending northward into the county of Calaveras, the distinguishing characteristics of the lode are the occurrence of a great vein of dolomitic mineral consisting of the carbonates of lime and magnesia and also often of iron. When the first two are alone combined the rock is essentially dolomite, but with the addition of the iron carbonate it becomes ankerite. This rock is usually, though not always, accompanied by a green scaly micaceous magnesian mineral named by Prof. Silliman, mariposite. The dolomitic mineral is seldom gold-bearing to an extent that would constitute payable ore, though there are exceptions, the most noted being at the Rawhide mine in Tuolumne county, near Jamestown, where a small shoot of this rock (ankerite with mariposite and little quartz) was found containing several thousand dollars per ton. The dolomitic vein is accompanied by large flat lenses or veins of quartz which are occasionally gold-bearing and worked at a profit. The quartz contains, besides free gold, auriferous pyrite. The value of this rock is very variable, ranging from a few cents to many dollars per ton. The quartz occurs along the sides of the dolomitic vein, which is from 15 or 20 feet to over 300 feet in width, and sometimes large lenses of quartz are found at intermediate points between the defining walls of the dolomite. (See accompanying illustration.) Often the quartz lenses are found crossing the lode at an angle. Small quartz veins and veinlets are of frequent occurrence, connecting the larger quartz masses. Free gold is not infrequently found, and occasionally pockets containing many thousands of dollars are discovered at points from the surface to 2000 feet deep.

It is not an uncommon thing to find the pay shoots crossing the lode, sometimes reaching from wall to wall, and again having a lesser extent, reaching only part way across. The wall rocks are greatly variable in these southern counties of the lode, and are, variously, black clay slate, serpentine, amphibolite schist, diahase, talc (altered serpentine), and the dolomitic material is itself often found sheared and altered to a scaly or schistose talcose mineral. Besides the above-mentioned rocks, there appear at various places large feldspathic dikes, as at the Grant mine on Moccasin creek and at the Eagle–Shawmut, near Jacksonville. Diorite also is occasionally seen, and in the Golden Rule at Stent a diorite dike has divided the dolomitic vein into two sections. The payable values at the latter mine, however, and at the New Era and Jumper, adjoining it, are not in the dolomite or the quartz veins accompanying it, but in the hanging-wall amphibolite schists, accompanied by an intrusive dike.

From its first appearance in southern Mariposa county the lode extends uninterruptedly northward several miles to Mount Ophir, near which a break occurs—that is, the lode proper disappears, but is found cropping farther northward in the same general direction. From there it is practically continuous to the Merced river, but on the north side of the river it again disappears, to again crop up several miles beyond. Other breaks occur between the Virginia mine, 5 miles south of Coulterville, and the Grant mine, on Moccasin creek, though where the great vein does appear it forms great masses of the dolomite with its accompanying quartz ledges, which outcrop to the height of 50 to 80 feet in places above the surrounding rocks, forming prominent features of the landscape.

These breaks in the continuity of the lode are not due to faulting, but to a thinning out of the vein and its reappearance at a greater or less distance beyond. In Tuolumne county it is practically continuous entirely across the county and several noted mines occur along its length. In a general way, these mines bear a similarity to one another, though no two are exactly alike. Moreover, the best values are not always found within the lode proper, but in the schists of the hanging wall. Several mines are being operated where this is the case. To what extent the mineralization of the schists has been influenced by the main fissure it is impossible at present to say.

When the lode crosses the Stanislaus river into Calaveras county it branches into several sections, and at the top of Carson hill (a mile from the river) the dolomitic vein practically disappears, though several large quartz veins mark its continuation northward toward Angels. From the summit of Carson hill northward the dolomitic vein does not reappear northward until near San Andreas—a distance of about 16 miles. The intervening section consists chiefly of amphibolite schists, with dikes of diorite and diahase, with occasional strips of clay slate, but the most extensively developed mines are in the schists. Large veins of quartz occur throughout this region, spreading out over a width of 3 miles near Angels, but the best values are found near the center of the belt in the town of Angels. Prospects are found in many places east and west of the main lode at Angels, but as yet no paying mines have been developed therein.

Near San Andreas, as above stated, the dolomitic vein reappears, and possesses the same features as those distinguishing it southward, viz., the broad zone of dolomite or ankerite, with its ferruginous red croppings, large quartz masses, cropping boldly above the surface, and always accompanied by the more or less abundant mariposite.

From San Andreas northward these features distinguish the lode for a mile or more. It is important to note that this dolomitic vein is almost invariably accompanied by serpentine, wherever it appears, though other rocks, such as diahase tuff, diabase dike rock or black slate, may also be present.

In northern Calaveras county, beyond this reoccurrence of the dolomite, the lode is confined chiefly to black slate, with occasional greenstone tuffs, as at the Gwin mine, where at the surface the vein is entirely in black slate, but in depth encounters a coarse, much-sheared diahase conglomerate. The Gwin vein is a large, strong fissure without fault, and is remarkably straight in its strike. Following the lode northward from the Gwin into Amador county, at the southern end it is split up into numerous branches, some of which are of large size. These veins occur in black slate or in amphibolite schist, or in part at contact of these two formations. One of the distinguishing characteristics of mines in this section is the occurrence of mispickel (arsenical iron sulphide) rich in gold and often accompanied by pockets of heavy gold. The veins which here occur on the easterly side of the belt, as at the Amador gold mine, near Jackson, and in the Hardenburg, show great movement. The quartz is often highly polished along its walls, and not infrequently it has been reduced to a sandy condition by heavy pressure and movement. Heavy gouges occur which represent the crushed and ground-up portions of large masses of slate and amphibolite schist. The gouge often contains fragments of vein quartz and infiltrated veinlets of quartz and calcite. Although gold occurs in these large veins, no remunerative mine has yet been developed there, though a number of the pocket mines farther south have yielded handsomely.

Near Jackson, in Amador county, the vein system is not complex, being represented by several fissures having a nearly parallel strike. The most easterly is developed in the Zeila mine, which is nearly wholly in amphibolite schist. This mine has been operated almost continuously for more than thirty years.

(TO BE CONTINUED.)

Tungsten, Molybdenum, Uranium and Vanadium.

According to the report to the United States Geological Survey for 1902 by J. H. Pratt, the production of crude tungsten ores during 1902 amounted to 183.5 tons, of which not more than a few tons were sold. The production of 1901 was 179 tons of concentrated ore, valued at $27,720. The larger part of the production of 1902 was from Colorado, with a smaller amount from Connecticut. No new localities were developed during 1902.

Almost the entire production of commercial molybdenite was by the Crown Point M. Co. of Seattle, Wash., from their property in the western part of Chelan county. The production amounted to about twelve tons. The value of the ores is very erratic, the prices quoted varying from $1500 to $100 per ton.

There was a marked increase in the production of uranium and vanadium minerals in 1902, which, as reported to the Survey, amounted to 3810 tons, valued at $48,125, or $12.63 per ton. This, of course, represents the crude ore. In 1901 the production was 375 tons of crude ore. A portion of the uranium ore was treated, giving a concentrated product of twenty-five tons, which was valued at $8000, or $320 per ton.

Although it has been determined that these metals have beneficial effects when used in the manufacture of steel, considerable study of them is necessary before their commercial position with respect to one another or to nickel and chromium can be definitely determined. Questions came up as to which of the various irons hardened by them are best adapted for steel drills, for dies and shoes in stamp mills, for car axles, carpenters' tools, etc., as to which will retain the best cutting edge, which will heat the least when in use, and which will make the toughest iron.

A. B. Frenzel of Denver, Colo., has offered prizes at a number of the schools of mines in the United States for investigations of these ferro-alloys in relation to the matters mentioned above, and they would seem to offer an inviting field for investigation by the Carnegie Institution.

Production of Quicksilver in 1902.

The production of quicksilver in the United States during 1902, says Dr. J. Struthers in his report to the United States Geological Survey, amounted to 34,451 flasks of 76½ pounds each, valued at $1,500,412, as compared with 29,727 flasks, valued at $1,382,305, in 1901—an increase in quantity of 4724 flasks and in value of $118,107. California contributed the greater part of the output, amounting to 29,199 flasks, as compared with 26,720 flasks in 1901. Texas reported 5252 flasks, as compared with 2932 flasks in 1901—both States thus showing an increase in the production above that of the preceding year. Oregon, which furnished 75 flasks in 1901, reported no production during 1902, the quicksilver mining operations in that State being limited to development work.

The report contains a review, by W. Forstner, of the progress in quicksilver mining in California during 1902. As is well known, California has produced nearly the entire output of quicksilver in the United States, the quantity to be credited to that State since 1850 amounting to 1,913,258 flasks, of which the New Almaden mine, in Santa Clara county, has furnished more than 50%.

The production of quicksilver in Texas during 1902, valued at $228,620, as compared with a value of $132,438 in 1901, shows a very active development of the industry. The entire output for both years was produced by the Marfa & Mariposa Mining Co., operating at Terlingua, Brewster county.

The exports of quicksilver for 1902 amounted to 13,247 flasks, valued at $575,099, as compared with 11,219 flasks, valued at $475,609, in 1901. Of the exports, 8913 flasks, valued at $383,578, went out of the port of San Francisco, nearly one-half going to Hongkong.

Ore Grades in the Witwatersrand.

As a means of comparison in the cost of operating deep mines, and particularly as referred to the grade of ores treated, the following extract from South African mines will be of interest wherever deep mining for gold is being carried on. It is evident that the development of the mines and economy of operations are greatly hampered by a lack of native Kaffir cheap labor, to which these mines were accustomed prior to the war; and it looks as though the very deep levels of the Rand would find a condition as to excessive cost of sinking and equipment. Values found in depth and cost of operating will place them on a plane with the low-grade gold mines of the United States. These deep mines of the Rand must not only pay a profit on the running expense, but must also realize the interest on the large capital invested in purchase of the property and its equipment and development, and this sum usually will exceed $3,000,000 on the very deep levels.

Although the conglomerates of the Rand deposits are noted for consistency of grade over large areas, there is an interesting localization of gold values in different areas, so that a rich mine may have a neighbor of comparatively low grade. Stores, forwarding agencies, transport offices, the market—in a word, the township, naturally focus at the most profitable point of a gold field, and hence Johannesburg has been built on the richest portion of the fields. A line from Market Square, Johannesburg, to the farthest extremity of its outlying suburb, Fordsburg, runs parallel to reef of high value, which is worked by the Wemmer, Ferreira, Ferreira Deep, Worcester, Robinson, Robinson Deep, Bonanza, Crown Reef and Crown Deep. The outcrop mines of to-day which have absorbed smaller interests, like the Pioneer, Tribute and Mint on this line, are the richest on the fields, and all have a normal value of over 50s per ton. The Deeps of this area and the Deep-Deep producers are not as rich on the whole as the first row propositions, and this fact has, in a measure, led to the popular fallacy that Main Reef series decreases in value as a greater depth is attained. It should be remembered that the Bonanza itself, which often yielded over £5 per ton in pre-war outputs, is the deep level of the Johannesburg Pioneer, and although the term deep level is somewhat of a misnomer, in this case it is farther from the outcrop than the latter property, which had a yield of a little over £4. The Ferriera Deep is now running about 55s, and the Robinson Deep about 42s or 43s to the ton. In talking of ore grades, one must necessarily refer to values exhibited before the war, and in this context it is necessary to recollect a condition which has already been reckoned as a most important factor in the settlement of values. The use of machine drills in stopes must be carefully limited in Rand mining if the best results are to be derived from them. In pre-war days their use was largely restricted to development work—drives, raises and winzes, and, in some instances, to large ore body stopes. To-day, owing to shortage of manual unskilled labor, rock drills have been universally substituted for native hammer boys in mining both large and small reefs. The extravagance of this system is not felt nearly as much by propositions containing big ore bodies as it is in the mines of the thinner reef. In mining the large reefs there is ample play for the explosive in the drill hole without breaking any considerable amount of country rock, but among the thinner beds the breaking of a large amount of thinner quartzite is inevitable, and, in consequence, either a deterioration of ore values or an increased expenditure in sorting is unavoidable. There are two evils, and the question with the management is, "Which is the lesser?" That big low-grade proposition, the Simmer and Jack Proprietary, which had an average of yield of 34s 8d from some 1,700,000 tons, is now going about 2s per ton less, and it is noticeable that only about 50% of the waste sorted out in pre-war days is now eliminated. This is a property carrying large reefs, and a drop of a little over 6% in rejection is evidenced. Turn now to the Central Rand and the figures quoted below for high-grade properties carrying thinner reefs speak for themselves:

	MAY, 1903.		JANUARY, 1899.	
MINE.	Percentage of Waste Rejected.	Value Per Ton Milled.	Percentage of Waste Rejected.	Value Per Ton Milled.
Bonanza.....	10.50	69.72s	28.16	104.45s
Ferreira.....	22 58	53 16s	34.58	92 97s
Robinson.....	17.02	59.79s	.....	71 50s

The policy of the Ferreira and Bonanza is, then, to sort out less waste, while the Robinson rejects 17.02%, as against no elimination in 1899. Percentage depreciation of values in these mines is as follows:

Bonanza	33.2
Ferreira	42.8
Robinson	10.3

Many more instances of this kind may be cited, but the above are indicative of the depreciation resulting from machine drills mining small reefs of high value. Holes put down by manual labor are not so "strong" and do not tear as much ground as those made by machine.

These figures seem to disagree with the statement of Mr. Weldon, the Government mining engineer, contained in the Chamber of Mines' Report for 1902. "At the producing mines," says Mr. Weldon, "the percentage of waste rock sorted out on surface before milling averaged 19.012%, as against 21.95% for sixty-six mines in the year 1898. The percentage of rock sorted out at the separate mines varied from 6.669% to 34 78%. Pennyweights of fine gold per ton crushed, 9.599 (August, 1899); 10.010 (June, 1902." This points to an average rise in gold values on the Rand; but it should be remembered that the 1902 figures refer to forty-five mines only, and all these are naturally high-grade propositions. Batteries of the lower grade mines are at present dormant, since the returns from these would not justify their crushing under present conditions. For May of the present year the average yield of forty-seven Witwatersrand mines was 40.43s. Low-grade mines like the Violet, Balmoral, Bantjes, North Randfontein, Kimberley-Roodeport, Roodeport West and Grey's Mynpacht, all of which have had average yields of under 25s. per ton, are not included in the list, and it is due to this non-inclusion of properties which reduce the Rand yield aggregate that the grade returns of mines producing to-day are higher than in the ante-bellum returns. Only one—the Vogelstruis Estates—of the thirteen companies with an ore grade of under 25s that have produced gold on the Rand figured in the list. Of companies with a yield of under 30s, 25% are included, 66% of mines with a grade under 35s, 36.3% of properties with a grade under 40s, 88.8% of mines with a yield over 45s, and 100% of the propositions with a yield over 50s.

As an approximation it may be stated that, rich or poor, auriferous areas may almost be grouped according to the bounding limits of the different farms. Take Turffontein, for instance. It is here that the wealth of the Witwatersrand conglomerates seems to be concentrated. Turffontein No. 198, on the western and central portions, is the richest area in the fields. From the Wemmer to the Bonanza—in reality a semi-deep level—the average ore grade of five outcrop properties during May, 1903, was 57.15s; the grade of the deep-level proposition of this area, the Ferreira Deep, was 55.27s, and of the third row mine, the Robinson Deep, 41.83s. On the eastern portion, the Salishury, Jubilee and City and Suburban—which is also in Doornfontein—had a yield of 39.45s, and the semi-deep proposition, the Village Main Reef, goes 42.53s. The Deep-Deep representative has not yet reached the producing stage, but the strike in the Village Deep shaft seems to indicate a good grade future for the proposition. South of the properties enumerated above are large blocks of ground vested in the South Village Deep, Turf Mines, etc., not yet opened up by shafts. Going east from the City and Suburban, the next property is the Meyer & Charlton, on the farm Doornfontein, the ore grade of which is placed at 37.54s in the May analysis sheet. During January, 1899, the Wolhuter Gold Mines, adjoining the Meyer and Charlton, made a crushing of close on 34s to the ton, while the adjoining group of mines on Doornfontein, viz., New Goch, Henry Nourse and New Heriot, of the outcrops, had a yield of 39.28s per ton during May. Returns from the Jumpers are not indicative of the value of the mine under present conditions, and it should be remembered that some very high returns have been made from this property. The New Heriot is at present working under very bad conditions, and a return of just over 25s during May, 1903, contrasts very poorly with 46.41s in January, 1899. The producing Deeps of this zone give an average value of 33.47s per ton. Doornfontein, as a whole, does not contain as high values as Turffontein, and may almost be said to correspond to Langlaagte on the western portion of the Central Rand. Elandsfontein is of about the Rand average grade, 42s per ton on the western portion, but the central and eastern parts are of fairly low value. Driefontein, the adjoining farm, shows a tendency to better values in the eastern portion, containing high value properties like the Angelo and Ginsberg, but also poorer propositions, an example of which is afforded by the Balmoral. Farther east are Vogelfontein, Rietfontein and Modderfontein, on which farms not so many properties have been brought to the producing stage, but the grades of one or two propositions in this area may be cited as indicative of the values of this zone. For the first two months of 1899 the New Kleinfontein recorded an average grade of 30.9s, while the New Modderfontein yield in February, 1899, was at the rate of 39.14s per ton. Farther northeast, on Vlakfontein, the Van Ryn is situated, which recorded a yield of 28.05s in February, 1899, and has recently resumed crushing.

From the farm Langlaagte, adjoining Turffontein on the western boundary, in a westerly direction, the Crown Reef is the first mine encountered, and during last May its average yield was 49.3s per ton, while the Crown Deep's was 32.09s, Langlaagte Estate's 32.87s and Langlaagte Deep's 29.72s. And now comes the poorest part of the Rand. Through the western portion of Langlaagte, Paardekraal and Vogelstruisfontein the reef series continues perseveringly, but it is by no means as rich as it is on the eastern portion or on Roodeport, where there is a valuable zone containing propositions like the Durban-Roodeport and Roodeport United Main, with yields approximating 45s to the ton during last month. Witpoortje, the next farm on the west, is again, a low value farm, chiefly on account of the broken character of the ground and the difficulty in obtaining "unadulterated reef." Luipaardslei, with the Lancaster and Lancaster West, is of more normal value, and Randfontein's milling grade may be adjudged from the following figures for February, 1899: Porges Randfontein, 38.25s; Robinson Randfontein, 35 67s; South Randfontein, 51.36s. It is worthy of note that these three properties eliminated no waste. To approximate the milling grades of propositions as yet only proved by boreholes to be auriferous, is too much like building castles in the air. The following table shows the ore grades of properties producing during May as compared with January, 1899:

	EASTERN RAND.			
(a) Farm Driefontein—	May, 1902.		January, 1899	
	Waste Rejected. Per Cent	Ore Grade.	Waste Rejected. Per Cent	Ore Grade.
Outcrops—				
Angelo.....	25.5	£9.53	18.6	54.4
Driefontein.....	21.8	45.0	16.4	40.3
Ginsberg.....	11.8	51.3	15.8	41.9
Witwatersrand....	27.6	42.7	25.0	26.5
Glencairn.....	21.6	27.9	18.1	27.0
May Consolidated..	12.4	39.1	19.2	45.6
Deep Levels—				
Wit Deep.....	11.9	33.7	....	....
Glen Deep..... ...		31.7	29 8	45.5
(b) Farm Elandsfontein—				
Outcrops—				
New Primrose.....	6 0	32.5	12.0	32.4
Simmer & Jack....	8.8	32.6	19.0	34.7
Geldenhus M. Reef.	5.8	23.2	....	19.5
Geldenhuis Estate.	17.9	31.7	26.5	48.1
Deep Levels—				
Rose Deep..... ...		31.03	19.3	43.3
Geldenhuis Deep...	7.7	35.9	18.1	40.4
	CENTRAL RAND.			
(c) Farm Doornfontein—				
Outcrops—				
Treasury.....	11.0	40.61	23.2	41.0
Jumpers..... ...		13.97*	41.3	39.6
New Heriot.....	14.9	25.0	30.8	46 4
Henry Nourse.....	15.4	51.1	18.8	52.9
New Goch.....	15.3	41.6	14.3	25.4
Meyer & Charlton.	14.9	37.5	13.8	34.0
†City & Suburban...	14.3	45.4	17.0	51.0
Deep Levels—				
Jumpers Deep..... ...		28.8	30.1	42.7
Nourse Deep.....	14.7	38.0	20.2	45.9
(d) Farm Turffontein—				
Outcrops—				
Jubilee.....	17.3	34.4	21.8	38.4
Salisbury.....	30.5	38.4	24.1	33.8
Wemmer.....	20.2	48.8	18.6	67.4
Ferreira.....	22.5	53.1	34.5	92.9
Worcester.....	40.8	54.21	35.4	43.8
Robinson.....	17.02	59.7	....	71.5
Semi-Deeps—				
Village Main Reef. ...		42.5	28.6	67.6
Bonanza.....	10.5	69.7	28.1	104.4
Deep Level—				
Ferreira Deep.....	12.7	55.2	....	....
Deep-Deep Level—				
Robinson Deep....	22.0	41.8	34.1	59.5
(e) Farm Langlaagte—				
Outcrops—				
Crown Reef.....	14.6	49.3	13.3	40.9
Langlaagte Estate.	21.0	32.8	....	30.8
Deep Levels—				
Crown Deep..... ...		32.0	19.0	43.4
Langlaagte Deep... ...		29.7	....	....
	WESTERN RAND			
(f) Farm Paardekraal—				
(g) Farm Vogelstruisfontein—				
Outcrop—				
Vogelstruis Estate.	24.8	38.2	....	....
(h) Farm Roodepoort—				
Outcrops—				
Roodep't U.M.R ..	20.4	44.33	22.0	54.2
Durban-Roodep't..	8.7	47.2	16.5	48.7
Semi-Deep—				
R'dep'rt Cen. D'p..	29.6	47.8	....	....
Deep Level—				
Durban-R'p't D'p.	15.4	42.7	46.7	45.5
(i) Farm Witpoortje—				
Outcrop—				
French Rand.....	18.4	35.6	27.0	40.9
(j) Farm Luipaardsvlei—				
Outcrops—				
Lancaster West...	16.4	33.9	....	....
West Rand Cen'l...	11.0	31.4	20.0	24.4

*From surface dumps. †Also on Turffontein.

Besides this variation in ore values along the strike of the Rand there is a fluctuation of grades along the dip, that is to say, in the different reefs. The South Reef becomes of less value as it is followed in an easterly direction from Johannesburg until on Dreifontein it is hardly mined at all. What the main Reef Leader lacks in size, as compared with the Main Reef itself, it more than makes up in richness on the Central Rand. In some properties the different banket beds are so complicated that it is extremely hard to distinguish between them, but there is certainly a localization of values along the dip analogous to the fluctuating tendency in different zones noted along the strike. The horizon occupied by the different

heds may be regarded as a negligible factor in dealing with the question of ore values, which vary directly as the conditions of chemical composition favorable to auriferous decomposition are localized. Similarly the Rand, although seemingly uniform in mineralization from far east to far west, varies in the chemical composition of its constituents in different areas. It is for this reason that localization of ore values is evident, and it accounts for the presence of a poor tract of land between the rich farms of Turffontein and Roodepoort, and for the fact that rich South Reef may overlie a poor Main Reef Leader or Main Reef.

Some Experiences of a Working Miner.

Written for the MINING AND SCIENTIFIC PRESS.

I have on several occasions in the past given your readers the benefit of some of my experiences, gained in traveling around among the mines. Some of these experiences have been instructive, some amusing, but the most of them have been of a sort teaching how things should not he done. If mining experience were all of one sort interest would fag, and there would probably he less incentive to find new and better ways of doing things, but there are all sorts of people mining nowadays, as it is a business of which one can acquire a complete knowledge in a very short time—at least so some of those engaged in mining have told me, and so, evidently others believe.

Not long since I heard a man say to another, "John, do you know I believe I will go into mining. There is more money in that than anything else I know of, unless it is a government contract—but seriously, they tell me all you have to do is to go into the hills, hunt for a vein of quartz, and that has the gold. You take this quartz—a kind of hard, white rock, you know—pound it up in an iron pot, and then wash it in the water, and there's your gold. Then all you need is a mill and you're fixed. I am going into mining, for I think I'll like it."

Now, this fellow was serious in what he said, and any one who knows anything about a mine can readily imagine the sort of miner he would make at the start. And yet, he might be lucky and strike it. A few years ago several farmers' boys located a lot of claims at R—— T—— and shipped away to the smelters a quantity of flint, rich in gold, they picked up on the surface of the ground or dug up near the surface. Trained prospectors and mining engineers had walked over the ground many a time but had not deigned to notice this ordinary rock. Half the battle is in luck, anyhow. At least, so it often seems.

* * *

A retired shoe merchant was a large holder of stock in a new mining enterprise. He had some slight knowledge of machinery and was selected by his associates for manager of the mine. These men were all Eastern people. The new manager came West, and in discussing the construction of a mill had an opportunity to show his knowledge of mechanics. The engineer suggested that it would be advisable to have a separate engine or wheel for the concentrators to insure steady and independent running. "Why, certainly," said Mr. Manager. "Why, certainly—just what I was about to suggest, and I think it would be an excellent idea to provide a separate engine for the feeders, too. We have plenty of money and intend to build this thing right." The engineer was convulsed, and scarcely knew how to put the manager straight without offending his dignity.

* * *

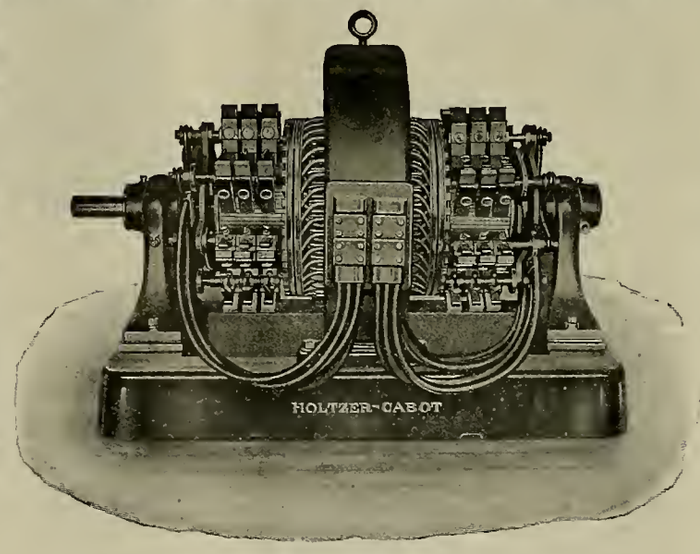
An ambitious young superintendent at the C—— H—— mine, who had abundance of confidence and conceit, but a small stock of experience, managed the business under him in a manner that would call for an explanation were he dealing with mining men instead of Eastern investors who knew nothing of the actual practice of mining. One of his "hobbies" was low tailings, and this was insisted on to the extent that he would go through the mill, and noticing that the concentrating machines were doing good clean work would hastily change their adjustment so as to carry in a lot of sand with the sulphides. This, of course, reduced his tailings to a value so low as to attract complimentary notice from the home office, but what of the actual result of so foolish a policy. The concentrates might contain from 2% to 5% sand, worth little or nothing—in fact the sand from an economic standpoint was valueless—but by his manipulation instead of 5%, 20% sand was carried into the concentrates, or 15% of worthless material, which was not subsequently separated, but was sacked, shipped and smelted with the sulphides. This means that in every carload of sulphurets shipped (twenty tons) there was at least three tons of sand more than there should have been. This was equivalent to an extra and unnecessary expense of about $45, including sacks, sacking, transportation by wagon and rail, reduction charges, discounts, etc., which would be a natural charge against the seventeen tons of (95% clean) concentrates, equal to about $2.65 per ton. As this mine produced about 300 tons of sulphurets monthly the foolish manager wasted nearly $800 per month. A careful manager who had the real interest of his company at heart would have endeavored to reduce the tailings to as low a grade as consistent with economy, but such machinations as that above described are criminal. This same fellow "invented" the scheme of shimming up a heavy compressor by placing soft wooden wedges between the bed plates and the concrete foundations.

* * *

The new manager at the Z—— mine at P—— was a shrewd man who watched every one about as though suspicious that each of the men under him might undertake to sieze the first opportunity to do some rascally act. He was suspicious of the foreman because he found him one morning diligently making a comparison of the month's work in the shaft with that of the previous month, when, according to the manager's idea, the foreman's place was underground helping the men. He also had a suspicion of the mill foreman because he found him in the clean-up room alone one morning weighing a lot of amalgam he had just finished cleaning, and his suspicions of the assayer were confirmed when he came suddenly upon him endeavoring to cover up his theft by pounding on the corner of a bar of gold bullion, evidently endeavoring to erase all traces of where he had chipped off a piece of the bullion for assay. He said nothing to the assayer, but confided his suspicions to the book-keeper, who suggested that possibly the assayer intended to use the little chip to determine the value of the gold bar. Gradually the new manager found he had entered upon a new world; his past experience did him little good. He had it all to learn over again. He learned rapidly and in time became a really good miner and manager. Even he laughs sometimes at the mistakes he once made, and he has a fellow feeling for others who, like himself, suddenly found themselves managers of mines with no knowledge of the business.

Electrolytic Generator.

The refinement or reduction of metals by electrolytic action has caused a growing demand for large electric generators of low voltage but relatively large output. The accompanying cut shows a generator of a capacity of 4000 amperes at an E. M. F. of 6 volts. In designing this machine the question of commutating the unusual quantity of current was determined by the use of a double armature winding with two commutators and a special conformation of field. The field ring is of cast iron. The poles—eight in number—are of wrought iron and cast welded into the ring.



Electrolytic Generator.

The armature core is relatively of large diameter, and is built up of thin discs of soft steel, painted on either side to break up eddy currents. It is mounted upon a spider, the lamination being clamped in a special manner by end plates, doing away with bolts running lengthwise through the body of the core, thus preventing local currents and reducing heat losses. The spider is provided with a threaded projection which holds the commutator in such a way as to leave an opening between the shaft and the commutator in front. Air ducts are provided in the core, and the air, being drawn into the body of the core and thrown out centrifugally through the ducts and winding, serves to keep the armature cool, notwithstanding the great quantity of current flowing. The cylindrical form of winding is used, making the armature resistance low and permitting of the replacing of a damaged coil without much difficulty. The coils are of bar copper and entirely without joint except where they are soldered to the risers of the commutator.

The commutators are made up of hard rolled copper segments, soft mica being used for insulation, and are clamped by bolts to prevent shifting of the segments. The section of the copper segments is usually large, to take care of heat generated by the flow of the current and the friction of the brushes, and at the same time allow for plenty of wear. The brush holder is of the tangent type, such as used on all Holtzer-Cabot platers.

This machine is usually separately excited, and, owing to the special shape of the pole shoes, is designed to be able to deliver any load from 0 to 25% overload without its heing necessary to change the position of the brushes, the diameter of commutation remaining practically fixed for these ranges of load. It is made by the Holtzer-Cabot Electric Co., Boston (Brookline), Mass.

The Determination of Lead in Ores.

The ordinary fire assay of lead is unsatisfactory. With most ores the results are about 2% too low, says J. C. Bull in the School of Mines Quarterly. With oxizided ores containing iron, copper, antimony and bismuth the result may be too high. Six ores were tested (1) a rich galena, (2) a poorer galena, (3) a poor cerussite ore, (4) a mixed galena and sphalerite, (5) a mixed galena and stibnite, (6) a richer cerussite. The ores were tested by (AA) ordinary assaying, following Ricketts & Miller's "Notes on Assaying," (A) gravimetrically, weighing as $PbSO_4$, (B) gravimetrically, weighing as $PbCrO_4$, (C) electrolytically, weighing as PbO_2, (D) volumetrically, by Alexander's ammonium molybdate method, (E) volumetrically, hy Koenig's method, (F) volumetrically, by the oxalate or permanganate method, (G) volumetrically, by the dichromate method, (H) volumetrically, by the ferrocyanide method. A summary of the results is as follows:

Method.	1.	2.	3.	4.	5.	6.
Fire assay (AA).....	76.0	37.0	9.0	24.7	26.7	37.8
Lead sulphate (A)...	78.65	37.23	10.75	18.42	27.23	38.52
Lead chromate (B)..	78.70	37.29	10.76	18.43	27.22	38.49
Electro. precip. (C)..	78.73	37.35	10.80	18.58	27.32	38.60
Alexander's (D).....	78.78	37.43	10.82	18.49	27.40	38.62
Koenig's (E).....	78.62	37.39	10.60	18.44	27.25	38.64
Oxalate (F).....	77.57	36.67	9.95	17.60	26.28	37.38
Dichromate fer. (G)..	78.75	37.35	10.75	18.46	27.29	38.49
Dichromate hypo. (G)	78.75	37.35	10.78	18.48	27.29	38.59
Ferrocyanide (H)....	78.66	37.30	10.88	18.46	27.22	38.62

The conclusions are that four volumetric methods for determining lead in ores deserve attention, of which it is remarked that the dichromate method is more liable to be inaccurate, unless a great deal of time is spent in washing. Koenig's method gives good results with ordinary amounts of impurities, but in some ores is unreliable. Alexander's method is quicker than the preceding and is less affected by large amounts of impurities, while the ferrocyanide method is as rapid, and not affected by even extraornary amounts of impurities, and is recommended as best.

Production of Borax in 1902.

The known deposits of borax in the United States, according to the report of Dr. J. Struthers to the United States Geological Survey, are in California, Nevada and Oregon, and the chief producer of borax and boric acid in this country is the Pacific Coast Borax Co., which owns the mines near Daggett, San Bernardino county, Cal., where the colemanite (calcium borate) is bedded in deposits from 5 to 30 feet thick. This company acquired much additional property during 1902 in the Death Valley region.

It has not been practicahle to separate the total output of borax salts during 1902 into the crude and the refined product. The reported returns, however, give an aggregate production of refined borax and boric acid amounting to 17,202 short tons, valued at $2,434,999, of which 862 short tons, valued at $155,000, were stated to be boric acid. The production during 1901 was 17,887 short tons of crude borax, valued at $314,811, and 5344 short tons of refined borax, valued at $697,307, a total value of $1,012,118.

The largest refinery in the country is at Bayonne, N. J., to which the pulverized colemanite is shipped in sacks from California.

The borax deposits of California have been described by M. R. Campbell in Bulletin No. 200 of the United States Geological Survey (1902) and by G. E. Bailey in Bulletin No. 24 of the California State Mining Bureau (1902).

Notes on the Metallurgy of Copper of Montana.*

NUMBER IV.

Written by H. O. HOFMAN.

The moist concentrates arriving from the ore-dressing plant on an overhead track are dumped into the two feed hoppers of a furnace. These are 10 feet apart and are 4 feet 6 inches in diameter for 9 feet 6 inches and then conical for 7 feet 6 inches. At the bottom they are 3 feet 6 inches by 1 foot 2 inches, to fit the openings in the roofs of the furnaces. The top of the hopper has a grating to break up any lumps and to keep out large pieces that may have accidentally gotten into the ore. The hopper holds two cars of concentrates, or 33 tons. This weight, pressing downward, prevents any hanging of the charge and thus solves the difficulty of feeding moist fine concentrates. The contents of the hopper are continuously discharged into the furnace by means of a feeding device of the form of an I, which passes to and fro under the mouth with a throw of about 10 inches. The rods of the two feeders are joined by a crosspiece which is pivoted in the center and connected by a rod to one end of a link, while the other end is attached to the pitman of a crank and spur wheel. The spur wheel is geared to the central shaft of the furnace. The ore is spread on the top hearth to the thickness of 3 inches by the stirring arms. The tops of these arms are protected by cast iron caps against rapid wear at the places where they strike the ore column coming down through the feed openings. The outer half hearth is 9 inches thick, the inner 6 inches. The reasons for the difference are saving of brick, reducing of weight at center, preventing contact with stirring teeth when the hearth rises upon heating, and furnishing an offset to hold the loose working bottom (crushed limestone, sometimes flue dust and even coke dust), which is about 4 inches thick at the center and 9 inches at the periphery. The two arms of a hearth have seven and eight cast iron teeth. These are 8 inches long by 6 inches wide by ⅝ inch thick. The lower 3 inches of the teeth, which come in contact with the ore, are chilled. There is no advantage in making the teeth thicker than ⅝ inch, as they wear off obliquely to the working surface and consequently would simply offer a larger wearing surface but not lengthen the life. At the same rate that the teeth are worn off the ore builds on the loose working hearth. When they are to be renewed they are removed and a plow is slipped over the stirrer arm and moved a little toward the center after every circuit of the arm. Thus a crust is easily and surely broken up. The crusts on the second hearth are harder to break than those of the other hearths. The teeth on the top hearth last twenty-five to thirty-four days; those on the sixth six to eight months. The shorter life of the former is attributed to mechanical wear caused by decrepitation of the ore. It cannot be due to chemical action, as the top hearth serves mainly for drying, unless the moisture should cause some sulphuric acid to form, but the temperature of the escaping gases is 315° C. and the draught is sufficiently strong to show a depression of 0.3 inch of water.

Roasting begins on the second or third hearth, varying with the strength of the draft and the number of circuits that the stirring arms make. With a strong draught the heat creeps up; with one circuit in fifty-five seconds the roast begins on the second hearth, with one in seventy-five seconds on the third. As the ore passes from the first hearth through the annular opening at the center of the roof of the second hearth (protected by a cast-iron ring), it strikes a distributor which prevents any of it from passing down the shaft. During normal work three doors on the bottom hearth are left open for the admission of air. If the furnace becomes too hot, the doors on the third floor are opened more or less and thus the draught checked. While the ore drops from hearth to hearth, the upward gas current carries with it dust, and this striking the roof adheres to it in part and builds. In order to protect the arms from being worn out at these places, they are protected by cast-iron caps. When the dust has grown to a thickness of 4 inches it is removed with chisel-pointed bars. Experiments to protect the roof at weak spots with cast-iron plates has proved successful, as the dust is easily pried off. The chunks of fritted dust go to the blast furnace as welcome lump-ore; they contain only 6% of silica with ore of 30% silica, thus showing that light particles of ferric oxide are more easily carried away by the gas currents than heavy gangue. The dust collected in the settling chambers run higher in sulphur than the roasted ore.

In starting a furnace, crushed limestone is fed to form the working bottom. Then a small fire of dry, soft, i. e., long-flame, wood is started from the three side doors of the third and fifth hearths. A new furnace is brought to a dark red in three to four days, an old furnace requires only two days. Now, concentrates are fed. After charging for five to six hours, it sometimes happens that the furnace cools down too much, and this makes it necessary to start on the third and fifth floors a new fire for one and one-half to two hours; occasionally, feeding of the ore is stopped and half a ton of coal is charged. When this has come to the third hearth, the machinery is stopped and the coal is allowed to burn out. The kindling of the coal may have to be assisted by placing dry wood on the hearth. Under normal conditions a furnace does its best work when the flue shows a depression in water of 0.3 inch; if it is less, the furnace gets cool. The normal ore mixture passes through the furnace in about one and one-half hour. If the furnace gets too hot, more slimes are fed; if too cold, coarser concentrates are charged and the rate of feeding is reduced. As indicated above, the temperature is further regulated by the admission of air; closing the bottom doors drives up the heat, opening them draws it down; opening doors higher up checks the draught. The rate of feed when once settled upon is usually not altered, and the number of circuits the arms make per hour remains, of course, constant.

*Trans. Am. Inst. Min. Engs. (Condensed).

EXAMPLES OF MONTANA BLAST FURNACE SMELTING.

FURNACE.	A.	B.	C.	D.	E.	F.
Horizontal section at throat	84 in. x 112 in.	54 in. x 98 in.	72 in. x 180 in.	53 in. x 160 in.	72 in. x 180 in.	72 in. x 180 in.
Horizontal section at tuyeres	42 in. x 112 in.	44 in. x 96 in.	56 in. x 180 in.	42 in. x 160 in.	58 in. x 180 in.	36 in. x 180 in.
Area at tuyeres	32.66 feet.	29.329 feet.	70.029 feet.	48.829 feet.	70.29 feet.	70.29 feet.
Height, tuyeres to throat	7 feet 3¾ inches	9 feet.	18 feet	10 feet 6 inches.	18 feet.	18 feet
Height, tuyeres to top of crucible	16 inches.	9 inches.	11 inches.	9 inches	11 inches.	11 inches.
Water jackets, height	9 feet.	6 feet.	14 feet 10 inches.	10 feet 6 inches	14 feet 10 inches.	14 feet 10 inches.
Bosh, inches in feet	12 in in 6 ft 4 in.	7 inches in 5 ft.	8 inches in 7 ft	1 inch in 10 in.‖	8 inches in 7 ft.	18 inches in 7 ft.
Crucible, depth	8 inches.	16 inches.	27 inches	9 to 14 inches.	27 inches.	28 inches.
Forehearth, fixed or movable	Fixed	Fixed.	Fixed.	Fixed	Fixed.	Fixed.
Forehearth, shell dimensions	8 feet x 5½ feet x 3 feet.	12 feet diam., 52 inches deep.	14 feet diam., 58 inches deep.	7 ft. 3 in. x 10 ft. 6 in x 4 ft.	14 feet diam., 56 inches deep.	14 feet diam., 56 inches deep.
Tuyeres, number	16	12	32	18	32	32
Tuyeres, diameter	3 and 3¼ inches.	2½ inches.	3 inches.	4 inches.	3¼ inches.	3¼ inches.
Tuyere ratio*	3.5	2.01	3.23	4.55	3.79	3.79
Blast, pressure, ounces	18†	24	35	30 to 32	28	28
Blast, cubic feet per ton of ore	57,100	88,574	65,000			80,178 ‖
Blast, temperature, degrees C.	150	15	15	15	15	15
Charge (ore + flux), weight, pounds	3,3000	2,400	2,150	4,000	8,700	10,000
Charge, tons in twenty-four hours	125	165	400	220	400	450
Charge, tons per sq. ft. hearth area	3 82	5.56	5.71	4.71	5.71	8.43
Coke, per cent ash	20.0	21.3	9 to 15	20.0	8.0	8.0
Coke, per cent on charge	13	12.3	6.1	11.5	9.2	8.5
Men, number in eight-hour shift‡	5+2	4+2	3 x 2 11-15	4¼+3¼	3+	4+
Matte, per cent on charge		5.1				5.5
Matte, Cu, per cent	50	46	49	38	42	42.12
Zn, per cent			1 0			
Ag, ounces	89	52	20			
Au, $	2	10				
Sp. gr.			5.0 to 5.1			4.8
Slag, SiO_2	47.7	44.7	40.7	48.0	40.0	42.8
Fe(Mn)O	18.5	27.0	28.2	17.0	23.0	30.7
Ca(Mg)O	28 2	23 0	19.5	20.0	22.8	19.5
Al_2O_3		9.0	9.8	8.0	9.8	
Cu	0.35	0.32	0.25	0.30	0.30	0.25
Ag	0.43	0.30			0.20	
Sp. gr.			3.0 to 3.55			3.3

* Square inch tuyere area : 1 square foot hearth area
† Estimated at 50% of the rated capacity of the blowers.
‡ First figure represents the regular crew, second figure auxiliary labor.
‖ Lower jackets only.
‖ Ore flux.

A furnace treats, under normal conditions in twenty-four hours, forty tons sulphide ore, with 35% sulphur and 10% copper, or 0.042 tons per square foot of hearth area, reducing the sulphur to 7%; roasted ore, with 14% copper treated in the same manner, retains about 10% of sulphur. The product can, of course, be varied with the speed of travel of the stirring arms. Thus, with one circuit in seventy-five seconds it is reduced to thirty tons, with one in fifty seconds it is increased to fifty to fifty-five tons.

A section of six furnaces is tended to in an eight-hour shift by one-third foreman, one furnace man, one helper, one-sixth oiler, one-ninth repair man and one trimmer.

Some of the leading facts of the roasting furnaces operated in Montana are brought together in the subjoined table:

DETAILS OF MONTANA ROASTING FURNACES.

	Tons Roasted, Twenty-four Hours.	Horse Power Required.	Sulphur in Concentrates, Per Ct.	Sulphur in Calcines, Per Cent.	Area of Hearths, Square Feet.	Concentrates per Sq. Ft. Hearth, lbs.	Coal per Ton Concentrates, lbs.	Cost per Ton.
Hand reverberatory furnace, 89½ feet x 16 feet hearth	13	....	35	7–8	1,112	12	307	$2 00
Allen-O'Hara furnace, two hearths, 94 feet x 9 feet	51	3.84	35	8	1,892	77	145	78
Bruckner cylinder, 8 feet x 18 feet	18–20	1½	37	9.5	.....	....	540	1 25
Pearce single-deck furnace	14	1½	32	7–8	505	55	400	98
Pearce double-deck furnace, 6-foot hearths	30	3	35	6–7	1,010	59	400	98
Pearce double-deck furnace, 7-foot hearths	42	3	35	6–7	1,218	89	182	98
Keller-Gayford-Cole furnace, two sets of six hearths	50	1¾	38	7–10	2,592	38	87	.....
Wethey furnace, two sets of four hearths, 50 feet x 5 feet	80	4	40	8	2,000	80	110	.....
Wethey furnace, two sets of four hearths, 65 feet x 10 feet	90	4	35	5–8	2,800	70	80	.....
Herreshoff furnace, five hearths	5–6	....	35	6	135	80	.....	50
MacDougall-Evans-Klepetko furnace, six hearths	40	1½	35	7	952	84	.....	35
Pearce multiple-hearth furnace, six hearths	58	12	35	6–7	2,947	38	28.5	98

The following partial average analysis of roasted ore represents two determinations from the average day and night samples, taken during an experimental run of fifteen days:

SiO_2, 26.9%. Cu, 18 3%, of which 9.9% was present as CuO. Fe, 30.0%, of which 17.9% was present as FeO. S, 9.2%, of which 0.81% was present as SO_3.

The matte formed in crucible fusions contained 65% copper. In comparing the roasted ore of the MacDougall furnace with that of the Bruckner furnace (size, 8 by 16 feet, one revolution in seven minutes; fifteen-ton charge in twenty-four hours; drying, two hours; burning, four hours; charging, roasting and discharging, eighteen hours) of the same plant it is found that it is reddish brown as against a dark brown (more Fe_2O_3 is formed), more porous (1 cubic foot weighs eighty-seven pounds as against 100 pounds) and finer (the rolling of the ore in the Bruckner cylinder causes particles to form pellets). In regard to flue dust, the MacDougall furnace makes much less than the Bruckner cylinder, although the amount is still great; they compare as 1 : 3 to 4.

SMELTING ORES IN THE BLAST FURNACE.—The furnaces are all of the same general type; they are oblong and water jacketed, and have a crucible partly external and partly internal, which discharges the slag-matte mixture continuously over a raised spout, whereby the blast is trapped. The matte is settled in a large forehearth, while the slag overflows, to be granulated and removed by water, or to be collected in waste-slag cars and conveyed electrically to the dump and poured.

The tendency is to increase the size of the furnaces. The smallest distance between tuyeres is 42 inches, the largest 56 inches; in one instance it was increased to 72 inches. This worked well with coarse ore, but it proved a failure with the usual run of ores which contain many fines. Thus, a screen analysis of an average sample of blast furnace ore from one important mine gave:

300	pounds	ore over 2 inches	13.3%
450	"	" 2–1 inch	20.0%
500	"	" 1–⅝ inch	22.2%
1,000	"	" under ⅝ inch	44.5%
2,250	pounds.		100.0%

Showing why such a large distance between tuyeres proved impracticable. The greatest length of furnace at tuyeres is 180 inches; this seems to be the limit with the present mode of construction of jackets. The height of the furnaces increases with the distances between tuyeres from 7 to 18 feet. But the charge in the 18-foot furnace is kept 4 feet or so below the throat, so that the actual working height is reduced to 14 feet. All furnaces are run with a top more or less hot. Temperature measurements of furnace gases in one instance showed 315° C., and a draught measurement gave a depression 0.8 inches of water. The water jackets are all made of low-carbon steel. They are two high, reaching to a short distance below the feed door, the remaining space being of brick. There are usually two jackets on a side and one on the ends; the lower tiers of side jackets only have a bosh, the amount of which is very small, while the upper tiers are vertical, as are generally the end jackets. The gasses are always drawn off above the feed floor. In one instance the top of the furnace carries a Giroux blast heater, made by the Union Iron Works of San Francisco, which raises the temperature of the blast to 150° C., and, at the same time, acts as a dust catcher, delivering the saved dust back into the blast furnace. The charge, in most works, is introduced by hand from the sides of the furnace; occasionally it is fed from the ends. In some instances, with large furnaces, putting through 400 tons charge in twenty-four hours, mechanical feeding has taken the place of hand feeding. The charge is brought by electric or compressed air traction to the side of the furnace on trucks with tilting carriages, the doors are raised

by compressed air, and the charge slid in alternately from one side and the other. This method seems to be satisfactory. At least, worked out in one large plant, it has been introduced in another with some improvements in the construction of the carriage. While it is generally maintained, and has recently been again emphasized by P. Johnson in connection with copper smelting, that the successful working of a blast furnace is much governed by the care given to feeding, it must be admitted that, considering the mechanical feeding practiced at Butte with copper ores producing siliceous slags high in lime, and at Pueblo, Colo., Murray, Utah, East Helena, Mont., with lead ores, where blow holes or uneven sinking of charges must be absolutely avoided, that hand feeding cannot hold its former monopoly, but will have to yield to mechanical devices.

(TO BE CONTINUED.)

Modern Methods in Ore Treatment by Cyanidation.*

Written by EDWIN O. WATT.

As introductory, it is necessary that a brief outline of the process by which the gold is won from the complex sulpho-telluride ore of the Kalgurli mine be given.

I will not enter into discussion as to the relative merits of the two sulpho-telluride ore treatment processes at work on the Kalgoorlie field, viz., the treatment of the unroasted ore after sliming by solutions of bromo-cyanide, as against the treatment of the ore after roasting by solutions of potassium or sodium cyanide, either in filter presses or percolating sand vats. Even if reliable costs and percentages of extractions were obtainable in each case, it would not constitute an infallible basis of comparison, as the larger plants would necessarily have an advantage in cost per ton as against the small plants, and the other conditions obtaining are in many cases dissimilar.

In the sulpho-telluride ore of the Kalgurli mine less than 10% of the gold is free, or amenable to direct amalgamation with mercury, and by direct cyanidation of the unroasted ore it does not appear possible to obtain an extraction averaging much over 50% of the gold contents. The successful treatment of the sulpho-telluride ores of the Kalgoorlie field generally constitutes a proposition demanding the best metallurgical skill available.

The ore treatment of the Kalgurli mine is briefly as follows:

The ore from the brace is tipped over grizzlies to two rock breakers, where it is broken to a size of about 2 inches, and falls into a bin. From this bin it is, after weighing, elevated to the treatment plant by an aerial tram 574 feet long, with an elevation of 97 feet. The dry ore is tipped into a bin of 300 tons capacity over six No. 5 Krupp ball mills. Provision is made for drying the damp ore through a dryer; but as most of the ore is already dry, it is seldom necessary to use it. The ore is fed automatically from the bin to the mills, which crush, approximately, twenty-five tons per twenty-four hours through a screen of forty holes to the lineal inch. From the mills the ore falls direct into a distributing screw conveyor placed longitudinally over a steel bin of 500 tons capacity placed over feed end of furnaces.

From this bin the ore is fed by fluted roll feeders into nine Edward's roasting furnaces. These feeders are worked from an eccentric which swings a bell crank, to which is attached four falls of unequal length working on a ratchet wheel on end of fluted roll. These feeders are readily adjustable to any required tonnage. The ore falls into furnaces and is at first subjected to a temperature of about 450° F, and, after passing through the roaster, discharges at a temperature of about 1170° F. A combined push conveyor and cooling floor, 4 feet wide and 170 feet long, conveys the ore from the furnaces to a crane and bucket elevator, which discharges into a mixer, where it is mixed with water and flows to the hydraulic classfiers designed on the mine. A working drawing of these is here shown. (Fig. 1.)

The purpose of these hydraulic classifiers is to separate the sand and concentrate from the slime, so that the sand, after the removal of the concentrate, may be treated by percolating solutions of cyanide in the usual way, thus obviating the necessity of reducing to slime and filter-pressing the whole product, as is usually done on the Kalgoorlie field. The slime eventually passes to the filter presses.

Each set of classifiers consists of three small inverted cones, approximately, 2 feet 6 inches, 3 feet, and 3 feet 6 inches deep. An adjustable upflow of water is admitted at the bottom of each cone, and the whole pulp flowing through is subjected to the action of this gentle upflow. The heavier particles fall through this upcast of water and discharge in a steady flow from the bottom. The lighter particles or slimes overflow at top. By increasing or decreasing the upcast, a greater or smaller quantity of ore is caused to overflow.

Slime on the Kalgurli mine is taken to mean that portion of the pulp which passes through a woven wire screen of 100 holes to the lineal inch, and sand that portion which will not pass through the same screen. The pulp before separation consists of about equal portions of these products and the gold values of each are nearly equal. Each set of classifiers will deal with over fifty tons of ore per twenty-four hours. They are small and light and have no working or wearing parts. They can be made to do almost any needful classification, and they require scarcely any attention. As designed and erected, they are a satisfactory classifier and are the result of much experimental work. The overflow from these classifiers, consisting of about five parts of water to one of slime, is distributed through launders to five settlers, which are made of steel and measure at top 13 feet by 6 feet 6 inches, and are 7 feet 6 inches deep. They are shaped in longitudinal sections, like a W, and consist of two inverted pyramids joined together near the top. A diagram of these is shown in Figs. 2 and 3. In these the slime is settled and clear water overflows at end and passes into circulation. The pulp, consisting of from 50% to 60% of slime, is drawn continuously from the two bottom taps. The necessary cyanide solution is here added, and the whole flows into a filling cone above five combined pneumatic agitators and filter press pressure tanks. From these pressure tanks the slime, after agitation by air, is charged into filter presses, where the auriferous solution is pressed out and passes to zinc extractor boxes. The slime, after being washed by having weak cyanide solution pumped through it to take away any dissolved gold mechanically held, is dumped.

The sand from bottom of classifiers passes over amalgamated copper plates, then over concentrating tables, where a small portion of concentrate is taken away.

This concentrate consists of any coarse or heavy particles and is ground to slime in a pan and passes away with the other slime. The sand passes up an air lift to sand leaching vats, where it is treated by percolating cyanide solutions for about twelve days. The solutions on these vats are, when not draining off, constantly re-circulating from bottom to top by miniature air lifts attached to the sides of the vats. As these vats are almost full with sand, and the solutions cover the sand, it follows that the solution equalizes in the little lift pipe; the actual lift over the side of the vat does not exceed 6 inches. A hole for the admission of the air at bottom of lift, $\frac{1}{16}$ of an inch in diameter, will keep a steady flow of solution passing from top to bottom of vat. These miniature lifts not only re-circulate the solutions, but they aerate them also, and they have proved very beneficial. I would recommend the use of these aerating re-circulators for cyanidation by percolation wherever it is possible to obtain the very small amount of compressed air necessary to work them.

AIR LIFTS.—Air lifts are sometimes alluded to in technical works as air lift pumps; but, while they do the work of pumps, they are not pumps, because they have no working parts, and, for all practical purposes, no wearing parts. To J. W. Archibald belongs the credit of having introduced them into Western Australia. Air lifts have been working

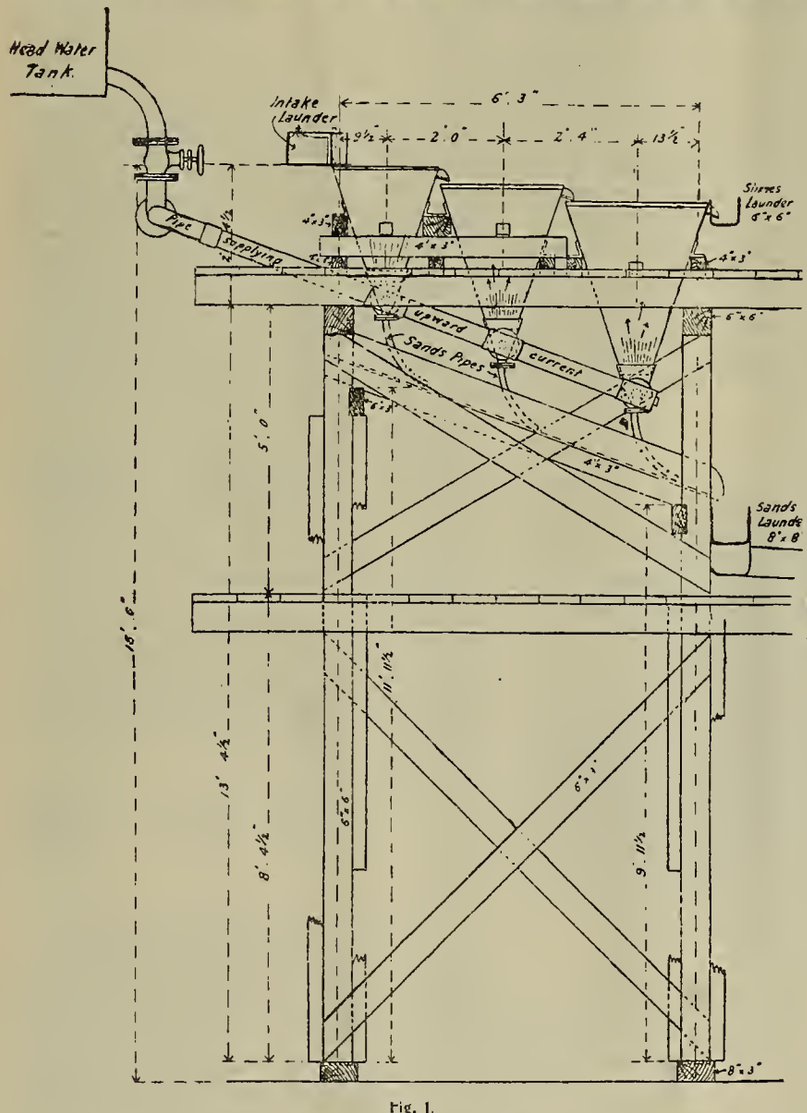


Fig. 1.

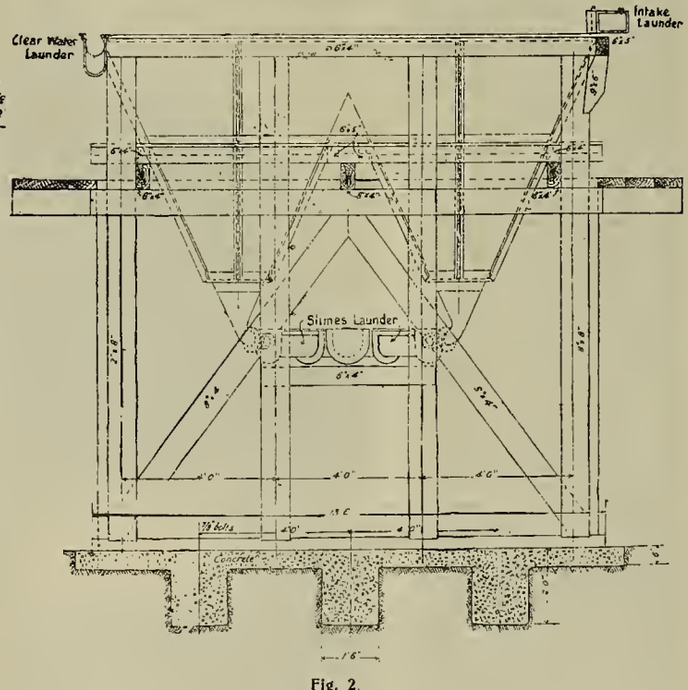


Fig. 2.

*Trans. Australian nst. Min. Engrs. (Condensed.)

under various conditions on the Kalgurli and Hainault mines for more than a year.

At present there are on the Kalgurli mine, in addition to the miniature lifts attached to the sand vats, which are very small and inexpensive to work, two 8-inch and one 6-inch lifts in constant work, and on the Hainault mine one 6-inch lift taking away the products from a 10-stamp battery, hut now being used only when the sand pump is under repair. Nearly all the ore reduction works on the field are using one or more of them.

Among metallurgists and authorities on the field it is unanimously acknowledged that, although they possess many advantages over a pump, they have proved rather expensive to work. Their efficiency on the actual steam power generated at the boilers is small. For the successful working of an air lift, the lift well should in no case be less than the height of lift above the well; but, even when these conditions obtain, the air lifts are seriously affected hy the pressure and also hy the volume of air, by the size of the air pipe and by the terminal position at hottom of lift, by the size of the lift pipe and by the consistancy of the pulp, hy the specific gravity of the ore and by the grade, i. e., the fineness or coarseness of the solids.

The fact that air lifts are influenced by so many conditions does not necessarily prove that they are difficult to work, and when properly installed no such difficulty need be apprehended; but it proves to my mind that it is not easy to find the best conditions under which air lifts work to the best economical advantage. Mr. Archihald estimates the efficiency of air lifts hy the pressure required to work them, and says "that the pressure required in pounds per square inch was approximately half the number of feet to be lifted."

In these two questions of detail I find that my experience does not coincide with that of Mr. Archibald. I helieve that the maximum pressure of air required to work an air lift is always that which will force itself through the air pipe to the bottom of the lift well, displacing the pulp.

Given that pressure, it becomes then, not a question of further pressure of air, but of volume of air. Other conditions heing equal, an air lift attains its greatest efficiency when the air pressure is just enough to carry through the pipe to the hottom of the lift well. This pressure is determined, when the air pipe is large enough to practically overcome friction, hy the depth of the well and by the specific gravity of the pulp. It may not be possihle to understand all the conditions under which an air lift works to the hest advantage, but it seems to me that an essential condition is the lightening of the water or pulp in the lift column by the introduction of air at low pressure, thus allowing the equalizing force of the outer liquid to exert an upward pressure. Under these conditions the air rises gently through the column in the form of large wads or plugs, and the pulp rises intermediately in a similar way. When the air pressure at the hottom of the lift is high, and especially when it is confined in its outlet, it will rise from the point of discharge more rapidly than the pulp can travel up the column.

Under these circumstances the air cuts through the ascending plugs of pulp and destroys the efficiency of the lift.

An 8-inch 37-foot lift, working from a well of equal depth with a 1-inch air pipe required an indicated pressure of twenty-eight pounds per square inch hetween a retention valve at the top of the well and the point of discharge at the bottom; but when this 1-inch air pipe was replaced by one of 2 inches in diameter, the lift worked more satisfactorily under the same conditions with an indicated pressure of only eight pounds per square inch. These conditions were confirmed in about the same ratio on two other lifts. On a 6-inch 20-foot lift, working from a 20-foot well, the point of the air pipe at the bottom of the column was subjected to a gradual filling up by the precipitation of sulphate of lime; hut the lift continued to work until the air pipe was almost closed, although at such times the pressure gauge between the retention valve and the bottom of lift indicated the maximum pressure of the air hehind the valve, which was sometimes 50 or 60 pounds per square inch at that time. When this pipe was pulled up and the accretion removed and the pipe replaced, the lift worked with greater economy with an indicated pressure of only 3½ pounds per square inch. This lift was working on the clear water overflowing from slime settlers. The hest results were ohtained when the air pipe was large enough to allow the air passing the retention valve to escape gently into the lift column, when the terminal of the pipe was neither enlarged nor contracted and when it did not rise ahove the hottom of the lift column.

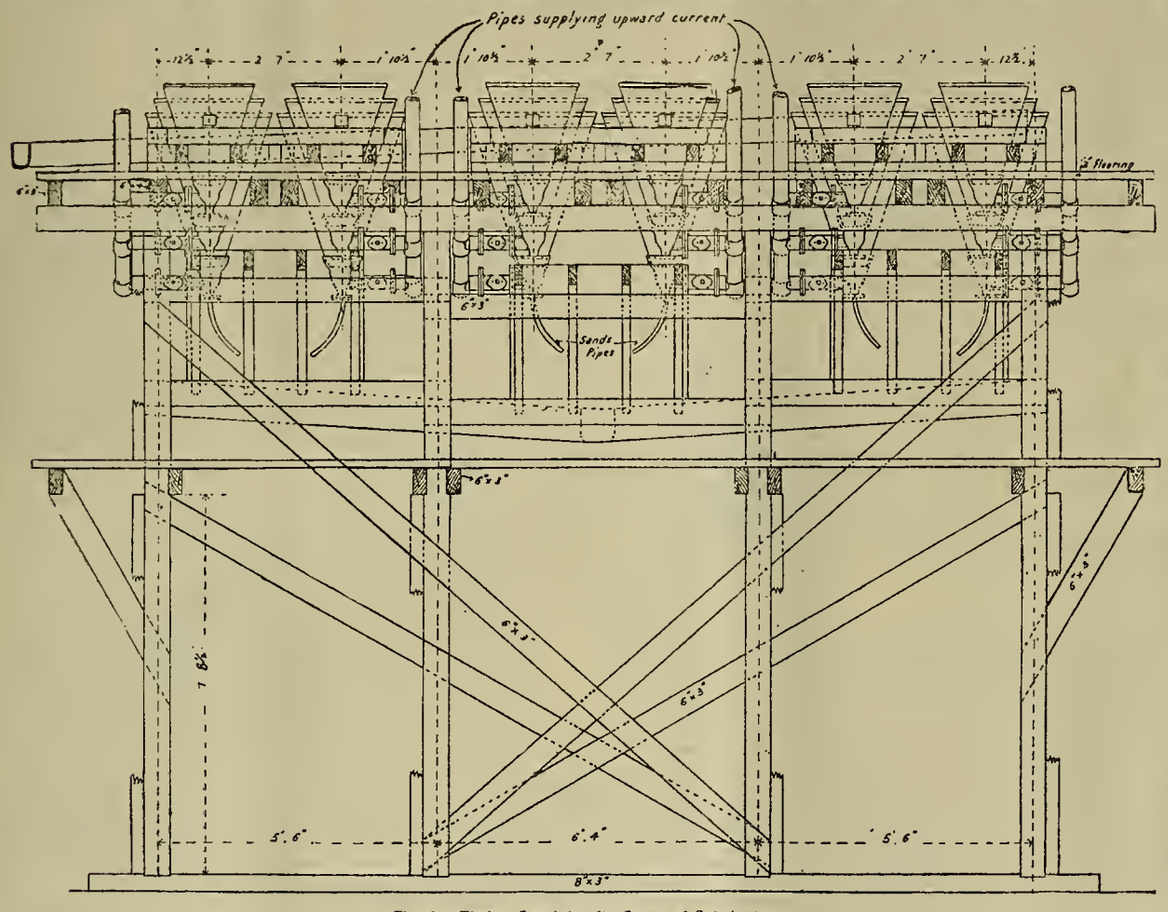


Fig. 3.—Timber Stand for Six Series of Spitzkasten.

(TO BE CONTINUED.)

Petroleum Briquettes.

A simple process has been devised at Coburg, Germany, by Mr. Maestracci for making petroleum briquettes, very much resemhling those made of coal. The modus operandi is as follows: To a liter of petroleum are added 150 grams of soft soap, 150 grams of resin and 300 grams of caustic-soda lye wash. This mixture is heated and well shaken. As soon as the mass begins to solidify, which should be in about forty minutes, the progress of the operation should be very carefully watched. To prevent the mixture running over a little soda should be poured into the vessel, shaking the whole until solidification is complete. When the operation is finished the matter is run into molds to be made into briquettes, which are then placed in a stove for ten or fifteen minutes. It then only remains to allow them to get cold, when they cau be used within an hour or two of being manufactured. By the addition of sawdust and sand the briquettes will be more solid and at the same time cheaper. From experiments said to have been conducted on tugs the inventor claims it has been clearly shown that these briquettes give three times more heat than ordinary coal, there being, in addition, the advantage of no waste remaining.

Tin in the United States.

Written for the MINING AND SCIENTIFIC PRESS.

The impost of a heavy duty on tin ore exported from the Straits Settlements, on the Malay peninsula, is likely to have an important bearing on the development of tin prospects in United States territory. Tin occurs in a number of localities in the United States, the most noted being those about the Harney Peak region and the Nigger Hill section, in South Dakota, and that in Riverside county, Cal. In the former extensive development and installation of heavy machinery at various places in the Harney Peak region has not as yet proven a commercial success, nor has it demonstrated the ability of those interested in the industry at these several places to properly and successfully handle an enterprise the character of which is, to say the least, novel—in America. At Nigger Hill considerable development has been done, and it is said good prospects have been found, but as yet no tin has heen produced in commercial quantities. In Riverside county, Cal., the Cajalco mine, on the San Jacinto estate, was equipped at large expense, and under the extravagant management failed to produce satisfactory results. At one time more than 120 men were employed, of whom but four were engaged in mining. Others were constructing roads, working gardens, building numerous houses, or putting in the elahorate plant. A mile or so distant from the mine a large force was engaged in building a dam across a gulch which was perpetually dry. The vein was small, but contained rich tin ore. The extravagances led to the closing of the mines, when about 40,000 pounds of bar tin had heen produced, and the ore was exhausted because of insufficient development. This is, briefly, the history of tin mining in the United States. At present there is said to be tin ore in the Santa Ana mountains, near the town of Santa Ana, Cal., and development is in progress. The most promising region for tin in United States territory is near Port Clarence, at and near Cape York, Alaska—promising hecause unproven; hut the stone occurs there, it is stated, in abundance, though the veins have not yet heen explored, if found.

Cape York* is located about half way hetween Port Clarence and Cape Prince of Wales. The York region extends westward from the York mountains to the extremity of Seward peninsula, an area of ahout 120 square miles. It is a plateau ahout 600 feet high, hounded on the east by the York mountains, which rise ahruptly from the plateau level to elevations of 2600 feet. Cape mountain, a sharp pinnacle of like elevation, marks its western margin. A shelving, shingle beach, not more than 100 to 200 yards wide, lies between the escarpment of the plateau and the ocean.

The larger part of the plateau is made up of jointed slates. To the west, near Cape mountain, is a helt of white limestone. Cape mountain itself consists of granite. The placer miners of the region found cassiterite in their sluice boxes, together with garnets, magnetite, gold and other heavy minerals, but the cassiterite was not recognized hy them until they learned it through reading a bulletin of the United States Geological Survey. It is reported that nearly all the streams northeast of York for a distance of 20 miles carry tinstone. Among them are the Anikovik river and all its tributaries, Kanauguk river, Baituk creek, Kinzuk creek and Lagoon creek, flowing into Bering sea, and Grouse, Buck, Yankee and York creeks, flowing into the Arctic ocean. York river is stated to be rich in stream tin, some of the gravel yielding from one ounce to one pound of tin to the pan.

In most mining regions of the world where tinstone is found granite is an accompaniment. This is the case in South Dakota, southern California and in Cornwall, England. In the latter district cassiterite is sometimes found in the slates accompanying

* See illustration on front page.

the granite, the tin replacing the feldspar developed in the slates by contact metamorphism. No acid eruptives have, as far as known, yet been found in the York region of Alaska, except the granite at York mountain, though there are large intrusions of greenstone. It is thought possible that the tin may be found associated with these greenstones, though, should this be found to be the case, the occurrence would be unusual. It is also possible that the stream tin may have been brought into the region at some subsequent time on the ice. The fact that there are a large number of boulders of rock scattered about the York region leads to the belief that the ice theory is one of considerable importance, and that the real source of the mineral may be found to be some distance away.

Flow of Water Over the Yosemite Falls.

Numerous miscellaneous measurements are made in California each year by the hydrographic branch of the United States Geological Survey on the streams that rise in the Sierra Nevadas. Measurements were recently made by S. G. Bennett, hydrographer, on the tributaries of the upper Merced river, which will be of interest to many persons who have looked upon the waters of these streams as they pour over the brink of the granite walls that form the boundary of the Yosemite valley, and have asked what is the volume of water flowing over the different falls.

This is a difficult question to answer, as the amount varies from season to season, from day to day, and even from hour to hour, according to the amount of snow and the state of the weather on the high mountains where these streams rise. These measurements, however, will answer this question in a general way, as they were made when the streams were at a stage said by the superintendent of the valley to represent the normal flow for June.

On June 24, 1903, Yosemite creek below Yosemite falls was flowing 119 cubic feet per second, or 53,400 gallons per minute.

On June 26, 1903, Merced river below Nevada and Vernal falls was flowing 853 cubic feet per second, or 382,800 gallons per minute.

One June 26, 1903, Illilouette creek below Illilouette falls was flowing 228 cubic feet per second, or 102,388 gallons per minute.

On June 26, 1903, Tenaya creek below Mirror lake was flowing 159 cubic feet per second, or 71,400 gallons per minute.

On June 26, 1903, Bridal Veil creek below Bridal Veil falls was flowing 20 cubic feet per second, or 9000 gallons per minute.

On June 26, 1903, the total flow of Merced river below the mouth of Bridal Veil creek was about 1380 cubic feet per second, or 620,000 gallons per minute, or nearly 900,000,000 gallons a day.

Electric Manufacture of Ferrosilicon.

The manufacture of ferrosilicon can only be carried on with economy in a large installation consisting of powerful electric furnaces. Those at the Livet works are of 650 H. P. each. The raw materials employed are preferably quartz, scrap iron and coke. Quartz is more suitable than sand, since the latter is often productive of obstructions in the furnace. Scrap iron and steel are to be preferred to iron ore, for the reason that, together with a pure quartz, the working proceeds without the formation of any appreciable quantity of slag. The purity of the product depends, therefore, entirely upon the care bestowed on the equipment of the works. The furnaces employed are of the resistance type, says M. A. Keller in Transactions Iron and Steel Institute of London.

As the use of high-grade ferrosilicon becomes more general the demand for electro ferrosilicon will probably increase; for the cost of production per unit of silicon is lower the higher the content of silicon in the finished product. For the manufacture of one ton of 10% to 15% ferrosilicon in the blast furnace, as much as three tons of coke are requisite, owing to the hot working and to the refractory nature of the slags. The process is thereby at once rendered too costly to compete on a large scale with the electrically produced ferrosilicon. If the additional cost of transport per unit of silicon in the case of alloys poor in silicon is considered, it may be concluded that the use of rich silicon is likely to be adopted, if solely for reasons of economy. The future of the electric furnace as applied to the metallurgical preparation of this alloy is therefore assured beyond question, and, for the reasons above mentioned, the development of the industry is likely to assume considerable proportions at no distant date.

Jade in China.

Large bodies of jade are found near Hsu-Yen on the river Ta-Yang that empties into the bay of Corea. Considerable jade is brought to that port by carts in large, rough blocks, and exported to other ports in China. It is found in a variety of colors—green, white, brown, red, etc. It is extensively used for tablets, table tops, cups, bowls, rings, bracelets, pipes, cigarette holders, carved figures, etc. It is worked by a combination of steel instruments and wet sand, the sand coming from the province of Shansi. The mines are not far from the sea and the cost of getting this stone aboard ship would not be very great.

Increasing Temperatures With Depth.

It is a well-known fact that there is an increase in temperature as depth is attained below the earth's surface. Various rates of increase have been reported and considered correct in the past. At one time it was stated to be 90 feet for each degree of increase in temperature. At another time 60 feet was supposed to represent the average depth for each degree of increase, but observations taken in deep mines in many widely separated regions show this increase to vary greatly in different regions, and in different mines in the same region. It also depends largely upon the temperature at the surface when the test is made. The temperature in the lower levels of a deep mine, no matter how well ventilated, is nearly uniform, while the surface temperature may vary 140° or more, at different seasons of the year. In some mines there are conditions which make certain levels of the mine very hot, due to chemical action, and to boiling water and steam arising through fissures which undoubtedly extend to great depth. The mines of the Comstock lode, Virginia City, Nev., is an instance of this. It is not always the deepest shaft or level in the mine that is hottest. This must be due to local causes, and to some extent to the condition of ventilation.

Following are the rates of increase in some of the deepest shafts in the world:

	Depth.	Feet Increase for 1°.
Calumet & Hecla, Lake Superior	4,580	223.7
Rand Victoria borehole	2,500	82.0
Port Jackson borehole, New South Wales	2,929	80.0
Wheeling wells, Virginia	4,462	71.6
Dolcoath mine, Cornwall	2,124	70.0
Schladebach borehole, Prussia	5,734	65.0
Baruschowitz borehole, Upper Silesia	6,573	62.1
Comstock lode, Nevada	2,230	33.0

In the case of the Calumet & Hecla mine, Red Jacket shaft, the temperature at depth of 4920 feet was 87.6° when the the shaft was first sunk, but after connection had been made with distant shafts the temperature was reduced to between 70° and 80°, averaging about 72°F. In the Tamarack mine, adjoining the Calumet & Hecla, the temperature is about 80°, but would undoubtedly be considerably higher if it were not for the large ventilating fans in use. The Tamarack shaft is 4938 feet deep, and at present the deepest shaft in the world.

Following are some temperatures in other Lake Superior mines and the depths at which they were taken:

	Depth.	Feet Increase for 1°.
Atlantic mine	907	99.5
Central mine	1,950	101.0
Conglomerate mine	617	95.0
Osceola mine	996	76.5
Tamarack mine	2,240	110.7
Quinsy mine	1,931	123.0

The mean increase is 1° in 100.8 feet. The variations among different mines are very noticeable and are due, no doubt, in large part to difference in ventilation. It is noted that those nearest the shores of Lake Superior show the lowest ratio of increase, and those farthest away show the highest.

In "Gold Mines of the Rand" Messrs. Hatch & Chalmers give the following data on deep mines in various parts of the world, showing temperature both in the strata and in the open air:

Country, Mine and Mineral Worked.	Depth in feet.	Temperature. Strata. Deg. F.	Air. Deg. F.
Belgium, Limon, coal	3,489	78	....
Austria, Adalbert, silver-lead	3,279	....	....
Prussia, Sanson, silver	2,532	....	....
England, Rosebridge, coal	2,442	93	85*
America, Comstock lode, gold-silver.	1,000	100	87
America, Comstock lode, gold-silver.	2,000	130	100

*At bottom of up-cast.

It will be noticed that the air temperature is from 8° to 30° lower than that of the rock strata itself. The temperatures in the mines of the Rand in South Africa, together with other data having a bearing on the subject, is given by "South African Mines" as follows:

Ferreira shaft: Depth.	Temperature. Deg. F.
123	62.4
221	63.4
317	63.6
409	64.6
496	64.8
572	65.1
638	65.7
698	67.1
758	69.0
808	69.1
Crown Deep shaft:	
825	66.7
906	69.5
1,030	70.7

These temperatures were taken by A. F. Crosse some years ago, and from them it would appear that the variation is somewhat less than 1° for every 100 feet. H. Jennings states that tests of the increment show only 1°F. for every 208 feet.

The following data taken from the last annual report of the Mines' Department contains interesting particulars regarding ventilation on three deep-level mines of the Rand:

	Robinson Deep.	Nourse Deep.
No. of employes	650	258 day, 10 night.
Depth of shafts	No. 1—2,498 ft. No. 2—2,449 ft.	No. 2—1,562 ft. vertical. No. 3—1,560.24 incline.
Cubic feet of air passing down down-cast per minute	30,000	42,898 (2 shafts).
Cubic feet of air passing up up-cast per minute	42,000	14,768
Temperature of air at the bottom of down-cast shaft	64°F.	No. 1—55°F. No. 2—62°F.
Temperature of air at the bottom of up-cast shaft	74°F.	No. 3—68°F.

	Rose Deep.
No. of employes	273
Depth of shafts	No 1—1,209 ft. No. 2—1,055 ft.
Cubic feet of air passing down down-cast per minute	30,000
Cubic feet of air passing up up-cast per minute	32,000
Temperature of air at the bottom of down-cast shaft	57°F.
Temperature of air at the bottom of up-cast shaft	67°F.

In the deep mines of Amador county, Cal., at 1500 to 2600 feet vertical depth, the temperature is about 80° F., varying somewhat according to condition of ventilation. The coolest places are about the down-cast shafts, and the hottest in close, poorly ventilated raises. All investigation of this interesting subject, however, has failed to establish a uniform rate of increase for all portions of the world, or even for different portions of the same region, but that there is an increase cannot be denied.

Miners' Unions and Miners' Wages.

To the Editor:—If all superintendents and foremen understood their business thoroughly, were willing to work harder than they do, and as hard as they should do to earn a proper salary, they could pay standard wages and would have little trouble with miners' unions.

If every miner was willing, faithful and competent, no employer having a practical knowledge of underground mining would object to paying the standard rate of $3 per day fixed by the miners' unions of California.

That all miners are not first-class is reasonable to suppose; that there is such a large proportion of worthless ones is hardly realized by the average miner himself. It is very forcibly brought home to any foreman starting up a mine requiring, say a hundred underground miners, for out of the first hundred engaged only about forty will prove to be good skilled men, who will, after receiving general instructions, proceed at once to perform their duties without needing advice or supervision; twenty will be ordinary, or average miners, and will need a great deal of direction and instruction; thirty will be indifferent and stupid, needing urging and pushing to get them to do anything like a fair day's work; the remaining ten will be classed by the shift boss as "not worth the powder to blow them to Hades."

Nevertheless miners' unions demand the same pay for each miner employed underground regardless of qualification or ability.

There is not the first principle of right or justice in this demand, and the miner admits it, but claims that it has to be done in self-defense; that employers cannot be trusted to discriminate fairly, and owing to the inherent selfishness, tyranny and greed of mankind, that if left to the employers' option very few men would receive even a living wage, and that the employer has as his remedy the right and privilege of discharging those who are incompetent and retaining the ones who give service.

It looks as if the only defense the mine owner has is intelligent, conscientious and fearless underground supervision.

In order to get such service better salary must be paid to compensate for the extremely hard work entailed upon one who properly performs such duty and to secure the right kind of brains and backbone. Of technical knowledge there is no lack, but handling men to advantage is not a matter of formulæ or mathematics, it is a thing by itself, and a foreman requires the use of ethnology and phrenology, as well as geology.

Improve the grade of mine foremen and you improve the miner under him. Pay the wages and see that you get the service. Chas. L. Lang.

Sonora, Cal., August 17.

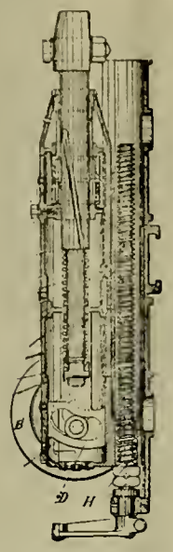
But six persons hold 1000 shares or over of Calumet & Hecla. They comprise Q. A. Shaw, 5500; A. Agassiz, 4904; J. J. Higginson, trustee, 4000; R. S. Oliver, trustee, 3500; C. P. Curtis, 1060; Lee, Higginson & Co., trustees, 1000. All of the above mentioned are of Boston.

Mining and Metallurgical Patents.

PATENTS ISSUED AUGUST 15, 1903.

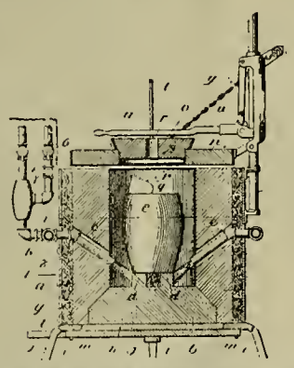
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

ROCK DRILL.—No. 735,717; H. A. Dalmas, Linden, Va.



In rock drill, reciprocating crosshead, piston provided with opening therein, collar encircling piston, spring seated between collar and crosshead and key adapted to enter opening comprising shank and oppositely disposed shoulders adapted to engage collar and plunger adapted to engage collar and key whereby collar is removably locked on piston.

GAS FURNACE.—No. 735,765; P. S. Harvey, Chicago, Ill.



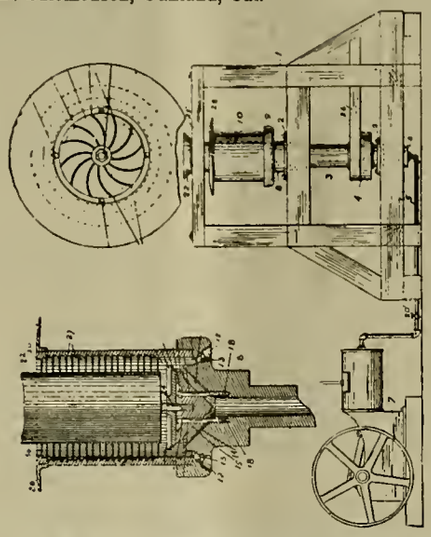
In gas crucible furnace, means for supporting crucible with space or chamber below, and means directing fuel into such chamber from side.

ROCK DRILL.—No. 735,767; P. Higgins, Beaumont, Tex.



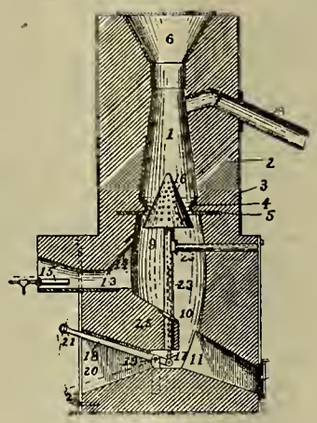
In well drilling apparatus, combination of drill barrel provided with guide, intercommunicating openings, drill slidably mounted within barrel and spaced from inner walls thereof, and having shank fitted in guide opening of plug, and stops at ends of shank for engagement with opposite ends of plug in alternation, distance between stops being regulable to vary sliding movement between drill and drill barrel.

ORE SEPARATOR.—No. 735,813; O. F. Pira and C. F. Salomonson, Oakland, Cal.



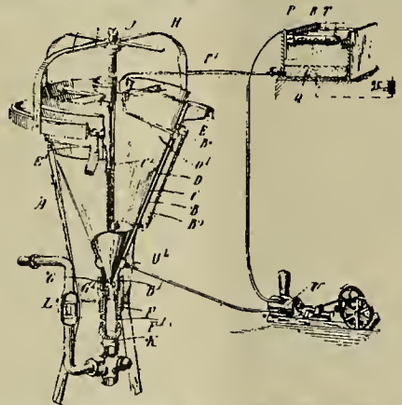
In ore separator, combination with rotatable cylinder, of centrally arranged distributing table, series riffles arranged on inner face of rotatable cylinder, means for imparting rotary motion to cylinder and distributing table, air-supply conduit discharging into cylinder, means for bodily adjusting distributing table whereby table constitutes valve for air-supply conduit, and feed pipe arranged within cylinder, through which material treated is delivered onto revolving distributing table.

QUICKSILVER FURNACE.—No. 735,919; A. A. Tregido, San Francisco, Cal.



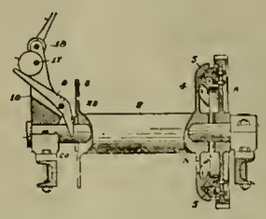
In quicksilver furnace, shaft in upper part of shell, having contracted base formed with conical seat, heat chamber below base and underlying discharge in lower part of shell, vertically movable hollow perforated cone co-operating with conical seat to close and open base of shaft to support and drop ore, opening through shell from exterior communicating with heat chamber below cone, and burner in opening.

APPARATUS FOR THE RECOVERY OF PRECIOUS METALS.—No. 736,036; H. L. Sulman and H. F. Kirkpatrick-Picard, London, England.



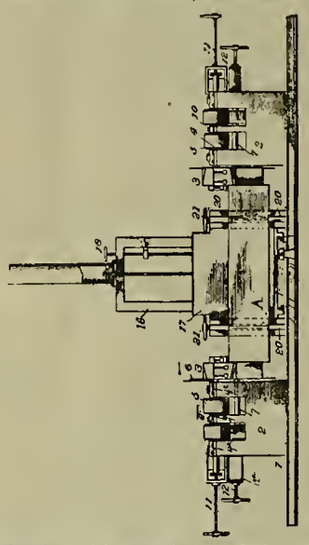
In apparatus for recovering precious metals, combination of vessel having inner amalgamated surface, body having outer surface amalgamated disposed within vessel and forming therewith narrow interspace, body of mercury charged with electropositive metal, inlet conduit for mercury from apparatus to top of interspace, outlet conduit for mercury from bottom of interspace to apparatus, and means for forcing solution carrying values upward through interspace.

CLUTCH FOR HOISTING MACHINES.—No. 735,862; P. F. Dundon, San Francisco, Cal.



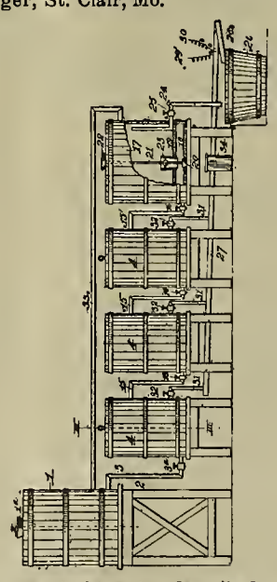
In hoisting machine clutch apparatus, solid fixed central shaft, winding drum revoluble thereon, motor gear wheel revolubly mounted on fixed shaft at end thereof, friction clutch members on gear wheel and drum adapted for engagement, means for throwing drum clutch out of engagement, lever for moving drum with clutch member into engagement, mounted directly above fixed shaft bearing, cam, gears and crank for operating lever, also mounted above shaft bearing, whereby width of machine is practically confined within limits of drum and clutch mechanism.

MINE TIMBER-FRAMING MACHINE.—No. 735,933; C. K. Barnes and A. Y. Smith, Pearce, Ariz.



In combination with tenoning head of work support having means for clamping and centering work, means for giving proper travel for cutting purposes to support past head in straight line forward and backward, and means giving another such travel at angle to first-mentioned travel and for maintaining positions of support obtained by one travel in either direction during other travel, so that two travels may be combined in succession to constitute circuit about tenoning head.

METAL EXTRACTING AND ORE LIXIVIATING APPARATUS.—No. 735,960. G. S. Foster, St. Louis, and A. D. Stringer, St. Clair, Mo.



In apparatus of character described, combination of solution supply tank, series of intercommunicating leaching tanks adapted to receive solution from supply tank, water tank having fume conducting connection with leaching tanks, and gas conducting pipe leading from water tank to solution supply tank.

Mining Summary.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

H Bratnoher, arrived at Dawson, says that several hundred mlners are on the verge of starvation in the northern part of Tanana district, and urges that immediate relief be furnished by the U. S. Government.

P. Johnson of Hadley, Alaska, manager, says they have men at work on the new copper smelter at the Mamie mine, owned by the Brown-Alaska C. M. Co on Prince of Wales Island. The smelter will be in operation by Jan. 1, and will have a capacity at the beginning of 400 tons a day, which it is expected to increase later on. The sawmill is in operation. Hadley is 28 miles from Ketchikan. One of the hardest troubles has been to clear the ground from timber, says Johnson. Vegetation is dense on the island, because of the mild climate and the heavy rainfall. The trees range from 2 to 11 feet in diameter.

The Alaska Con. Oil Co., J. A. Moore of Seattle, Wash., president, has men at work building a road to its holdings near Kayak. Its property adjoins the lands of the Alaska Oil Syndicate, the Lippy-Davis Co. and the English Oil Co. A drilling plant will be taken in. W. R. Brawley of Seattle, Wash., is manager of the Alaska Con. The payroll of the oil district amounts to $40,000 per month and 300 men are at work. The English Oil Co is putting up two derricks. The Abernethy-White Co., the Lippy Co. and the English Co. are all developing their holdings. The owners of the coal land propose building a wagon road from the coal mines and oil fields to supply the drilling plants with fuel and to furnish fuel at Catella and elsewhere in the district.

In Inmachuck district, at the Utica group, below Arizona creek and above Dashley Bros. group, extensive operations are being started by the owners, J. Johnson, G Shea, L. Lane et al.

The York-Alaska Tin Corporation, R. Parmele manager, have two creeks in the York district which carry placer tin deposits. Superintendent E. R. Steiner has men at work putting in a hydraulic plant to work both Buck and Onokovuk creeks.

The first quartz mill to begin operations on Seward peninsula was put in motion July 16, says the Nome Mining Gazette. The mill is on the Big Hurrah property, in the Solomon river country, near Nome, and is owned by C. D. and T. Lane. It is of ten stamps. A large quantity of ore is on the dumps ready to be crushed. The ledge has been tapped in several places.

ARIZONA.

COCHISE COUNTY.

The Gardner shaft of the Copper Queen Co., at Bisbee, is being enlarged to three compartments, the work being prosecuted from various levels by upraises. A heavy hoisting and compressor plant will be installed.

The Bisbee & Superior D. Co. has been organized, president, C. D. Shelden, of Houghton; vice-president, H. J. Vivian, of Calumet; secretary and treasurer, J. L. Nankervis, of Calumet, to operate a group of twenty-eight claims, comprising 4000 feet wide and 6000 feet long, in Tombstone canyon, 5 miles north of Bisbee. The ore bodies are found in limestone. W. Wills is in charge.

GILA COUNTY.

W. Pohl has a lease on the Tip Top No. 2, Bobby Burns and Buster mines, near Globe, and expects to begin work next week.

The four-compartment shaft of the Old Dominion C. M. & S. Co., at Globe, is down 350 feet and connection has been made at 300 feet with the sixth level of the mine, which gives good air in the shaft and facilitates sinking, says the Silver Belt. About Sept. 1 the eighth level crosscut will have been driven to connect with the shaft, and raises will be started from the tenth and twelfth level crosscuts. The electric light installation will be completed next week. Wiring the mine is progressing. At the smelter two furnaces are again running.

GRAHAM COUNTY.

The Shannon Co. continue to reduce 450 tons of ore a day, producing fifteen to eighteen tons of copper seven days in the week. The strike and cloudburst in June caused a shut down for three weeks. The mine is being developed, and it is stated the tonnage of ore in sight is on the increase. A new ore body is reported in the Black Hawk No. 3 tunnel, and a small streak of 40% ore shows in the Carter tunnel, the lowest workings of the mine.

MARICOPA COUNTY.

S. Hubbard and associates have bonded the Minerva group, near Wickenburg. This group adjoins the Goldberg properties in Black Rock district. Sinking will be commenced.

The Caledonia group of mines have been bought by C. W. Stewart of Los Angeles, Cal. These mines are 3½ miles from the Gila river and adjoin the Arizona-Pacific C. Co.'s properties, near Phœnix.

MOHAVE COUNTY.

The Treasure Hill Co. is sinking its shaft on the mine near Kingman, but the presence of an increasing volume of water is quite a detriment, as hoisting is done by whim, says the Kingman Miner. The shaft is down 125 feet and should the casing of one of the veins be broken a pumping plant will have to be put in before further work can he done.

C. T. English of St. Paul, Minn., consulting engineer for the Minnesota & Arizona G. M. Co., says that company has determinad to utilize falls in the Colorado river, 25 miles below the Grand canyon, for the estimated development of 23,000 horse power. The purpose is to furnish cheap power for the operation of several groups of mines in the desert on the Arizona side of the Colorado river, north and west of Kingman.

The Sorpresa G. M. & M. Co. has been organized by R. A. Gurley, C. Baylor, A. F. Judson, G. C. Davis and D. Sullivan of Denver, Colo., to operate sixty claims 3 miles south of Kingman, on which it has started work. A 3-mile pipe line to convey water from a spring in Railroad canyon to the mines will be laid and a 20-stamp mill will be built.

PIMA COUNTY.

F. V. Swinney has bonded the property of the Arizona O. & M. Co. in Davidson canyon, near Tucson.

The Azurite mine, 20 miles south of Tucson, has been bonded by L. Zeckendorf & Co. for $50,000, says the Bisbee Review. There are thirteen claims in the Azurite, carrying a low-grade copper ore.

YAVAPAI COUNTY.

At the Decatur mine, near Jerome, Superintendent Owens has overhauled and reset the machinery, resuming development this week.

The Ideal M. Co., operating at Groom Creek, is preparing to put up a reduction plant, which will comprise a steam stamp, with capacity of fifteen tons of ore per day, and a concentrator. E. L. Sharpneck is superintendent.

Plans are being drawn for the mill to be erected at the Home Run mine, near Groom creek, which has been bought by Douglas, Lacy & Co. The grading has been done. The pumps have been started in the Old King Extension mine, operated by the same company, and the drift is going ahead into the Iron King ledge.

CALIFORNIA.

ALAMEDA COUNTY.

The Pyne smelter, on Alameda Point, at Alameda, is reported to have suspended operations, because of the smoke and fumes destroying vegetation.

AMADOR COUNTY.

W. Moon, owner of the Red Cloud mine, south of Jackson, adjoining the Moore mine, says he has completed preliminary work and will start a tunnel, 500 feet south of the old workings, to strike the hanging wall of the ledge.

F. Eudey, a director of the Fremont Con. mine at Amador City, says a 20-foot vein of free-milling quartz which runs $5 per ton has been struck at the 1500-foot level, in the south drift from the Gover shaft. The framework of the mill is up and covered and the machinery is being set up. The mill is expected to be running by October 1st. The hoisting machinery at the Fremont shaft is in position and the boilers are being set.

At the Tom & Dick mine, ½ mile from Defender, it is expected work will be started next week, says the Amador Ledger. F. B. Joyce is owner.——At the Red Tape mine, owned hy Superintendent Lofstad, a shaft has been sunk 90 feet, showing ore. This is 1 mile from Defender.——At the Bunker Hill mine, near Amador City, grading for the mill was started last week.——At the Butte Basin mine work has been resumed in sinking the shaft with view of striking bedrock. The shaft is 110 feet deep, says Superintendent W. E. Stewart. It is a gravel proposition, and they expect to reach bedrock in 40 feet.

At the Kennedy mine, at Jackson, there are 300 men at work. The new hoist is ready to start. The mill is to be increased by addition of twenty more stamps, says the Amador Ledger. They have two mills completed, one of sixty stamps and one of forty stamps.

CALAVERAS COUNTY.

It is reported the South Bank mine on Indian creek, between Angels and San Andreas, will resume.

Construction work on the 20-stamp addition to the mill of the Angels quartz mine at Angels is progressing.

The Duchess mine, near Vallecito, has been closed down. This property has two tunnels and a 10-stamp mill.

At the Woodhouse mine at West Point, operations are under way, says J. B. Summers, manager. A hoist and other machinery has been put in.

Operations began at the Stockton Hill placer mine, near Mokelumne Hill, last week, says Superintendent Robinson. It is expected work will start up on the Hexter mine.

EL DORADO COUNTY.

(Special Correspondence).—The 240-ton cyanide plant that D. Frlcot is installing at the Sand Pile mill is expected to be in operation by the 15th prox.

Latrobe, Aug. 18

The tunnel at the River Hill mine, near Placerville, is completed—connection having been made last week. The length of the tunnel is 2800 feet, and several ledges were crosscut during its development, says the Mountain Democrat.

FRESNO COUNTY.

The New San Francisco Crude Oil Co. finished its No. 2 well, near Coalinga, last week, at a depth of 1300 feet. The well has not been pumped as yet.——The Penn-Coalinga well No. 2 has been finished and will be put on the pump this week. This well is opposite the Esperanza wells —— Well No. 3 of the Esperanza Oil & Gas Co. has been finished and proves to be a flowing well.——The 28 Oil Co., operating near Coalinga, is pumping its No. 8 well. No. 9 is down 1050 feet, with 11§ casing in the hole. No. 10 derrick is completed and the grade made for No. 11. Two 500-barrel galvanized iron tanks are being built near No. 9 well.

INYO COUNTY.

The Poleta mine, 6 miles east of Bishop, has been sold to W. McGregor, of Berkeley, et al. Development work will be started.

KERN COUNTY.

D. B. Newell and E. T. Garlock are putting up a plant to work the tailings of the Garlock mill, near Randsburg.—— Johnson & Jensen have reached bedrock on their placer claim and have put in a dry washer.

Owing to the shortage of water the Echo mill at Mojave has been forced to close down. The company is making preparation to develop more water.—— A. J. Martin, manager for the Flamoflume M Co., says he is arranging to put in machinery and will have twenty men at work in Jaw Bone canyon, near Mojave. A road is being built to the mine

The R. D. Robinson Oil Co. of Los Angeles will drill fifteen oil and three water wells on its Clairmont property, near Bakersfield, says the Reporter.

MARIPOSA COUNTY.

The dump at the Malvina mine, at Coulterville, is being sorted and worked at the Tyro mill, says the Prospector.

L. J. and L. E. Hanchett, of San Francisco, part owners of the Sweetwater mine, near Mariposa, report making arrangements to build a 20-stamp quartz mill at the mine.

MONO COUNTY.

In the White mountains, J. S. Stotler, with P. Blume of Tonopah, Nev., are developing the Continental group, near Furnace canyon, 6 miles from Queen and at an altitude of 8000 feet. The main ledge is 4 feet in width at the surface and carries silver-lead ore.

D. Bell and J. Aneer report having found coal in Cottonwood canyon, near Bodie. They have uncovered 9 feet of lignite croppings and have also found oil sand and fire clay.

NEVADA COUNTY.

Near Grass Valley E. C. Lawrey & Co. are putting up a 3-stamp mill at the Rose Hill mine, on Winchester hill, to be run by steam power.

The Virginia-Gold Hill mine at French Corral has been sold to G. F. Macpherson & Bro. of San Francisco. The vein carries values in copper and gold. There are three tunnels on the property, each 400 feet in length, which are said to show the vein.

N. W. Schoorel of San Francisco has bonded the Old Junction mine and adjacent locations — six in number — at the junction of the North and Middle Yuba rivers, 4 miles west of North San Juan. The Quartz Quarry G. M. Co. has been organized by N. W. Schoorel, G. B. Horsfell, D. E. Gates, N. A. Robinson and M. M. Johnson to operate the group. H. Huckins is superintendent. A road is being built to the mine, and as soon as completed a milling plant will be put in.

Superintendent C. Kent of the Last Chance mine, on Diamond creek, near Nevada City, has started up the mill.

The Menlo ledge has been struck, says Superintendent Starr of the Empire mine, near Grass Valley. Eight months ago a crosscut was started from the Omaha shaft, in the 1400-foot level, to develop the ground and cut this ledge. It is 15 to 18 inches thick and as far as observed contains low-grade ore. Work in the Omaha shaft has also been under way, which is down 1575 feet.

PLACER COUNTY.

Work on the Cash Rock mine, near Forest Hill, is progressing and preparations are being made to put in additional machinery.

PLUMAS COUNTY.

Superintendent Redstreake of the Jamison mine, near Johnsville, says he has fifty-five men employed and work is progressing. Indications are that there will be sufficient water in the supply lakes to run the mine and mill steadily till the fall rains. Most of the ore milled is being taken mostly from development made southwest of the old part of the mine.

A body of free gold ore has been found in the Bluff City mine at Quincy, says Superintendent A. E. Shinn, being opened in a prospect shaft sunk on the north end of the ledge, and 700 feet from the face of the working tunnel.

C. M. Dobson says as soon as arrangements can be made with the Round Valley Reservoir Co. for water for power purposes the work of opening up the Indian Valley group of mines at Greenville will begin, reports the Plumas Bulletin. He has arranged with the Prentiss and Blood interests by which the Indian Valley, the Union and the Summit groups, as well as some others contiguous thereto, will be consolidated. They are preparing to drive a lower tunnel from near the Short place, opposite Greenville. This is but 100 feet above the level of Indian valley and it is estimated that to open up the properties it will be necessary to drive this tunnel 1900 feet.

C. M. Dobson has bonded the Whitney-Duncan-Hook copper mine in Genessee valley, near Genessee, and will develop it. Parts of the ledge already exposed show values.

SAN BERNARDINO COUNTY.

The Gold Peak M. Co., near Victor, reports producing bullion of the value of $2500 in a nineteen-day run with five stamps.

SAN DIEGO COUNTY.

F. Harritt has a lease on the Hubbard mine, near Banner, and has begun work. ——J. D. Moulton and L. L. Wilcox are working the dump of the Ella mine by dry washing.——F. D. Jones will resume operations in the Elevada mine at Banner Sept. 1.——L. N. Bailey will resume work of drilling in the Kentuck tunnel Sept. 1.

The work of sinking the two-compartment shaft on the Helvetia mine, near Julian, is progressing with seven men, says the Julian Miner. The shaft is down 85 feet. The 10-stamp mill is running steadily, crushing ore from the High Peak.

SANTA BARBARA COUNTY.

The Union Oil Co. is planning to put in a pipe line from the summit of the Santa Rita hills, near Santa Barbara, to the beach, a distance of 15 miles.

SHASTA COUNTY.

L. W. Vaughn of Merced, president of the Stockton Con. C. M. Co., says he is preparing to open its mine on Pit river, 3½ miles below Big Bend, near Redding. There are ten claims in the group. Native copper is said to show in places. The property is remote from means of transportation and later it is proposed to put in a road or build a small smelter on the site.

SIERRA COUNTY.

Manager J. S. Herron has arranged to resume work on the Rattlesnake placers, 14 miles above Downieville, which are owned by J. Sparks of Reno, Nev.

SISKIYOU COUNTY.

C. Fry and T. McCauley have a lease and bond on the Sheba mine, and start operations this week. The mine is located on Patterson creek, north of Orofino.

J. F. Lewis is reported to have sold his interest in the Lucky Strike mine to W. H. Overton of San Francisco for $3000. It is on Cow creek, tributary to Russian creek in the Salmon country, near Fort Jones. The ledge is 3½ feet wide and carries values in free gold and sulphurets.

TRINITY COUNTY.

Work on the cyanide plant at the Headlight mine, on Coffee creek, near Trinity Center, is under way. The old plant was destroyed by fire. The capacity will be enlarged.——The Golden Jubilee mine will start up this week.

TUOLUMNE COUNTY.

The Garfield mine has been taken over

by W. W. Coe and Eastern parties interested in the Starr King mine. The Garfield is on the North Fork of the Tuolumne river, between the Grizzly and Providence mines, near Carters. It is opened by a tunnel 300 feet, connecting with a shaft sunk 100 feet. The vein is 22 inches wide. The quartz shows free gold and galena. Water can be obtained from the Seminole ditch at a height of 800 feet. There is a good millsite, but it is thought the Bonita claim, which is on the river below the Garfield, may be bought and a better site obtained.

At the Jumper mine at Stent connection on the 500-foot level has been made with the Golden Rule mine, track laid and the shipment of ore from the Golden Rule to the Jumper mill will begin. The new air compressor is set up and is being connected with the new boiler plant. There are 125 men at the Jumper.

At the Horseshoe Bend mine, near Columbia, sixteen men are at work. The main tunnel on the ledge is in 440 feet. Two crosscuts are being driven on the ledge, one 80 feet in, with no signs of a hanging wall, says the Magnet.

At the Eagle-Shawmut mine, near Chinese, there are 285 men at work.

A. E. Hendricks has bought the Little Beauty quartz mine, near Columbia.

Preliminary work having been done on the Blue Jay and Jack Rabbit mines, near Carters, the tunnel is being driven ahead on the vein to open up the ore shoot that shows in the upper tunnels.

In the action of W. A. Nevills vs. Tuolumne Mother Lode M. & D. Co., under a decree of foreclosure, the Columbus lode claim, near Moccasin creek, and the Big Oak mine No. 1 at Big Oak Flat, together with all improvements, mills, machinery, etc., were sold at public auction by a commissioner for $10,000, being bid in by W. A. Nevills of San Francisco, Cal.

Grading for the 10-stamp mill has been completed at the Norwegian mine, near Tuttletown, and machinery is reported arriving.

S. Carlon has bought a one-half interest in the Telegraph Line mine, south of the Tuolumne river, near Groveland.——Superintendent E. C. Loftus is putting in a set of boilers at the Santa Ysabel mine, near Quartz, and it is expected operations will be resumed by Sept. 1st.

C. F. Lukens has bought a one-twelfth interest in the Belcher and Daisy quartz mines, on Turnback creek, 1 mile north of Carters; also one-sixth interest in the John W., East and West Ledge quartz mines.

At the Altadena mine, near Columbia, sinking has proceeded with a windlass to a point where other power is necessary and a steam hoist is being set up, says C. A. Holland, superintendent.

The Tuolumne County Dev. Co. has been incorporated at Carters by W. T. Carter, K. C. Parish, J. E. Conde, W. R. Hall, C. A. Holland, J. F. Summers, C. I. McLaine, G. D. Rose and C. A. Belli.

YUBA COUNTY.

To divert the Yuba river from its regular channel, near Daguerre Point, near Marysville, Colonel Heuer, U. S. engineer in charge of the river improvement, and W. W. Waggoner, State Debris Commissioner, this week awarded the contract to E. Malley of San Francisco, whose bid was 23½ cents a yard for earth work and 90 cents a yard for rock. The proposals called for bids to excavate a waterway or canal 1000 feet long with an average depth of 25 feet. This waterway will be 800 feet wide at the upper end and 600 feet wide at the lower end, and will necessitate, as estimated, the removal of 670,000 yards of earth and rock. Thirty thousand yards per month will be the minimum allowed the contractor, and two years will be required to complete the work. It is estimated the cost will reach $150,000.

COLORADO.

BOULDER COUNTY.

R. A. Duncan, part owner of the Lucky Star mine, near Wallstreet, says operations have been resumed with men at work clearing out the drifts and getting ready to take out ore. There is a shaft 400 feet deep.

CLEAR CREEK COUNTY.

H. I. Seaman of Denver, president of the Yankee Con. M. Co., operating on Yankee hill, near Idaho Springs, says the new mill is ready for operation. The crusher machinery has been put on the ground floor, and from this the ore is raised by link buckets to the ore bins. The mill has fifteen rapid-drop stamps, and it is expected to have a capacity of fifty tons a day. The mill is equipped with amalgamating tables and two sets of concentrating tables.

DOLORES COUNTY.

F. A. McNeill is developing the C. H. C. group of gold claims in Mt. Wilson district, near Rico.——The Rio Dolores M. Co. started opening up their properties at Burns this week. The company has men at work on its Santa Clara mine, and the breast of the tunnel is in a 2-foot body of oxidized iron and lead carbonate ore, says the Rico News.——The Ocean Wave M. Co. is the owner of a group of claims in Horse Gulch district, which are being opened up, and in addition to drifting on the veins a shaft will be sunk on the Ocean Wave vein. Additional machinery will be put in.

FREMONT COUNTY.

Negotiations are on between the American Federation of Labor and Western Federation of Miners for forcing the issue of an eight-hour day in the coal mines of Fremont county, says the Times.

GARFIELD COUNTY.

The Boston-Colorado Coal Co., operating near Glenwood Springs, report work progressing. Development work was started in three different points—at the mines (2 miles up the canyon), at the townsite (farther down) and at the railroad tracks (which pass at the mouth). At the same time grading was begun on a tram line to run from the mines to the shipping point. The coal deposits in the canyon are said to consist of twenty-one veins, of which three are being worked, two openings having been made in each vein. There are three separate roads of escape from each mine. The coal is found near the surface and is run out to two ninety-ton bins, from which the electric cars will be loaded. The development work has so far progressed that 1500 tons daily are being shipped and 250 miners are at work. Shipping facilities are provided by the electric tramway. The line is 2.7 miles long and has an average grade of 3½%. Trains will be made up of twenty cars, carrying five tons each, drawn by an electric motor. To guard against disaster, safety switches have been put in at two points near the lower end. These switches will always be set, and, in case the motorman has his train under full control, he will be able to turn the switch without stopping. If he is going too fast, his train will pass onto the switch and up a steep grade, which will bring the train to a stop, says the Post.

GILPIN COUNTY.

The Penobscot M. Co. has their tunnel near Rollinsville in 360 feet, and the management is considering building a mill, says the Register-Call.

Superintendent Draper of the Town Topics G. M. Co., near Central City, says arrangements are being made to sink the main shaft of the East Notaway mine from 600 feet to a total depth of 1500 feet.

Idaho Springs parties have taken a lease and bond on the John L. and Nashville mines near the head of Virginia canyon, near Russell gulch, owned by H. J. Hawley of Central City and E. W. Williams of Denver.

GUNNISON COUNTY.

It is reported that the Brooklyn M. Co. is negotiating to buy the Elko concentrator for treating its own ores which are on Galena mountain, above Elko, says the Elk Mountain Pilot.

HINSDALE COUNTY.

It is expected the Dupre M. Co., near Lake City, will, pending further development of the Tobasco mine, lease the mill of the Tobasco M. Co., to make a thorough test of the cyaniding properties of the Isolde ore, says the Lake City Times.

LAKE COUNTY.

(Special Correspondence.)—J. D. Evans, manager of the New Leadville Home M. Co., is sinking and shipping 100 tons of ore per day. This company is operating the Penrose shaft, which is 680 feet deep. Instead of sinking the main shaft from the surface they are sinking an interior shaft, by means of which it will be determined whether they have ore to justify the expense of sinking the main shaft.——C. Delker has a lease on the tailings from the A. M. W. mill and is operating in a small way. He intends adding a crusher and rolls to his plant.——The A. M. W. mill is handling 100 tons per day, and they will increase the capacity by adding Huntington mills and concentrators.

Leadville, Aug. 17.

(Special Correspondence) —No one is able to tell at present where the strike, now on in the Cripple Creek district, will end. Whether it will extend to other parts of the State is an uncertainty. Some think the mill men at Colorado City have a grievance against the United States Refining & Smelting Co., while others believe the smelter has taken the proper stand. But a majority seem to think the strike in Victor and Cripple Creek is uncalled for, as the men had no grievance. Leadville operators do not anticipate any trouble, though the closing of the Denver plants has caused some of the mines in Summit and Lake counties to suspend operations for the present.

Leadville, Aug. 17.

(Special Correspondence).—The Manhattan M. & M. Co. expect to erect a hundred-ton cyanide plant here this fall. M. L. Sargent is superintendent.

Twin Lakes, Aug. 18.

The Ten Mile M. Co., near Leadville, reports having struck the body of silver ore for which it was prospecting. It has been followed for 30 feet and has opened up to 5 feet in width, says Superintendent Shepherd. The company is putting in a pump and expects to begin prospecting in the New York mine by September 1.

The New Monarch M. Co. at Leadville will start another shaft before September 1st. The ore shoot which has been developed has been shown to extend to the northeast, and the shaft will be sunk east of the present New Monarch, says Manager Goodwin.——The Bon Air and Starr properties, which are under lease to T. S. Schlessinger, are being operated under the name of The Hague M Co, and they are taking out a considerable tonnage of iron ore——The Crown Point mine is being operated under lease to M. Starne and J. D Murphy, and a portion of the ground has been sublet to four sets of lessees who are taking out considerable iron ore.

It is expected that P. K. Connolly will have operations resumed on the Dolly B. mine in Big Evans gulch, near Leadville.

LA PLATA COUNTY.

M. McLean, C. E, and J. C. Herr of Durango, and T. Dapra of La Plata, began work last week on their group of six claims on the east side of Silver Lake gulch, near La Plata.

J. T. O'Hara has taken a lease and bond on the Yellow Eye mine, near La Plata, and will put men on next week.

LARIMER COUNTY.

President McGuire of the Grand Republic and Mount Zirkel C. M. Cos., at Pearl, says his companies will build a concentrating plant near the Mount Zirkel mine and ground will be broken by September 10th. A smelter is also proposed.——Developments continue at the Coldwater copper mine at Pearl.

PITKIN COUNTY.

Aspen reports say the fire which broke out anew in the Smuggler mine there last week has gained such headway that the management has closed the mine to let the fire burn out. The company will work the Molly Gibson mine for the present. Smoke is coming out of the Cowenhoven tunnel in great volume.

SUMMIT COUNTY.

(Special Correspondence) —E. F. Hall, Jr., manager of the French Guich M. Co., says he will put in a dredger and plant of machinery large enough to handle 3000 to 4000 cubic yards of earth per day. The company owns 350 acres of placer ground near Breckenridge and is only working part time at present, on account of the scarcity of water.——The Gold Pan Co. has closed down after a successful run during the summer.

M. W. Hoyle has a lease on the Puzzle mine and is cleaning same out preparatory to operating. The tunnel is in 2200 feet, and they are running a crosscut from the breast of the tunnel to cut another vein. The breast of the tunnel is in sulphide ore at 280 feet below the surface. He expects to put in a compressor later on.

J. B Conrad has a lease on the Atlantic claim of the Washington group, and has a shaft 25 feet deep, and reports striking a vein of ore. It will be necessary to put in a pump before sinking the shaft deeper. The property is in Illinois guich, near Dillon.

C. S. Newsom has a lease on the Washington mill and proposes to enlarge the same. He has twenty stamps dropping at present.

Breckenridge, Aug. 17.

The Oro Grande Placer M. Co. will install a steam shovel for removing the rocks from the pit, which will do away with hand work.

Dillon, Aug. 17.

(Special Correspondence).—The Tillicum M. Co. has seven claims 8 miles northeast of Dillon, in the Blue River range, 4 miles from the Continental Divide, which they are developing. The ore is low grade, but they have a large body of the same. T. Hamilton has charge of the work.

Dillon, Aug. 18.

TELLER COUNTY.

Fifty miners went to work at the El Paso Con. mine at Cripple Creek on the 19th under protection of an armed guard, part of which was furnished by the sheriff of Teller county and part by the Mine Owners' Association. Men armed with rifles are guarding the shaft house and all of the approaches to the mine, refusing admittance to all not actually employed there. This action is in the nature of a test, and if no interference is made by the union miners it is understood that a number of leading mines will attempt to resume operations at once. Provisions have been sent to the El Paso mine, it being the purpose of the operators to keep the miners on the property during the labor difficulty. Work was also resumed on the drainage tunnel under the same conditions, the union having called Superintendent Bainbridge's men out on the 13th. At the Portland mine, which employed 525 men, President Burns says he has nailed up the shaft and the property will be closed for an indefinite period. Electric lights have been placed at all points about the mine, which will be lighted at night so that no one can approach within a certain limit and not be observed. It is estimated 500 teamsters and ore handlers are out of work because of the strike. The C. K. & M., the Old Gold and the Valley City are working, as they ship to the Dorcas mill at Florence, which is union.

The Burns, Shannon and Howbert interests in the Portland mine at Victor have been sold to W. K. Ryan of New York, for the Whitney-Ryan syndicate and the Guggenheim Exploration Co, the price being reported at $5,000,000.

The Cripple Creek Enterprise M. Co., operating under the streets and alleys of Cripple Creek, have taken a lease on the Trachyte mine from the Practical M Co. They also have a block on the Deadwood mine of the Woods Investment Co., and will begin to thoroughly prospect these holdings.

J. Erisman, manager of the Blue Flag M. Co.'s mines on Bull hill, Cripple Creek, says sinking on the Blue Flag claim will be continued indefinitely. The shaft is down 100 feet. Next month they will increase their plant by two 80 H. P. boilers and heavier hoisting machinery.

IDAHO.

BLAINE COUNTY.

M. H. Lipman reports at his Point Lookout group of mines, near Hailey, the face of the drift had cut 2 feet of galena and gray copper, carrying native silver. The discovery was at a depth of 350 feet below the croppings.

The Queen Hills M. Co. has been incorporated at Halley, principal place of business at Bellevue, with J. A. Schenck, J. Rees, T. Naggs, G. D. Rees, L. T. Witty, and R. M. Barnes of Memphis, Mo., and R. B. French and D. Whitner of Bellevue, as directors.

BOISE COUNTY.

Manager Dorsey has let a contract on the Independence mine at Pearl, and has also put men to work on the Highland Mary and the Blue Bucket, that he is developing. The shaft has come into ore at 125 feet.

W. Gibbs has a lease on the Lilliputian quartz claim on Willow creek, near Idaho City, and has started work. There is a 1-stamp mill at the mine.

ELMORE COUNTY.

It is reported the Atlantic M. Co. will build a 100 stamp mill on its group near Mountainhome. The Monarch mine shaft will be sunk an additional 200 feet. A new hoisting cable 1000 feet in length has been put onto the drum. The shaft at the Monarch is down 600 feet. The company has twenty-five men at work at its mines.

The Big Lode M. Co., operating at Atlanta, will start its twenty stamps dropping this week.

A 10-stamp mill will be built at Atlanta by the Queen River Con. M. Co., says the Tribune.

LATAH COUNTY.

G. B. Dennis has secured control of the Muscovite mica mines, 15 miles from Voilmer (Troy), and expects to start operations within a month working twenty miners and about forty girls. The mine was worked regularly until 1896, when it was closed. The vein is an upright ledge between walls of mica slate and granite, 8 to 12 feet wide, the pay being continuous for 450 feet. Development consists of shaft and tunnels, 3500 feet of work having been done.

SHOSHONE COUNTY.

At Lewiston, D. T. Denton of Duluth and R. B. Hibbs have bought 200 acres of placer ground on Snake creek in the Pierce district. Mr. Denton is president of the Alder Creek M. Co. and Mr. Hibbs is the manager of the company's properties on Reed creek. It is the purpose to hydraulic in the spring.

Work has been resumed on the Happy Day, a prospect northeast of the Hercules, near Wallace.

The Sunrise M. & D. Co, whose property is northwest of the Hercules, consists of three claims owned by O. C. Smith. The tunnel is in 130 feet.

The Eagle Peaks G. M. & M. Co. has been incorporated to work mines about 12 miles from De Borgia, on the summit of the Bitter Root range. H. Topping of Newark, Ohio, is the principal incorporator.

The Toledo syndicate which has bought the Simmons-Avery group at Beartop, near Murray, will be known as the Bear-

top M. Co. Manager C. C. Groesbeck is superintending the installation of the machinery. An assay office is to be established by the company.

The Wonder M. Co. has been incorporated to operate a group of five claims 2 miles from Gem. A tunnel is being run in 150 feet to tap the ledge. Stewart & Howard of Spokane, Wash., with J. F. Howarth, P. Luela, W. A. Hostetter, J. E, Thompson, S. R. Cooper and F. P. Greene are incorporators.

The option which members of the Empire State-Idaho M. & Dev. Co. held on 30% of the Black Hawk M. Co. has been taken up. The Black Hawk is near Government gulch, near Wardner, and contains a body of high-grade galena ore. The property is being developed by a tunnel that is in over 200 feet.

The Moose Creek Placer M. Co. has been incorporated at Wallace to operate a group of placer claims on Moose creek by F. J. Short, L. L. Sweet, O. M. Gaut, J. F. Moffatt, D. Reardon, P. Rourke and K. Powers.

The Sonora M. Co. has let a contract for a 100 foot extension of its tunnel to P. Brady.

Work has been resumed on the New Hope mine, 2 miles below Osburn.

MICHIGAN.

Calumet reports say the production of copper of the Lake Superior mines in July was less than 16,500,000 pounds. There is little metal in sight for the district and it is thought some of the mines are not producing to their full capacity, and that the companies are withholding their copper until prices advance.

HOUGHTON COUNTY.

Last week the Arcadian mill, near Hancock, went out of commission, the Trimountain having shipped the last carload and the cleanup being finished. It is thought the Centennial may use the mill.

The work of ballasting the extension of the Hecla & Torch Lake Railroad to the site of the proposed shaft on the Kearsarge lode, near the northern limit of the Calumet & Hecla Co.'s property, began last week; also the laying of the 5-inch air main north from No. 7 shaft is under way.

The Osceola Con. M. Co. is operating five shafts double shift, four at the Kearsarge and No. 6 at the Osceola, near Calumet. At the mill six heads are in operation. Electric haulage may be introduced in the Kearsarge. The exploratory winze from the twelfth or bottom level of the Tamarack Junior branch of the Osceola Con. is down 336 feet from that level. Four hundred feet more will carry it to the boundary winze sunk on the plane of the lode.

ONTONAGON COUNTY.

At the Adventure mine, at Greenland, the rock at present being taken out is being sorted and the mineral yield is better than any that has been reported since the stamp mill started operations. Ten drills are being employed in enlarging the mine openings, and sinking is being confined to No. 1 and No 3 shafts. Drifting and stoping is under way in the Butler tunnel on the Evergreen lode, and three drills are opening stopes on the Butler lode. The present rock shipments aggregate 700 tons daily, as against 1500 tons which were shipped early in the year, but of higher grade.

MISSOURI.

JASPER COUNTY.

The Luke & Brown M. Co. of Carthage has been incorporated by J. Luke, J. Brown and B. Ash.

McMunnigal & Co., operating a prospect on the Burgner land, near Webb City, cleaned thirty-two wagon loads of dirt last week on hand jigs, and made 10,180 pounds of lead and 19,030 pounds of jack.——Edwards & Co, operating the Slaight & McConey mill on the Missouri Zinc Fields ground, propose to work in their own ground, as the pump will be put in operation by the Zinc Fields Co.——The Wanner L. & Z. Co. has started its mill, and an air drift is being cut from the mill shaft to the pump shaft.

Dodge & Patton are building another mill east of the Holy Smoke on the Aylor tract at Alba, which is the third mill for this firm ——The Majestic mill, north of Webb City, has been remodeled, and it is producing thirty-five tons of jack and ten tons of lead weekly, says Superintendent Nicholson.

MONTANA.

BEAVERHEAD COUNTY.

(Special Correspondence).—At the Birch Creek smelter of the Western M. Co., operating the Indian Queen mine near Dillon, Superintendent G. A. Heberlein is treating 42 3 tons of dry ore per day, and shipping twenty tons of matte every four days. The matte assays 55% copper, 30-40 ounces silver, and 0.10-0.25 ounces gold. T. F. Stevens is manager of the company.

Dillon, Aug. 17.

FLATHEAD COUNTY.

Greenough & Larson, who own mines in the Cœur d'Alene country, have a bond on the B. & B. mine at Troy, and are working thirty men. It is a silver-lead proposition and they expect to ship the ore.

At the Abbey mine, near Kalispell, the steam hoist used at the Kendall mine is being used to sink the new shaft. The future work of the company in developing the property will be decided by the results of the development work now in progress. E. Johnson is in charge.

GRANITE COUNTY.

L Evans and J. J. Fitzpatrick of Butte, who have a lease on the Southern Cross mine in Georgetown district, near Philipsburg, have bought the Twilight mill and fitted it up. The cyanide process will be used. Mr. Fitzpatrick, one of the leasers, has been experimenting with the ores from this mine for a year and believes he has solved the problem of extracting the values. The mill was started up Monday. The Southern Cross adjoins the Cable mine on the west.

The Montana G. M. Co. has again started its mill on the Sunday mine in Royal district, near Phillipsburg. The mill was closed three months ago to allow of sinking from the 120 foot level another 100 feet, and since sinking the company has been drifting and raising, says Superintendent P. C. White. This development filled the ore hins, no stoping being done hut development work being continued until there is 300 feet of work from the 220-foot station. The first stope was started last week from one of the raises, the ore being 30 inches wide and assaying $30.

Full operations are again under way at the Bimetallic mine and mill at Granite, with seventy-five men at work. The number of men in the mine will be increased. P. A. Fusz is manager.

JEFFERSON COUNTY.

The Big Indian M. Co., operating a group of mines near Basin, report having made a cleanup last week of $6300 from a two weeks run of the 60-stamp mill. From the previous fourteen days run they cleaned up $7000. At an expense of $12, 1000 tons of ore were blasted down from the pit to the ore house at one time, says the Basin Progress. The holes are hored with long augers, the ground being too soft for the use of drills. The company will start operations on a new ore body developed by the south tunnel.

LEWIS AND CLARKE COUNTY.

The Inter-Mountain reports Mrs. Gilroy has bought the Gold Coin quartz mine and has put men at developing and running a tunnel to tap the lead. The ore carries gold, silver and copper.

MADISON COUNTY.

L. D McCall has men putting up the U. S. Grant mill near Virginia City. In the mine he is driving one of the tunnels. T. Port, superintendent of the North Dakota Co which has a lease and bond on a group of claims in Hungry Hollow, has men at work opening them up.

A lease and hond has been given on the Bell and Grand Union claims, near Virginia City, to Merrill & St. Johns of Tacoma, Wash. The Bell is bonded for $25,000 and the Grand Union for $37,500. G. St. John has put men to work in the tunnel.

C. T. Weidman has bought a 5-stamp mill for his mine near Pony.

The preliminary work on the U. S. Grant mill and cyanide plant near Virginia City is progressing rapidly. The foundations are finished.

The electric drill lately installed at the Garnet Co.'s plant, 2 miles from Pony, is working and the tunnel has advanced 80 feet. It will be driven 1500 feet. Within that distance four veins will be crossed. At about 1500 feet the Galena vein will be cut at a depth of 600 feet, and 300 feet lower than the present workings. The Garnet 20-stamp mill will run on custom ore from the Bozeman, owned by the McKitterick estate, and other mines in the neighhorhood, including the Proctor-Knott group, Elkhorn and Iola.

Operations are again under way on the Old Joe group of mines on Mineral hill, near Pony. The first class ore will be shipped to the smelters, while the concentrating ore will be hauled to the Strawberry mill, 2 miles above Pony. L. B. Olds is superintendent.

PARK COUNTY.

At the Horseshoe Camp, 16 miles northwest of Cooke, the Elmen-Burke-J. de Bernard Co. of Red Lodge has secured control of 280 acres of placer ground in a gulch, and conditions are favorable for hydraulic mining. A stamp mill of 10-ton daily capacity will be placed in operation on the Klondike free-milling gold claim.

NEVADA.

EUREKA COUNTY.

The Lincoln M. Co., owning a group of lead and silver claims at Phillipsburg, in in Diamond district, 18 miles north of Eureka, has incorporated at Carson City.

HUMBOLDT COUNTY.

The mill of the Sheha M. Co., south of Mill City, is running but not to full capacity, on account of shortage of water. The lower tunnel to tap the Sheha ledge is in 790 feet and it is expected the ledge will he reached by Oct. 1st.

LINCOLN COUNTY.

The Empire Con. M. Co. has been incorporated to operate the Mountain Jewel group of mines, near Searcblght, hy W. H. Fuller and J. F. Dexter of Los Angeles, Cal., and J. Flynn, E B. Scott and H. Oster of Searchlight. Tbe Mountain Jewel group consists of five claims and the Badger group of six. A. A. Ross is superintendent.

NYE COUNTY.

The Pactolus mine, in Pactolus district, near Tonopah, has been shut down, and so far as the Salt Lake Co., which has a bond on it, is concerned, it is uncertain when operations will he resumed, says the Tribune. One thing which has been a hindrance to the development of the region is its isolation. The camp is out in the desert, where water and transportation advantages are scarce.

C. Peters says he is arranging to put in a mill of 10-ton capacity at his mine at Ellsworth, 10 miles west of Berlin. The shaft is down 50 feet and a ledge 2 feet wide carrying gold values has been opened up. Near the Peters mine, the Plute mine, owned by New York men, is being opened up. A mill with capacity of twenty-five tons a day is being put up.——Tbe Phelps-Stokes property at Berlin is working 150 men.

The Timher Hill M. & M. Co. is taking out ore for shipment to Salt Lake City, Utah, via Austin, and first shipment was made this week. The company will put on more men.——The Salt Lake & Willow Springs M. Co. is preparing to put men to work on a group of claims which have a showing of gold and copper. Timber Hill is 12 miles from San Antonio and 35 miles north of Tonopah, in the same range of mountains, says the Austin Revelille.

STOREY COUNTY.

The Con. Cal & Virginia and the Ophir mines at Virginia City have been consolidated under one management, with J. R. Ryan as superintendent.

WASHOE COUNTY.

Work on the Desert King and Wedekind mines near Reno, owned by J. Sparks, is progressing. There are thirty men employed. The work under way is development exclusively, principally sinking the main shaft, which will be put down to the 1000-foot point and drifts extended on the vein.——The Con. Nevada, owning the adjoining properties to the Wedekind mine, is meeting with delays in sinking, owing to bad air in the shaft. Plans are being made to overcome this by putting in blowers to he run by electricity. The company is also considering using a diamond drill outfit.

WHITE PINE COUNTY.

The Wide West M. Co. is running drifts on a body of free milling gold ore from the hottom of the winze and stoping in the upper tunnel in the Wide West mine, in Cocomungo district, near Cherry Creek, says the Cherry Creek Miner. A lower tunnel will he run 200 feet below the present workings, to tap the ledge below the level of the winze, to which an upraise will he made for air connection. The company's mill was started up this week.

The Last Hope and Columbia mines, near Ely, have been sold to the White Pine Copper Co. for $10,000. These claims show gold and copper-hearing quartz——Work is progressing at Pilot Knob, with the station at 450-foot level of the Giroux shaft being cut.

The Bimetallic group in Dolly Varden mining district, near Cherry creek, has been incorporated under Nevada laws hy Butte, Mont., and Eastern men, and will put men at work this week on its copper properties, says the Cherry Creek Miner.

NEW MEXICO.

GRANT COUNTY.

A group of the Ahhott & Mason claims, west of Stein's Pass, have been sold to the Arizona Line M. Co.

The Gem Turquoise Co., under Manager Parker, is operating in the Burro mountains, near Silver City. Several new turquoise mines are being developed in the central Burro district.

LINCOLN COUNTY.

The mill at the Helen Rae mine at White Oaks is being repaired preparatory to resuming work, says the New Mexican. Additional machinery has been placed in the mine and an improved method for treating the ores installed. Work is also to be resumed on the Parsons mine.

A strike of oil is reported made in the well of the New Mexico Oil & D. Co., near Flat Top mountain, at Carrizozo. The strike was made at depth of 320 feet.

OTERO COUNTY.

E. A. Hersperger of Alamogordo, who has a lease on the Garnett mine at Jarilla, has started operations.——E. Knight is developing a manganese mine near Tularosa.

SAN MIGUEL COUNTY.

The reduction plant at Tecolote was completed last week, says the New Mexican. The mill will test a new process, which is claimed to lessen the cost of treating the low-grade copper ore of the Tecolote district. It has a capacity of twenty-five tons a day. A 150-ton plant will be erected later. Standish & Matt are building a lixiviating plant to treat low grade copper ores.

SIERRA COUNTY.

Last week men were put to work hy the Prosper G. M. & M. Co at Hillsboro to open up the 100 and 200 foot levels. The mill has been repaired.

TAOS COUNTY.

C. Garner is developing the Hornet mine near Red River.——S M Malette is developing the Boggy lode, 3 miles below Red river.

OREGON.

BAKER COUNTY.

Work was resumed on the Golden Rule mine last week, which has been idle for four years, with A. Hillier, half owner, as superintendent. The Golden Rule is in Cable Cove district, near Sumpter. Hillier's plan of development is to ahandon the old workings and move farther down the mountain and start a crosscut, which in 400 feet is expected to tap the vein at depth of 450 feet.

Superintendent Townsend of the California mine, near Sumpter, says the mill began operations this week. The capacity will be 100 tons a day. The building and machinery were arranged to increase the capacity should conditions demand.

Chloride of silver, with some gold in the quartz, is reported struck in the tunnel being driven on the Cuba and Porto Rico group, adjoining the Midway mine, near Sumpter, by Superintendent E. P. Smith. The quartz vein has a width of 6 feet.

JOSEPHINE COUNTY.

The St. Helens & Galice M. Co., operating on Galice creek, near Grants Pass, report making preparations for completion of the reservoir at the head of the high ditch; enlarging of all ditches and flumes, putting in an additional hydraulic plant and derrick and a general increase in the facilities for operating at Galice creek, including the cutting and hauling of 25,000 feet of lumber for the next season's work; also deepening the bedrock cuts, says the Courier.

SOUTH DAKOTA.

CUSTER COUNTY.

Manager Ratte of the Ivanboe G M. & M. Co., a consolidation of the Ivanhoe and Chilcoot groups of mines, says the company is preparing to put up a steam hoisting plant, with air compressor and machine drills. The mines are 9 miles east from Custer.

LAWRENCE COUNTY.

The Columbia Commercial G. M. & M. Co. has been organized hy Deadwood and Eastern parties to operate on Polo peak, Miller gulch, 3 miles northwest of Deadwood. The company owns 260 acres surrounding the peak, on which some shallow shafts and tunnels have shown bodies of quartzite ore The company intends to build a cyanide plant later on. E. McLaughlin is president, W. McLaughlin vice-president and treasurer, and O. U. Pryce secretary.

The Canton M. Co. having struck water in the shaft being sunk on its Canton vein, near Deadwood, ceased work on the same. The tunnel which was being driven from the south end of the vein has also been stopped for the time being, and work is being done on the north end of the same vein, a mile distant from the former workings. The proposed millsite for the company is in Patterson gulch, at the extreme north end of its group, and it is from this gulch that the tunnel is being driven.

J. S. Ford and J. Thompson of Chicago, Ill., part owners in the Hercules M. Co., are arranging to resume operations at their holdings in Two Bit gulch, near Deadwood, says the Lead Call.

PENNINGTON COUNTY.

Tbe Standby mine at Rochford is idle, but it is reported that the Ajax M. Co., owner of the property, proposes to re-

sume.——The Ohio-Deadwood M. Co. is preparing to resume work on its grounds above Rochford, along Little Rapid creek.

UTAH.

BEAVER COUNTY.

Development work will be resumed at the Sheep Rock M. Co.'s properties on Indian creek, near Milford, before September 1.

The mill at the Horn Silver mine at Frisco has been started up again after a shutdown of several weeks, says Secretary Morris.

CARBON COUNTY.

The American Asphalt Co. reports operations progressing on their holdings in the White River country, near Price. Manager Barron, with headquarters at St. Louis, Mo., says he has twenty-eight six-horse teams on the road, transporting the product from its ground on the Cowboy vein, which is between the claims of the St. Louis company. The product of these mines (gilsonite) is used by the wire manufacturers as a coating to prevent rust, and bicycle manufacturors use it for varnish and enamel.

IRON COUNTY.

W. W. Cook of Frisco, Beaver county, has taken an option on the Indigo Blue group, south of Indian peak, near tateline, for $30,000. It is stated the group shows a 3-foot vein that carries copper, gold, lead and silver.

JUAB COUNTY.

The annual report of the Yankee Con. M. Co. at Eureka shows net earnings of $18,893.60, besides an expenditure of $6000 for a compressor plant. During the year 5373 tons of first-class ore netting $16 per ton was sold, and 3059 tons of second-class which netted $4.20 per ton. L. A. Amsden continues as manager.

The South Swansea M. Co. at Eureka has given up the development of the lower levels of that property and the management has ordered the pumps withdrawn, says the Tribune, the reason given being that the ore found below is not of grade sufficient to stand the expense.

PIUTE COUNTY.

Work will be resumed on the Trapper's Pride mine in Gold Mountain district, near Marysvale, says Manager P. M. Maudsen of Salt Lake City. A. D. McLain is superintendent and has ten men at work cleaning out and will retimber the working tunnel, which has been run into the mountain 1500 feet, after which it will be extended.

SAN JUAN COUNTY.

Preparations are being made to resume operations on the International copper mine, in La Sal mining district, with S. A. King of Provo as manager.

SALT LAKE COUNTY.

The Continental M. & S. Co. has incorporated in New York, with H. M. Crowther of Salt Lake City as president and manager and G. C. Van Alstyne secretary and treasurer, to operate the Continental-Alta mine at Alta. In the crosscut from the intermediate tunnel the ore recently cut shows 42 ounces silver, 15% lead and $1 gold per ton. They also have some copper ore.

The cyanide plant on the property of the New Mammoth M. Co. in Bingham has been bought by J. M. Swem and is to be dismantled.

Operations are to be resumed at the Butterfield mines at Bingham, says the Bulletin. The low-grade ore will be hauled out through the Queen tunnel and the Queen mill will be improved by the addition of a concentuating floor and change of process.

TOOELE COUNTY.

Manager G. H. Dern of the Con. Mercur mine at Mercur says he expects to have the remodeled reduction plant in operation by the 15th, the slimes settling tanks being ready.

UTAH COUNTY.

The Black Vault M. Co. has been incorporated at Provo to operate the Dad Lander, Peter Elliott, Bishop, Huish and Judge Dana claims, in El Dorado mining district. M. M. Warner, A. Smith, N. C. Larsen; W. E. Cooper and W. P. Davis are officers.

The Milkmaid mine, near American Forks, will have a milling plant, say the owners, W. & H. Green and J. R. Reeve. There is a sufficient supply of water for a mill flowing out of the tunnel. The ores exposed in the Milkmaid carry values principally in lead, but also contain gold, silver and copper.

WASHINGTON.

KITTITAS COUNTY.

(Special Correspondence). — At Roslyn measures of bituminous coal furnish employment for many men and supply steam fuel. The output this year will be nearly 2,000,000 tons.

Under the direction of R. Young men are opening a ledge of iron ore on the Cle Elum river.

W. A. Denny and G. W. Gallagher are opening a promising group of ten copper claims along the mineralized belt from head of Tannea way to Camp creek.

The Fortune, Dolphin, La Veda, Last Chance and Copper Queen are paralleled by the Mountain View, Mammoth, W. J., Uncle Sam and Copper King claims, making a block of ground 7500 feet in length and 1200 feet in width. Throughout this territory porphyry dikes are seen cropping. The mineralized zones present the same characteristics, having lenticular masses of ore that parallel the layers of slate and the strike of the veins in the porphyry. These lenses are usually found at the junction of slate and porphyry. Insufficient development has taken place to allow of a thorough examination. Considerable ore has been shipped from this district.

East of the Cle Elum district, 25 miles, and in the north central section of Kittitas county, is the Swauk mining district. For the past twenty-five years a constant revenue has been derived from the washing of the stream gravels and talus slope. Some quartz mining has been done there, but the principal revenue of the miners has been obtained from the placer mines along Swauk, Boulder and Williams creeks. Nuggets worth $1200 have been taken out, and a great many ranging in value from $100 to $250 have been picked up. There is no authentic record of the gold taken from these placers, but it goes into the hundreds of thousands. The gold is mostly coarse, and in the talus slopes adjacent to the veins from which it was derived, is frequently angular and branching. Crystalline specimens, "leaf gold," are often found.

Placer mining is being carried on both by sluices, into which the gravel is shoveled, and by hydraulic methods. The bedrock in this section is Tertiary sandstone and shales, highly inclined, and where they have been planed off by stream action present an uneven surface, well suited to act as natural "riffles" in retaining the gold or other heavy minerals. In some cases along the larger streams the great thickness of these deposits, and the depth of bedrock below the present water flow, make them unfavorable for ordinary hydraulic mining, but where sufficiently rich gravel is found it is brought to the surface and washed. In the vicinity of gold-bearing veins, where bedrock is well above the present streams, conditions are most favorable for hydraulic mining on a large scale.

In the past quartz mining has not received much attention, but is now being taken up by men well equipped to give this branch of mining the attention its splendid surface showing seems to warrant.

Veins occur as a casing on each side of vertical dikes of diabase, and consist of quartz and calcite, usually crowded with angular fragments of shale and sandstones, which are entirely separate one from another Considerable movement has taken place as the walls of diabase forming one border of the veins are generally slickensided, with a consequent fracturing of the adjacent stratified rocks, one wall being well defined, while the opposite is usually indefinite.

Cle Elum, August 18.

STEVENS COUNTY.

Near Ryan, machinery is being put in by the American Onyx & Marble Co. at their quarries.

OKANOGAN COUNTY.

Preparations are being made by the Bodie M. Co., operating at Bodie, to put in a mill and other equipment this fall. A sawmill is on the ground. C. M. Fassett, of Spokane, consulting engineer for the company, says a cyanide plant will be built.

WYOMING.

CARBON COUNTY.

A strike is reported made in the lower tunnel of the Doane-Rambler mine at Grand Encampment. It is a 12-inch shoot of black oxide of copper in a quartz vein. The Ætna tunnel has also 18 inches of high-grade ore.

UINTA COUNTY.

At Fossil the Globe, Fossil & Idaho-Wyoming Oil Co.'s report work progressing.

FOREIGN.

AFRICA.

TRANSVAAL.

At the Barnato group of the Coronation Syndicate, in Heidelberg district, Consulting Engineer J. H. Johns says that since the intersection of the reef in No. 2 borehole on Edenkop at a depth of 267 feet, when 18 inches gave 2 ozs. 1 dwt. per ton, further investigations have satisfied the management that the reef struck was the Coronation. Shaft sinking has been temporarily stopped, but development work is proceeding. On Blinkpoort three holes are being bored and drilling is also proceeding on Viakfontein, Rietbult and Withoek. Rustfontein, Doornhoek and Grootviel are also being exploited. There are seven diamond drills proving the formations on the Coronation line.

The finding of "true diamondiferous ground near Braamfontein" is reported, says the South African Miner. Workmen employed in a clay pit while making bricks are alleged to have encountered "all the mineral associates of the precious gems." It is further stated that a gold reef runs through the ground.

The De Beers Con. Co. is preparing to resume operations at the Dutoitspan mine, near Kimberley.

AUSTRALIA.

WESTERN AUSTRALIA.

Prospecting with a diamond drill at the Great Boulder Proprietary, Edwards shaft, on the 1200-foot level, at a depth of 1240 feet from the surface, ore 50 feet to the east of the boundary was struck. The formation is schist. The vein dips west. The average width is 5 feet and the average value is $62 gold per ton. The same borehole at a depth of 1300 feet from the surface struck ore 35 feet to the east of the boundary, 420 feet south of the main shaft west crosscut. The width of the lode is 10 feet 6 inches. The vein dips 5° east from the vertical. Average assay of ore is $18 per ton. Eleven hundred feet of level has been driven to the Golden Horseshoe boundary in the south end of section 20. On the 1300-foot level in the main shaft, driving north, the lode has been found 35 feet from the crosscut. The width of the lode is 5 feet. The average is $18 gold.

NEW SOUTH WALES.

The Broken Hill Proprietary mines at Broken Hill report output for four weeks ending July 15 (including product from ores purchased)—Refinery products for same period: Fine silver, 415,383 ounces; soft lead, 4193 tons; antimonial lead (estimated), 30 tons. In consequence of temporary condensers doing satisfactory work the difficulties of the water situation have been overcome, and the mine and concentration plant are running full time. Half-yearly statements have been issued showing a profit for the six months to July 1 of £57,661; £21,532 has been expended in construction during the half year, of which amount £7422 has been on extension of coke works and £4570 for completion of the Huntington-Heberlein process, which is now in operation and treating 2500 tons weekly. Explorations in the lower levels have advanced and £20,000 has been expended in this direction during the half year. In consequence of continued drought special consideration has been given to the matter of reduction. Experiments have been made on the zinc process with the result that a plant to handle 1000 tons weekly will be built.

QUEENSLAND.

The No. 2 South Great Eastern Gold Co. at Gympie reports that the new mill of sixty stamps is in full operation, with satisfactory results.

The Brilliant Central Gold, at Charters Towers, July 30, report having crushed during month 3030 tons of quartz for a yield of 2508 ounces gold; value of cyanide bullion, £1220 ——No. 2 South Great Eastern Gold, at Gympie, July output was: Crushed 3732 tons for 3914 ounces gold, including 690 ounces from battery plates.

W. Nethercote has taken up 3000 acres of dredging ground at the junction of the Little Palmer river and the Palmer river. It is said in the early days portions of this ground were rich, and Chinese fossickers even up to the present time have been making a profit of it by their primitive methods of working, says the Queensland Government Journal.

VICTORIA.

The Ballarat Bucket Dredge Co. has been formed to work 115 acres of ground on the Yarrowee and Little Bendigo creeks, near Bendigo.

At the West Berry Consols mine, at Creswick, R. B. Squire, manager, says a new haulage shaft will be sunk to accommodate cages that will carry a two-ton load on each deck.

The Great Boulder Proprietary G. M., Ltd., at East Coolgardie, on July 28 reports prospecting with diamond drill 1700-foot level depressed borehole at angle of 43° in westerly direction have struck ore 7 feet in width, with average assay of 11½ dwts. at a distance of 1 foot west of shaft. The main lode was struck at distance of 30 feet from the main shaft at depth of 1750 feet. The total width is 50 feet, with average assay of ore at 28 dwts.

Extensive operations have been started at the mines of the Societe le Chrome at New Caledonia. They have taken on 300 men.

BRITISH COLUMBIA.

BOUNDARY DISTRICT.

The number of men at the Fife lime quarries, being operated for the Trail smelter, was increased by twenty-five men this week due to more furnaces being blown in at Trail.

CASSIAR DISTRICT.

The Atlin Claim says on Spruce creek, near Atlin, several miles of ditches are under construction for use of the Con. Spruce Creek Placers, Ltd., while results all along Spruce creek are said to be satisfactory and a large amount of gold is being recovered. On Pine creek the Pine Creek Power Co, Ltd., is at work. They have three 6-ton hydraulic derricks in operation, says Superintendent Loveridge. The company owns 600 acres, have flumes and ditches 6½ miles long and 2 miles of steel pipe; they are using six monitors It is intended to open up another pit above Discovery at an early date.

EAST KOOTENAY DISTRICT.

The Crow's Nest Pass Coal Co. is considering several improvements in the haulage system at its mines at Fernie, says the Rossland Miner. It is the intention to put an endless rope from the tipple to the mines. This will do away with the light engine work on top of the tipple.

Final payment of $11,500 on the Badger and Red Mountain claims was made last week by F. L Byron and J. E. Woods of Frank, Alberta.

It is reported that parties boring for oil near Morrissey have struck coal.

ROSSLAND DISTRICT.

Le Roi No. 2 oil concentrator at Rossland is being constructed in a series of attached buildings, five in number, and all but the first or upper sections are complete so far as the buildings are concerned, says the Review. Three carloads of machinery have been put in and the crushing plant is being set up. The plant is expected to be in operation by Sept. 1.

SLOCAN DISTRICT.

(Special Correspondence).—In the Slocan mining division, owing to the granting of the lead bounty, there has been a steady improvement in mining for some time past. More miners have been added to the number employed and still the demand is unsatisfied. Several idle properties are starting up again, and more are to follow. Over 350 men are working at the mines around Sandon, and a greater increase is looked for. Taken as a whole, the outlook is most encouraging. The organization of the mine owners is considered to be the best movement possible to protect themselves and secure stability in silver-lead mining in British Columbia.

Nelson, Aug. 15.

Work was resumed on the Echo, near Whitewater, by M. J. Halpin and H. J. Wright, who have a lease on it. —— D. Kennedy and R. Bradshaw have leased and bonded the Bachelor group and will start work this week. —— The Daphire and Champion mines on Twelve-Mile creek, near Slocan City, have been leased to Paul Hauck ——The Queen Bess mine and buildings were sold to the Bank of Montreal for $6500. The mineral claims Tiger, Deadwood, Bland No. 2, Howard Fraction and Tiger Fraction, belonging to the Slocan Lake G. & S. Mines, Ltd., were also turned over to the Bank of Montreal to cover an overdraft. —— The bonus granted on iron and steel is expected to result in the iron deposits on Crawford creek, near Slocan City, being worked at a profit.

VANCOUVER ISLAND.

About 1100 tons of coal a day are being taken out of No. 2 and No. 3 mines at Extension. As more men are being put to work daily it is expected the maximum production (1600 tons a day) attained before the strike will again be reached. The tunnel is being opened up again. The coal is sent to Ladysmith for foreign shipment.

WEST KOOTENAY DISTRICT.

(Special Correspondence). — In Fish River camp, Lardeau mining division, at the Calumet & B. C. Gold Mines, Ltd., two of the vanners are now in place and another under way. Two of the Pelton wheels are in place and the other will be installed this week. The rock crusher is now being put in place and the cam shaft and cams are set up. Ore bins are finished and a telephone system is installed from mill to mine. It is expected to have the mill completed by the 20th inst. At the Oyster-Criterion mill the rock crusher and mortars are now in place. The compressor and power house are being roofed in. Cables for tramway have arrived and the preliminary wire for hauling up the cable is strung.

Nelson, Aug. 15.

W. E. Pool reports paying $200,000 for a three-fourths interest in the Lucky

Jack mine on Poplar creek, near Lardeau. The other fourth interest is owned by E. Morgan. It is proposed to build a stamp mill on the property this season.

YALE DISTRICT.

Placer mining is reported in full swing around Erie. The north fork of the Salmon river has been staked for 7 miles, out of which claims covering half that distance have been bought up by the North Fork Placer M. Co. of Colorado men, and the Buckeye Placer Co., owned in Spokane, Wash. These two companies are jointly putting up a flume which will cost $20,000, being 3½ miles long. This flume will run the monitors of both companies. Much of the gold is found in the present bed of the creek, and the stream has to be diverted. On either side the pay ground stretches back 100 feet from the creek bed, and in addition several bench claims have been staked outside the present course on the creek, says the Spokesman-Review.

KLONDIKE.

Near Dawson good pay is reported to have been found on Last Chance creek. ——The Violet quartz claims will be worked, for which a 10-stamp mill is being set up.

MALAY STATES.

The Malay Government has imposed an additional export tax on tin ore of $30 Mexican ($11.50) per picul of 133⅓ pounds, except when it is to be smelted in the colony. The export tax was formerly $13 63 Mexican ($5.22) per picul, all the ore being smelted within colonial limits. It is thought that the new export tax will discriminate not only against foreign countries, hut also against British colonies, such as Hongkong, Australia and Ceylon; it will also act against the smelting in England or Wales of any tin ore from the oriental supply stations. Local smelters will now have a monopoly. Local tin smelters obtain tin ore with $13.63 Mexican ($5 22) export tax, while all outsiders must pay $43 63 Mexican ($16.71) per picul. Allowing 40% dross in smelting, tbis export tax alone amounts to about $333 gold per ton of smelted or pig tin.

The annual output of the world exceeds 75,000 tons, and of this more than 46,000 tons—over 51% of the whole—come from the Straits Settlements, while Cornwall produces only 5000 tons and the Australian output has similarly declined. The Dutch East Indies export 14,000 tons and Bolivia outputs 5000 tons.

MEXICO.

CHIHUAHUA.

J. Folenshy and W. Kraft of Bisbee, Ariz , have hought the Nueva Chihuahua mine for $50,000, Mexican. The property consists of forty-four pertenencias and is near the mines of the Prieto estate and the Buena Tierra.

T. L. Greer, of Chihuahua, reports the Santa Brigida mine and mill, owned by himself et al., in the western part of the State, are again in operation.

COAHUILA.

A. O. Ihlseng and J. J. Murphy of New York City have leased La Union M. Co.'s La San Salvadora and La Porvenir mines, near Barroteran. Mining equipment will be put in consisting of machine drills, hoists and a concentrating plant. The number of men at work will he increased to 300. It is reported that the Mexican Central will build a spur from its San Pedro–Paredon branch to the mines. The ores are silver-lead-zinc.

GUANAJUATO.

J. H. Hohhs et al., of Colorado Springs, Colo., are reported preparing to put up a 100-ton mill at La Luz mine, near Guanajuato.

SAN LUIS POTOSI.

T. C. Creeling, manager of the Tiro mines, near Las Charcas, says he is making arrangements to build a narrow-gauge railroad from the mines to Las Charcas station on the National railroad.

SONORA.

At Emperor camp, near Magdalena, the Loraine M. Co. has completed an addition of five stamps to its mili and is running ten stamps. Last week a shipment of twelve kilos was made. The Loraine is owned hy Tener Bros. & Balch.——The Magdalena M. & E. Co. has been organized to develop and operate a group of mines in the Cibuta mountains, 4 miles west of the Sonora Railway, near Cerro Blanco. There are two veins of high-grade gold ore, on which some development has heen done. The officers are A. N. Carter, W. Schuckman and F. F. Hummel.

The Latz & Pearce group at Puertocitos is reported sold to the Lake Superior G. M. & M. Co. for $100,000 gold. The group adjoins a portion of the Greene Con. M. Co.'s properties.

Three groups of gold prospects near the Picacho mine, 35 miles southwest of Cos, have been bonded by R. K. Clancey of Detroit, Mich., the Eva for $250,000, the Cinco Senores for $90,000 and the Don Ramon, Adan and Dos Amigos for $20,000. These mines are owned hy Douglas, Ariz , men.

The Nogales C. Co., among other improvements which it is starting at its properties near Magdalena, will put up a 100-stamp mill; and a concentrator and 40-ton smelting plant are being erected at La Blanca mines, near Suaqui Grande. The Santa Cruz C. Co. has been organized to work a group at Santa Cruz. The Gutierrez M. Co., working the Gutierrez mine at La Barranca, has taken under lease and bond for $75,000, gold, the Belene mines of La Barranca, and the Nahuila group at San Javier for $65,000, gold, and development work will be started at both places. An American company has hought of the Lopez Bros. of Hermosillo some gold properties near Acouchi for $100,000, gold, and the Carmen and Esmeralda, both of Arizpe, have also heen hought by an American company at $40,000 and $100,000, gold, respectively. Near Bocoachi W. Lane reports a gold strike, says the Investor.

ZACATECAS.

There is considerahle activity reported in the State of Zacatecas, in the way of railroad building to the mining sections, principally to Somhrerete and Mazapil. The Comacho M. Co. is building a hranch road from Comacho station, on the Mexican Central, to Mazapil, a distance of 20 miles, and another line is projected from the National to Mazapil; and still another from Mazapil to Concepcion del Oro, a distance of 30 miles.

NOVA SCOTIA.

D. B. Richardson of Toronto, of the Dominion Coal Co., says the area of coal land extends for a distance of 45 miles from Sydney to Louishurg, and five collieries are working, raising 11,000 tons of coal a day. Increased development work is being done.

SIAM.

A new mining district is reported attracting attention. Rubies have heen found at Klong Aeng, in the Amphur district of Sri-Buathong, Muang Krat, in the Monthon of Chantaburi. Some forty persons were digging and washing for precious stones there, and evidently making a living at it at least. A formal notification has been issued bringing the district under the mining Act, and from August 1 every miner will be required to have a permit, for which he will pay 5 ticals a year, says the Times of Burma.

SIBERIA.

L. Tovey, mining engineer, of Tomsk, says the iron industry is not the only industry which is making progress iu Siberia. Extensive placer claims which have heen operated in a primitive way for 100 years are being equipped with machinery and considerahle work is being done in sinking shafts and tunneling to cut the veins of gold and silver ores which are found in the northern districts.

TASMANIA.

The Mt. Lyell M. & R. Co., at Mt. Lyell, report for month of July shows: From June 25 to July 22, inclusive, a total of 16,971 tons of ore was treated; average assay value of ore hefore treatment was: Copper, 2.14%; silver, 2 33 ounces; gold, .088 ounce per ton. The converters produced during same period 573 tons of blister copper, containing: Copper, 567 tons; silver, 49,698 ounces; gold, 1722 ounces. In addition to the ahove, there were treated during same period 981 tons of Mt. Lyell ore and metal-bearing fluxes. The reduced quantity of Mt. Lyell ore treated was due to weather conditions, having entirely suspended operations in open cuts four days during period and accident to smelting works.

Catalogues Received.

"Appliances for Assayers" is a catalogue with an illuminated cover from the Calkins Co., 608 N. Main street, Los Angeles, Cal., describing their latest improved Calkins' assayers special appliances, including assay furnaces, hydrocarbon burner, cupel press, ore crusher, zinc shavings, etc.

The Cyclone Drilling Machine Co , Orrville, Ohio, sends a catalogue of their drilling machinery, including the hollow rod system, with full detailed illustrated information concerning their several makes. There is a wide field for their use, including prospecting of gold dredger ground, and the subjects are of interest.

Catalogue No. 54, Victor Turbines, is at hand from the Stilwell–Bierce & Smith–Valle Co., Dayton, Ohio, Pacific coast office, 11 First St., San Francisco, Cal.—leather hound and of vest-pocket size, containing "power tables of Victor turbines, comprising the cylinder gate, register gate and high pressure types," and accompanied hy numerous illustrations.

Of standard size (6x9 inches), substantially bound and superhly illustrated, the new drill catalogue No. 43 of the Ingersoll-Sergeant Drill Co., 26 Cortlandt street, New York City, commends itself to the attention of mining men. This fine volume of 168 pages is stated to be the first of a series of catalogues which will illustrate and describe in complete form all classes of Ingersoll–Sergeant machinery. The one to hand sets a high standard of excellence, and one that will doubtless be maintained.

Of standard size, 6x9 inches, Catalogue No. 11, fifth edition, from the Allis-Chalmers Co , Chicago, U. S. A., treats of the Tremain steam stamp, with full illustrated description, and practical instructions for erecting the Tremain mill. In addition minute details of instruction are given, including ninety separate engravings of as many parts of the Tremain steam mill. There are also complete estimates of each requirement in setting up and operating a Tremain steam stamp mill. The treatise is in sumptuous style from the press of the Meisenheimer Printing Co., Milwaukee, Wis.

PERSONAL.

J. RODMAN, Leadville, Colo., is in New York City.

G. M. HARRIS has returned to New York from Alma, Colo.

W. E. DUNCAN is in San Francisco, Cal., from Oroville, Cal.

D. W. BRUNTON has returned from Montana to Denver, Colo.

H. V. WINCHELL has returned from a visit to Copper River, Alaska.

E. F. JONES of Oroville, Cal., is in San Francisco, Cal., on mining business.

L. A. GROSS, an Amador county, Cal., mine manager, is in San Francisco, Cal.

A. J. SELFRIDGE, of Boston, Mass., is in San Francisco, Cal., on mining business.

R. B. CROWELL of Tonopah, Nev., is in San Francisco, Cal., on mining business.

H. K. WHEELER, M. E., of Los Angeles, Cal., is visiting San Francisco, Cal

W. H. CLARY, a Calaveras county mine owner, near Murphy, is in San Francisco, Cal.

J. FULLERTON, interested in mines at Red Lodge, Mont., is in San Francisco, Cal.

JAMES EARLS is superintendent of the Bullion–Beck mine, Eureka, Juah county, Utah.

J. ERISMAN, manager of the Blue Flag M. Co., at Cripple Creek, Colo., is in Buffalo, N. Y.

S. NEWHOUSE has left Salt Lake City, Utah, for a several weeks' visit at Bar Harhor, Me.

S. NICHOLSON, manager of the A. M. W. Mining Co., Leadville, Colo., is in Nova Scotia.

J. F. MCFARLAND of Grand Junction, Colo., is at Alma, Colo., looking after mining interests.

CHAS. M. FASSETT has returned to Spokane, Wash., from a visit to San Francisco, Cal.

D. MCCLURE, superintendent of the Gwin mine, Calaveras Co , Cal., is in San Francisco, Cal.

G. E. ALEXANDER, E. M., of Denver, Colo , is in California, investigating the mining industry.

R. M. GREEN, a mine owner of Oroville, Butte county, Cal., is in San Francisco, Cal., on business.

W. H. KINNON, metallurgist, is superintendent at the Majestic C. Co. smelter, at Milford, Utah.

H. HUCKINS is superintendent of the Junction mine, near North San Juan, Nevada county, Cal.

N. GETCHELL is superintendent of the Post group, at Grantville, near Berlin, Nye county, Nev.

P. A. H. FRANKLIN returned to Salt Lake City, Utah, last week, from a two months' trip East.

ARTHUR HAUMAN has been appointed United States Deputy Mineral Surveyor at Jamestown, Cal.

J. SHINN, Leadville, Colorado, has been examining mining property near Grant, Park county, Colo.

A. D. MCLAIN is superintendent of the Trapper's Pride mine, near Marysvale, Piute county, Utah.

H. P GORDON has returned from San Francisco, Cal., to his mine superintendency at Nashville, Cal.

J. F. HOLDEN of the Corona G. M. Co , near Prescott, Ariz., has gone to Chicago, Ill., on mining business.

G. W. KEEL is superintendent of the Little Bell and the Lucky Bill Mining Cos., at Park City, Utah.

G. ASHTON has returned to Pueblo, Colo., from Summit Co., Colo., where he has been examining mines.

J. L. SHEPARD, president of the Tri-Metallic M. & S. Co., has returned to Nogales, Ariz , from a trip East.

W. E. THORNE has returned to San Francisco, Cal., from an investigation of mines in Siskiyou county, Cal.

GUIDO DE VOLTAIRE is consulting engineer for the Jupiter M. Co., operating at El Oro, in the State of Mexico.

I. HALE, manager of the Denver branch, General Electric Co., has returned to Denver, Colo., from Summit Co., Colo.

E. C. VOORHIES of Sutter Creek, Cal., has been appointed manager of the Darien Mining Co. at Cana, Colombia.

GEORGE F. SHURTLEFF, general manager of the Crowned King Mines Co , Crown King, Ariz , is in New York.

JOHN SPARKS, principal owner of the Wedekind and Desert King mines near Reno, Nev., is in San Francisco, Cal.

TODD C. WOODWORTH, formerly of California, is now consulting engineer of the Sibley–Sawyer Co. of Boston, Mass.

F W. BRADLEY, president Bunker Hill & Sullivan M. Co , has returned from Wardner, Idaho, to San Francisco, Cal.

L. W. VAUGHN of Merced, Cal., president of the Stockton Con. C. M. Co., is at the company's mines in Shasta county, Cal.

W. N. LINDSEY, E AND R A. HATTON of Red River, Taos county, N. M , have gone to Idaho to look after mining interests.

T. W. JAYCOX, Leadville, Colo , has been appointed Deputy State Engineer of Colorado with headquarters in Denver, Colo.

F. COBB, with Taylor & Brunton of Denver, has returned there from Dillon, Colo., where he was inspecting mining property.

J D. MURPHY bas resigned as superintendent at the Bullion–Beck mine, at Eureka, Utah, and has gone to Salt Lake City, Utah.

W. W. MEIN, mine manager for the Durban-Roodepoort Deep, Ltd., near Johannesburg, South Africa, is visiting in Oakland, Cal.

E. A. HERPSBERGER of Almagordo, N. M., has gone to Jarilla, Otero county, N. M , to superintend operations at the Garnett mine.

D. R. MORGAN, mine manager of the Torreon smelter, at Torreon, Chihuahua, Mexico, has estahlished his headquarters at Chihuahua.

MANAGER G. D. B TURNER of the J. I. C. mine of Park City, Utah, returned last week to Salt Lake City, Utah, from a trip to Scotland.

A. R. BOYNTON of the McKinnon G. M. Co., operating at Silver City, Idaho, returned to Cbicago, Ill , last week from a trip to their mines.

L. HEYNEMAN, secretary of the Fulton Engineering & Shipbuilding Works, has returned to San Francisco, Cal., from an Eastern business trip.

J. A. MCSHANE of Omaha, Neb., owner of the Belen, Refugio and other mines at Ocampa, Chihuahua, Mexico, has returned from a visit to his mines.

A. A. ROSS, formerly with the Southern Nevada M. Co., at Searchlight, Nev , is superintendent of the Empire Con. M. Co., operating in same section.

H. M. GORHAM, superintendent of the Chollar, Virginia, Nev., is at Colegrove, Cal. A. J. McDonald has charge at the Chollar in Mr. Gorham's absence.

GEO. W. CAMPBELL, of Oakland, Cal., of the firm of Scott, Dow & Co., owners of the Black Oak mine at Soulsbyville, Cal., has heen appointed general manager.

W. F. SNYDER, president of the Western Ex. Co , has returned to Salt Lake City, Utah, after several weeks at the

Balaklala copper mines in Shasta county, Cal.

G. McM. Ross has resigned as superintendent of the Ophir M. Co., operating at Virginia City, Nev., and is superintendent of the Andes, also on the Comstock lode.

M. L Requa, vice-president of the Pacific Wire & Steel Works and a mine owner of Nevada and California, leaves the coming week for a trip through the East.

H. W. Fairbanks, geologist, has returned to Berkeley, Cal, from an extended tour of northern California gathering material for a series of school textbooks.

A. C. Lawson, professor of geology and mineralogy, University of California, has returned to Berkeley, Cal., from a geological tour of the southern Sierra Nevada mountains.

Jesse Scobey has resigned as general manager of the Pride of the West M. & M. Co, and will he in Denver, Colo , after Sept. 1, where he will he engaged as consulting mining engineer.

J. R. Ryan has resigned as superintendent of the Andes S. M. Co., at Virginia City, Nev., and is superintendent of the Con. Cal. & Virginia and Ophir mines, which have been consolidated.

Commercial Paragraphs.

Fraser & Chalmers, Ltd, of 43 Threadneedle St., London, E. C., England, state that on the 11th inst. their offices were removed to 3 London Wall Buildings, London, E. C.

The Compressed Air Machinery Co. of San Francisco, Cal., is preparing for shipment a Word drill sharpener to the St. John del Rey mine in Brazil, via Rio Janeiro. They shipped one last week to the Daly-Judge mine at Park City, Utah

The Risdon Iron Works, San Francisco, Cal., report during the last week having received an order from J. H. Leggett of Oroville, Cal , for one of their largest sized gold dredgers, costing $80,000. This company built a dredger operating on Mr. Leggett's ground about two years ago, and they report that Mr. Leggett is so well satisfied with its gold saving properties that he has adopted this type of machine and will use it on his ground in the future.

"On the 15th of July," writes the Penberthy I jector Co. of Detroit, Mich., "we placed the number 300,000 on one of our 'Penberthy' automatic injectors, having completed this number of injectors in just a little over sixteen years, a remarkable record, especially when it took nearly ten years to convince engineers that an automatic injector was a practical device, and to manufacture and sell the first 100,000 machines. Three hundred thousand injectors is a good many. Basing figures on the average capacity of the injectors sold during the past twelve months, the 300,000 'Penberthy' automatic injectors on the market will handle in one hour 109,500,000 gallons of water. This amount of water if pumped into an upright tank 50 feet square would require the tank to be over a mile high; or, to put it in another way, if the output of these 300,000 injectors were combined into one stream, they would supply a river 10 feet deep and 250 wide, and keep up a steady flow of water at the rate of a little over 1 mile per hour. If the 300,000 injectors were all connected to one source of water supply, they would in ten hours completely drain a lake 10 feet deep, 1 mile long and ½ mile wide." Information regarding these injectors will be gladly furnished any inquirer by the Penberthy Injector Co., Detroit, Mich.

Obituary.

Pedro Alvarado, known as a wealthy mine owner and philanthropist of Parral, Chihuahua, Mexico, died on the 18th inst. He was owner of the Palmillo mine at Parral.

W. E. Dodge, of the firm of Phelps, Dodge & Co., and a large holder in the Copper Queen mine, at Bisbee, Ariz., died at New York on the 9th inst. Deceased had passed his seventy-third year.

H. F. Kemper, one of the original locators of the Temple Bar placer mines in Mohave county, Ariz , died in Kingman, Ariz., August 11, after an illness of several weeks. Deceased was born in Ohio forty-one years ago, and is survived by a wife and several brothers.

New Patents.

Dewey, Strong & Co.'s Scientific Press Patent Agency, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR WEEK ENDING AUGUST 11, 1903.

735,851. — Therapeutical Apparatus — G. L. Abell, Oakland, Cal.

735,689.—Strap Lock—W. P. C. Adams, Seattle, Wash.

736,191.—Draft Equalizer—F. Bahler, Spokane, Wash.

735,933.—Timber Framing Macrine — Barnes & Smith, Pearce, Ariz.

736,061.—Cetyl-gnaiacyl — M. W. Beylik, Burhank, Cal

736,202.—Cork Retainer—W. E. Brown, Los Angeles, Cal.

736,203.—Heater—G. W. Brunner, S. F.

735,942.—Ore Crusher — A. C. Calkins, Los Angeles, Cal.

735,862.—Clutch—P. F. Dundon, S. F.

736,078.—Treatment of Ores—H. T. Durant, London, England.

735,863.—Engine Cylinders — Duryea & White, Los Angeles, Cal.

735 957.—Animal Trap—G. F. Eherhard, S. F.

735,865.—Portable Desk—J. B. Elliott, S. F.

735,734.—Wrench—C. C. English, S. F.

735,868.—Saw Sharpeners—G. A. W. and J. H. L. Folkers, S. F.

735,872.—Sash Lock—L. H. Handy, S F.

735,972.—Hotel Reoister - C. H. Harger, S. F.

735,979.—Weighing Machine—G. Hepner, S F.

736,100.—Locator—N. Hosiettler, Eugene, Or.

736,098.—Purifying Liquors—J. Houden, S. F.

735,733.—Ticket Holder—A. L. J. hnson, Seattle, Wash.

736,267.—Well Drill — H. Kelly, Los Angeles, Cal.

735,986.—Vineyard Cultivator — I. B. Kilgore, Concord, Cal

735,886.—Cultivator—G. P. Kimhall, Salem, Or.

735,887.—Powder Distributor—G. Lagomarsino, S. F.

736,121.—Boot Calk — A. P. Lipscomh, Yaeger, Cal.

736,123.—Rail Joint—P. J. Lukes, Balls Ferry, Cal.

735,991.—Train Pipe Coupling—J. C. Martin, Jr., S. F.

735,997.—Igniter for Gas Engines—J. D. McFarland, Jr., S. F.

736,136.—Piston Rod Joint—J. D. McFarland, Jr., S. F.

736,137. — Propeller — A. C. G. H. McIntosh, Eureka, Cal.

735,794.—Fastening—C. E. Morgan, Portland, Or.

735,994.—Fish Cleaning Machine — T. Morris, S. F.

736,140.—Memorizer—Mary E. Nicholl, Oakland, Cal.

736,334.—Curtain Fixture—Susan A. Norwood, Portland, Or.

735,897.—Logoing Jack—J. G. Owen, Southhend, Wash.

736,006.—Electric Railway—J. W. Perkins, San Jose, Cal.

735,813.—Ore Separator — Pira & Salomonson, Oakland, Cal.

736,305.—Amusement Device—A. Seyfried, S. F.

735,843.—Corset—Nettie Temple, Stockton, Cal.

735,919.—Quicksilver Furnace - A. A. Tregidgo, S. F.

736,320.—Weed Cutter—J C Walter, Athena, Or.

736,325.—Feed Mechanism—White & Duryea, Los Angeles, Cal.

Notice of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s Scientific Press U. S. and Foreign Patent Agency, the following are worthy of special mention:

Piston Rod Joints.—No. 736,136. Aug. 11, 1903. J. D. McFarland, Jr., Fruitvale, Cal. One-half assigned to J. Bruckman of San Francisco, Cal. This invention relates to improvements in means for connecting the piston rods with a crank shaft, and is particularly applicable in engines having a plurality of radially disposed cylinders in the same plane. Its object is to confine the connections between the piston rods and crank shafts within the narrowest practical limits and to provide for take up when these bearing parts have become worn.

Vineyard or Orchard Cultivator.—No. 735,986. Aug. 11, 1903. Ira B. Kilgore, Concord, Cal. The object of this invention is to provide a cultivator which can he driven between rows of growing vines, trees or like objects so as to thoroughly cultivate the soil between the rows, and to so construct the device that the angle of the cultivating teeth to the line of travel may he changed, so as to throw the soil to or from the rows between which the apparatus is traveling, and also to change the forward and backward tilt of the teeth that they may he more or less upright with relation to the line of travel.

Hotel Reoister.—No. 735,972 Aug. 11, 1903. C. H. Harger, San Francisco, Cal. This invention relates to improvements in registering devices in which there is a containing box or case, a series of loose leaves, and a transversely and longitudinally lined supporting plate for the leaves. Its object is to provide a perpetual register for hotel purposes which shall he simple, neat and compact, and which shall permit of the introduction of additional leaves when necessary and of the removal of leaves when they have become filled.

Device for Sharpening Saws.—No. 735,888. Aug. 11, 1903. G. A. W. Folkers and John H. L. Folkers of San Francisco, Cal. This invention relates to improvements in saw filing and sharpening machines of the type employing rotary cutters or grinders. Its objects are in the direction of simplicity of construction and of securing steadiness and uniformity in operation of the file members in relation to the saw.

Apparatus for the Treatment of Ores With Solvents.—No. 736,078, Aug. 11, 1903. H. T. Durant, London, England. This invention consists of a peculiarly constructed tank and means for circulating the solution through the tailings or like contents of the said tank. The object of the invention is to provide an apparatus for the treatment of various ores, tailings or the like hy the use of solvents which are suitable for the particular character of the ore under treatment and hy the use of which solvents the gold and silver or other metals may he extracted.

Animal Traps.—No. 735,957. Aug. 11, 1903. G. F. Eherhard, San Francisco, Cal. Assigned to the Geo. F. Eherhard Co. of San Francisco, Cal., a corporation. This trap is designed particularly for gophers and other hurrowing pests. The object of the invention is to obviate the disadvantage present in ordinary traps of this general type hy forming these jaws so that hy no amount of wriggling can a gopher once in the grasp of the jaws escape.

Latest Market Reports.

San Francisco, August 21, 1903.

METALS.

SILVER.—Per oz., Troy: London, 25⅞d (standard ounce, 925 fine); New York, bar silver, 54¼c, refined (1000 fine); San Francisco, 54¼c; Mexican dollars, 42½c San Francisco, 42c New York.

COPPER. — New York: Standard, $13.75; Lake, 1 to 3 casks, $13 62½@13 75; Electrolytic, 1 to 3 casks, $13.62½@13 75; Casting, 1 to 3 casks, $13.25; San Francisco: $13.00. Mill copper plates, $17.00; bars, 18@24c. London: £59 10s spot per ton.

In his report to the United States Geological Survey on the production of copper in 1902, C. Kirchhoff says the copper mining industry of the United States suffered during 1902 from the reaction which followed the unsuccessful attempt during 1901 to maintain the value of the metal at an artificial level. The collapse which came toward the close of 1901 left many producers committed to sales covering a long period, at low prices, with the menace of heavy accumulations of metal constantly over the market. Yet production was heavier during 1902 than it had been in 1901, because some of the important mines were worked to full capacity and because some of the enlargements and improvements previously hegun became effective during the year. Furthermore, a number of new enterprises first produced important quantities of metal. On the other hand, labor troubles cut down the output of some of the larger undertakings.

As compared with 268,782 long tons in 1901, the total production of copper in the United States in 1902 was 294,423 long tons, of which the Lake Superior district produced 76,165, or 25 9%; Montana, 128,975 long tons, 43 8%; and Arizona, 53,547 long tons, 18.2%. This is an increase in the total production of 25,641 long tons, or nearly 10%, as compared with 1901.

The imports of copper ore in 1902 were valued at $7,921,641, as compared with $14,394,663 in 1901; and the imports of copper in bars, ingots, pigs and in manufactured forms were valued at $12,864,021, as compared with $11,820,459 in 1901. The exports of domestic copper in different forms were valued at $46,811,729 in 1902, as compared with $36,071,448 in 1901. The exports from Baltimore, Md., increased from 54,377,355 pounds in 1901 to 103,607,256 pounds in 1902; and from New York the increase was from 133,540,150 pounds in 1901 to 236,622,515 pounds in 1902.

In the aggregate the reporting mines had a stock of 155,665,652 pounds of copper on January 1, 1903, as compared with 282,014,297 pounds on January 1, 1902, a decline of over 126,000,000 pounds during 1902.

The estimated consumption in 1902 was 551,688,191 pounds, as compared with 382,761,014 pounds in 1901. The average selling price of Lake copper during 1902 was 11.86 cents per pound.

LEAD.—New York, $4.25; Salt Lake City, $3.50; St. Louis, $4.00; San Francisco $4.50, carload lots; 4¼c 1000 to 4000 lbs.; pipe 5½, sheet 6, bar 5½c; pig, $4.75. London: £11 6s 3d per long ton=2.75c per lb.

SPELTER. — New York, $5.87½; St. Louis, $4.85; London, £20 12s 6d per ton; San Francisco, ton lots, 6½c; 100-lb lots, 7c.

ANTIMONY.—New York, Cookson's 9¾c; Hallett's, 8½c; San Francisco, 1000-lb. lots, 7½c; 300 to 500 lbs., 7½c; 100-lb. lots, 10c.

TIN.—New York, pig, $27.80@28.00; San Francisco, ton lots, 28½c; 500 lbs., 29c; 200 lbs., 29½c; less, 30c; bar tin, ℔ lb, 30c @32½c. London, £127 spot.

PLATINUM.—San Francisco, crude, $18.00 ℔ oz.; New York, ingot, $19.00 per Troy oz Platinum ware, 75@80c per gram.

QUICKSILVER.—New York, $46.00@47.00; large lots; London, £8 10s; San Francisco, local, $44.50 ℔ flask of 76½ lbs.; Denver, $49.50. Export, $43.00.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 34c.

SOLDER. — Half-and-half, 100-lb. lots, 18.75c; San Francisco, Plumbers', 100-lb. lots, 15.50c.

NICKEL.—New York, 50@60c ℔ lb.; ton lots, 45@48c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, $18.85 @19.00; gray forge, $17.10; San Francisco, bar, 3c ℔ lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $27.00@29.00; open hearth billets, $28.00; San Francisco, bar, 7c to 12c per lb.

LUMBER.—(Retail): Pine, ordinary sizes, $20.00@22.00; extra sizes higher; redwood, $22.00@23.00; lath, 4 feet, $4.25 @4.50; pickets, $19.50; shingles, $2.35 for No. 1 and $2.00 for No. 2; shakes, $13.50 for split and $14.50 for sawed; rustic, $26.00 @32.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, $3.25; Cut, $3.35; 10d to 16d, Wire, $3.35; Cut, $3.35; 8d, Wire, $3.40; Cut, $3.40; 6d and 7d, Wire, $3.50; Cut, $3.50; 4d and 5d, Wire, $3.60; Cut, $3.60; 3d, Wire, $3.75; Cut, $3.75; 2d, Wire, $4.00; Cut, $4.00. Special rates for carload lots.

LIME.—Santa Cruz, $2.25; Roche Harbor, $2.25 per hhl.

CEMENT. — Germania, $2.50 @ 2.75; Hewmoor, $2.90; Trowell, $2.90; Portland, $2.50@2.75 per hhl.

GENERAL SUPPLIES.

POWDER.—F. o. h. San Francisco: No 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10½c ℔ set; 14 oz., 40s., 9½c.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 24@25c ℔ lb.: carloads, 23@24½c; in tins, 35c; soda ash, $2.00 ℔ 100 lbs.; hyposulphite of soda, 2½@2¾c ℔ lb.; caustic soda, in drums, 3@3½c ℔ lb; Cal. s. soda, hbls., $1.25@1.50 ℔ 100 lbs.; sks., $1.05; chlorate of potash, 12@13c; nitrate of potash, bhls., 10c; caustic potash, 10c in 40-lb tins; horax concentrated, 7@8c ℔ lb.; roll sulphur, 4@6c; powdered sulphur, 2@3c; flour sulphur, French, 2@3c; alum, $2.00@2.25; California refined, 2@2½c; sulphide of iron, 9c ℔ lb; copper sulphate, 5@7c; chloride of lime, spot, $2 50@2.75; sulphuric acid, in carhoys, 66° B, 2½c ℔ lb.; nitric acid, in carhoys, 8c ℔ lh.

OILS.—Linseed, boiled, hhl., 44c; cs., 49c; raw, bhl., 42c; cs., 47c; Lucol oil, hoiled, bhl., 41c; cs, 46c; raw, hhl., 39c; cs, 44c. Kerosene—Pearl, per gal., 20½c; Astral, 20½c; Star, 20½c; Extra Star, 24½c; Eocene, 23½c; Elaine, 26½c; Water White, in hulk, 14½c; Mineral Seal, iron hhls., 18½c; wooden hhls., 21c; cs, 24c; Mineral Sperm, cs, 26½c; Deodorized Stove Gasoline, hulk, 17c; do., cs., 23½c; 86° Gasoline, hulk, 21c; do., cs., 27½c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 16c; do., in cs., 22½ c; Lard Oil, E. W. S., bbl., $1.00; cs., $1.05; Neats-foot Oil, pure, bbl., 75c; cs., 80c; Sperm, crude, 70@60c; Natural White, 65c; Bleached do, 50c; Whale Oil, cs, 50@55c.

COAL. — San Francisco, coast, yard prices: Wellington, $8.00; Seattle, $6.50; Coos Bay, $5.50; Southfield, $8.00. Cargo lots, Eastern and foreign: Wallsend, $6 .50 Brymbo, $7.50; Pennsylvania, hd., $14. 00 Scotch, $8; Cumberland, $12; Cannel, $9.00; Welsh Anthracite, $11.50; Rock Springs, $9.50, long ton; Colorado Anthracite, $14.00. Coke, $10.50 per ton in bulk, $13 in sacks; Sunnyside, $8.50, long ton.

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6c; less than 500 lbs., per lb., 6½c; in 25-lb. tin palls, ½c per lb. above keg price; in 1 and 5 lb. tin cans, 100 lbs. per case, ½c per lb. above keg price. Dry Lead—In hbls., 1 ton and over, 6c; do. in kegs, 6½c.

RED LEAD.—500 lbs. and over at one purchase, per lb., 6c; less than 500 lbs., 6½c.

LITHARGE.—Pure, in 25-lb. hags, 8 @9c per lb.

BONE ASH.—Extra No. 1, 5@6c per lb. No. 1, 4@5c.

BORAX.—Concentrated, 7@9c per lb powdered, 9@12c; fused, 25@30c.

BORAX.—Crystal, 7c; calcined, 25c.

MANGANESE.—Pure, ℔ lb., 60c.

SODIUM.—Metal, ℔ lb., $1.00.

MOLYBDENUM.—$2 per lb.

MERCURY.—Bichloride, ℔ lb., 90c.

SILVER.—Chloride, ℔ oz., 90c@$1.00; nitrate, 55c.

ALUMINUM.—No. 1, 99%, small lots, 37c ℔ lb.; 100 lbs., 35c; 1000 lbs., 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittshurg.

URANIUM.—Oxide, ℔ lb., $3.50.

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MINING ENGINEER NOW IN CHARGE COPper proposition desires change of location. Management gold or copper proposition. State terms Address Box 25, this office.

MINING ENGINEER AND METALLURGIST, at present general manager of a large mining concern in Mexico, desires to change his position. Would need four months' notice. Address F.B.A.S., care of this office.

MINING ENGINEER WISHES POSITION AS superintendent or assistant superintendent at metal mine. Has had eight years' experience in civil and mining engineering, and is surveyor, draughtsman and assayer. Also had practical experience in underground work and handling men. Can furnish transit and two sets halances Age twenty-eight. References. Address Box 818, Salt Lake City, Utah.

MINING ENGINEER, GRADUATE GERMAN University, at present assistant manager of gold mining corporation and in charge of large amalgamating, concentrating and cyanlding mill, desires change. Thorough experience in treatment of refractory gold ores hy all processes. Would like position as manager or assistant manager of producing company. Age 33; unmarried. Best references. Addre.s R. R. 18, care of Mining and Scientific Press

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MINING AND SCIENTIFIC PRESS.

Whole No. 2249.—VOLUME LXXXVII. Number 9. SAN FRANCISCO, CAL., SATURDAY, AUGUST 29, 1903. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

IN the notices of catalogues which appear weekly in another part of this journal considerable stress is laid from time to time on the fact that certain of those received are of "standard" size, meaning that they are 6 inches wide and 9 inches long, that being the standard some time ago adopted as being in the judgment of many the most suitable and convenient size. While of course there is nothing compulsory or obligatory as to what size anything shall be, yet in the case of a trade catalogue it is well that some convenient size should be adhered to as closely as possible, and the size specified is probably as convenient a general size as any that could be suggested. The main idea in those catalogues is preservation; when they vary so much in size it is impossible to conveniently file them, and thus some of their usefulness is lost. Many leading firms will spend from $5000 to $15,000 on a single catalogue, and they are veritable works of art. The old term "catalogue" is a misnomer; they are rare trade treatises, often sumptuous in their typographical excellence and admirable in illustration and style, and of high value as a technical treatise, up-to-date on the subject of discussion, and finely showing the "present state of the art" as regards points discussed. Often these elaborate trade treatises contain much better material than more pretentious bound volumes on technical subjects, and deserve a place in the library of the progressive man. That they may have such permanent place is why the "standard" size is advocated.



The Yellow Aster Mine and Mill, Randsburg, Cal. (See Page 132.)

THREE months ago was made modest announcement herein of the entrance of this journal on its 44th year of successful existence. Immediately came cordial words from nearby friends and patrons; later were received similar congratulations from more distant well-wishers, and like a stone dropped into water the widening rings of motion reach remote shores from which come congratulatory echoes months after the little notice of the 43rd milestone having been passed. Fortunate indeed is the publication that is able to justly earn so cordial and widespread expression of good wishes, and its aim and earnest effort shall be to deserve their continuance.

THERE is always intimate connection between the prosperity of the country and the condition of the mining industry. When mining is prosperous so is the country, and vice versa. Most particularly is this manifest in the case of gold and silver. The reason is plain. Money, which is the blood of business, is based, so far as redemption is concerned, on gold and silver. If it were not for the regular output of these metals the present prosperity of the country could not continue: when the mining industry languishes, every other industry languishes likewise. This is why mining is justly styled the basic industry. The unparalleled prosperity of this country during the past six years is proportional with the flourishing condition of the mining industry in that time. Should its life wane, so also would the life of every other industrial enterprise. Hence it is that they who would recklessly end the present era of industrial prosperity by making it unwise or unprofitable to commence or continue mining operations are in the same position as the man who sawed off the limb of the tree on which he sat. This seems to be a department in which human experience of the most disastrous kind counts for nothing. Men have to learn the same sad lesson of the centuries, each generation by itself, in ignorance or defiance of the eternal and inexorable law of cause and effect.

TO get the best of "strikes" some industry will eventually organize a trust in which employer and employe (capital and labor) will combine to cinch the consumer. In that way the employer can pay any wage demanded, and still keep going, simply passing the raise up to the consumer. This is most possible in a skilled industry. If the consumers don't like it they can organize a trust of their own. The situation is not devoid of humor.



Another View of the Yellow Aster Property, Rrandsburg, Cal. (See Page 132.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION.

United States, Mexico and Canada.....$3 00
All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

BRANCH OFFICES:

NEW YORK CITY, 720 Park Row Bldg. BOSTON, 42 Worcester Square.
CHICAGO, 1115 Monadnock Block. DENVER, 606 Mack Block.

J. F. HALLORAN.....Publisher

San Francisco, August 29, 1903.

TABLE OF CONTENTS.

ILLUSTRATIONS: Page.

The Yellow Aster Mine and Mill, Randsburg, Cal..... 126
Another View of the Yellow Aster Property, Randsburg, Cal..126
Fault on the 900-Foot Level of Mahoney Mine, Sutter Creek..129
The Cripple Creek Drainage Tunnel 130
Properties Through Which Tunnel Passes.....130
Flume and Hydraulic Work, Boise River, Idaho.....131
Carrying Water in a 48-Inch Pipe Over Boise River, Idaho.....131
Drift and Stope, 321-Foot Level, Little Butte Mine, Randsburg.132
Drift, 480-Foot Level, Little Butte Mine, Randsburg.....132
Little Butte Mine, Randsburg.....132
Air Lift.....133
Timber Stand for Five Spitzkasten.....134
Arrangement of Series of Spitzkasten.....134
Double Jet Alcohol Blow Pipe.....135
The Gross Automatically and Mechanically Stirred Ore Desulphurizing Furnace.....135
Mining and Metallurgical Patents.....136

EDITORIAL:

"Standard" Size Catalogues.....126
To Get the Best of "Strikes".....126
Cordial Words for This Journal.....126
A National Necessity.....127
Fooling the Credulous.....127
A Splendid Result.....127

MINING SUMMARY.....137-138-139-140-141

LATEST MARKET REPORTS.....142

MISCELLANEOUS:

Concentrates.....128
Some Structural Features of the California Gold Belt.....129
Parting Gold and Silver Bullion.....129
Electrolytic Leaching of Copper Ore.....130
The Cripple Creek Drainage Tunnel.....130
Production of Platinum in 1902.....130
Selium.....130
Mining Aqueducts.....131
A New Alloy.....131
Sulphide Treatment.....131
A Test for Gold and Silver.....131
The "Grub Stake" Proposition.....131
Value of United States Importations.....131
Mines of Randsburg, Cal.....132
Value of Mexican Exports.....132
Production of Chromite in 1902.....132
Notes on the Metallurgy of Copper of Montana.....133
Modern Methods in Ore Treatment by Cyanidation.....133
The Gross Automatic and Mechanically Stirred Ore Desulphurizing Furnace.....135
Double Jet Alcohol Blow Pipe.....135
Cedros Island Ores.....135
Points on Placer Locations.....135
Mining and Metallurgical Patents.....136
Personal.....141
Commercial Paragraphs.....141
Catalogues Received.....141
Obituary.....141
New Patents.....141
Notices of Recent Patents.....141

A National Necessity.

Much has been said in this journal in the last ten years in favor of the creation of a cabinet department of mines and mining, and the arguments advanced in supporting such a measure continue to gain in force by the natural sequence of events. The objection is noted that, as the supervision of the mining industry can well be left to the several States, it is unnecessary to burden the general government with such a matter.

But that is only begging the question. The point asserted as conceded is one of the things denied by the supporters of the project. The supervision and fostering care required by the nation's greatest basic industry is justly a national question, and can be best served by national aid. There are many things that the several sovereignties which make up this great republic can do, but there are many things that none but the national government can compass with justice to all, and this is one of them. The federal power is dominant over all, and when it lays the great ægis of its supreme authority over any subject, that takes on a majesty and is lifted to a lofty height of industrial importance denied to any thing controlled solely by State laws. If the mining industry of the United States were confined to a few insignificant sections of our common country; if the interests it represents were of little commercial importance, or if its destinies had little influence on our national life; if it mattered little whether the mining industry lived or languished, and if the issues involved affected only a small part of the people, the objection might have some weight. But as all the other industries of the continent rest upon the mining industry; as its operations are coextensive with the extent of American territory itself; as it is only the federal power that can wield the necessary national influence to administer on such a necessary national industry, it is only business that requisite attention be bestowed upon such industry by the creation of a national bureau that can alone give the needed attention which through the years has been withheld.

The question cannot be downed nor put aside; it may some day become a political question, just as have other matters of less import in our national life. Originally when we were weak and small the Federal Cabinet had but four members. As we advanced, the President's advisers grew in number with the growth of the country. Many things needed fostering care and protection, and they rightly got it. The mining industry never asked for any help. It asks none now. In peace or war it has ever held up the arms of the nation and with sturdy independence has made possible the splendid progress that has marked the years and made this a world-wide power. The fact that the nation occupies the forefront rank is due to the mining industry as much as to any other one factor in so splendid and satisfactory a result. Nor does there come any Macedonian cry for help or succor from any miner anywhere. As a private proposition the mining industry of the nation and the several States will advance in proportion to the wealth they develop and the skill, vim and science of those who make up the mining world, with due regard to the limitations imposed by the nation's neglect. It is not a plea for assistance nor a bid for office that prompts the suggestion that a cabinet department of mines and mining is needed. It comes from a clear conception of national requirements; from a knowledge that such a department is needed as a public measure; the evidence that however efficient State supervision may be, it lacks the iron-clad potency of federal jurisdiction; it comes from the consciousness in the minds of many that the great industry that has furnished so great a part of our national wealth should have the attention that will enable it to be of even still greater good to the nation of the twentieth century. What mining has done for the nation is but an index of what it can do. As a business proposition it would be the best paying investment the nation ever made to create a national department of mines and mining and have a representative of the nation's greatest industry in the President's cabinet. The matter is not a narrow one of place or petty politics; it is one of wide import and should be treated in a broad gauge way. It should be the province and the purpose of our public men to conserve the interests of their country, and where duty and policy so plainly dictate the way it should not be difficult to follow it.

"HOPE springs eternal in the human breast," and so does folly, the latter being fostered by fooling the credulous. Profitable extraction of gold from sea water, oil of gold, transmutation of silver, etc., into gold are constantly kept before those who take stock in that sort of thing. Occasionally the game is varied. A Leadville, Colo., genius takes a half-page advertisement to give all and sundry short cuts to fortune. By the simple process of exercising his faculties as a "prophetic seer and psychic" he can guarantee to anyone fortunate enough to be possessed of a dollar how to succeed in stocks or actual mining operations. Those who buy mining stock worth most for wall paper purposes and subsequently write asking an opinion regarding its unworth, might well advise with him. They couldn't do worse. It is questionable, however, whether the "seer and psychic" can be of much avail to the miner. True, he claims in his advertisement where upon payment of $1 he fell into a "trance" and falling out thereof located "nine valuable gold and copper claims in Gunnison county." True, also, according to the advertisement, that he similarly rediscovered "lost ore shoots" in Cripple Creek; yet it is, after all, unlikely that he will continue to content himself with a paltry dollar fee for putting others in position to acquire rapid wealth when he can see those veins of gold in the ground, and, doubtless, we shall all presently hear that he has discarded such slow process of accumulating riches and gone into finding rich store of gold in place for himself.

A Splendid Result.

The decadence of the once famous mining town of Virginia, Nev., calls to mind the debt that mining owes to the methods pursued by the miners of the Comstock and their splendid audacity in the days when it took nerve to do what they did, viz.: prove the existence at depth of ore in greater paying quantities than surface or superficial workings would warrant. Like the cautious voyagers of ancient days, who crept carefully from headland to headland, ever content to skirt the shores of the great sea, many miners of an earlier day had mostly confined their workings to be continuous only with the continuity of ore, and when a "barren zone" was encountered work usually stopped in that particular place. If the oxidized ore gave out and the sulphurets came in; if water made sinking a matter of expense, or the small appropriation made further progress a question of doubtful finance, the tendency was to stop and try elsewhere. But as Columbus, sublime in the conception of scientific fact, forsook the shore and sailed boldly out to discover a new world, so the Comstock miner discarded ancient custom and regardless of precedent or tradition went on in demonstration of the fact that a superficial stratum of hard rock, or an apparently insuperable obstacle of water or swelling ground, only made necessary the exercise of greater enterprise and skill. The material success that crowned his efforts, that poured a steady stream of treasure into the nation's life at the very time the nation was engaged in a struggle for existence and most needed help, great as that success was, is but a part of the advantage the world derived in the splendid lesson taught, that in mining, as in other things, the greater the obstacle the greater the incentive to overcome it. It is largely because of his indomitable courage and energy that deep mining is now possible in every place where now successfully carried on, for when men saw the vast treasure uncovered at Mount Davidson, the sight told them that in many other places the same energy would tend to the same success.

Nevada has other Comstocks probably equal in value to the Comstock of a generation ago, and is now busy uncovering some of those embryo bonanzas. That great mining State has had its day of decadence, but will have its day of assured success, when its output of bullion will approximate that of the early '70s.

How curiously things come about is illustrated in the case of the Comstock, for it is but fair to say in any reference to this matter that it was the purchasing public that largely enabled the miners of the Comstock to go ahead on so great a scale. The tremendous expenditure in those days of enormous cost was made possible by the lavish supply of funds. For those were the days when every one with a few dollars to spare bought stocks in the Comstock, and the companies operating there had unlimited funds at their disposal. At that day the ordinary private company operating in California or Nevada or Colorado had to keep a close watch on the expense account, and often when the ore secured in sinking a hundred feet failed to yield sufficient profit to pay for the sinking of another hundred feet, it became a question whether that next 100 feet would be sunk or not. In the case of the Comstock captains they were not thus hampered. The purchasing public mostly knew little and cared less whether the mine shaft was down 300 or 3000 feet, or whether the breast of the drift on the lowest level was in ore or not. What they were watching was the ticker on the stock exchange, for the street was worked then as diligently as the mine, and while the purchase of stocks made an ever-flowing treasury and the managers had unlimited funds at their disposal, the temporary owners of the stock usually held them only long enough to "make a winning." Thus the gamble was at the bottom of it all; but this does not detract from the skill of the men who seized the opportunity to do some of the biggest things in mining ever heard of, nor does it affect the permanent value to the mining world in the demonstrated results. The copper miner in Michigan, Montana and Arizona, the gold miner in South Africa, Australia, Colorado and California, the lead miner in Missouri, Idaho or British Columbia, is to-day doing bigger work with better results because of what the miners of the Comstock did so many years ago.

CONCENTRATES.

AS THE term "amorpbous" means not formed by crystallization, it can not be correctly applied to any alloy.

AS THE ash of charcoal is strongly alkaline, it would be of use as a flux in tho case of ore reduction referred to.

A SOLUTION of cyanide out of which all oxygen has been removed is not capable of dissolving any gold or silver out of their ores.

WHENEVER steel works are established on the Pacific coast the manganese oro deposits will be of commercial value, but are not thus available at present.

LAST YEAR'S world's coal production was about 920,000,000 short tons, of which the United States produced 33%, the United Kingdom 30% and Germany 20%.

NINE PARTS of lead, two parts of antimony and one part of bismuth make an alloy that will expand when cooling, this being of practical value in filling holes in castings.

ACETYLENE GAS has a specific gravity of 13, referring to hydrogen as a unit, or of 0.92, if air is taken as the unit. The ordinary specific gravity of illuminating gas is about 0.5.

IN the care of electric machinery cleanliness includes dryness, for wet and dirt often go together. Of course there is much apparatus that has to work out of doors and is designed accordingly.

NO ATTENTION is to be paid to those compounds "fuel stimulants," advertised as having great power to increase the heating value of coal. They are "fakes," solely designed to swindle the investor.

OPAL consists of hydrous silica, the proportion of water varying from 2% to 13% in different varieties. The mineral is softer than quartz, hardness from 5 to 6, quartz being 7. Its specific gravity ranges from 1.9 to 2.3.

TO HARDEN STEEL in the case of ordinary makes, it must be heated above a temperature of 700° C. Salt water conducts heat better than pure water; the salt assists in keeping the surface of the steel clear of scale, and therefore aids in the hardening.

A CENTRIFUGAL PUMP with an 8-inch suction pipe and a 6-inch discharge, running at 600 revolutions per minute, lifting water 42 feet, with a fall of 12 feet in the suction pipe leading to the pump, would have a theoretical capacity of 2650 gallons per minute.

MICA for electrical purposes must be free from oxides of iron and other foreign substances. The best for that purpose comes from India. Deposits in New Hampshire and North Carolina are also in the market and are largely used, as are deposits from other States for commutator work.

A SIMPLE chemical test will distinguish between sylvanite and calaverite. Boil the mineral with concentrated nitric acid. The decanted solution when diluted and tested with hydrochloric acid gives a curdy precipitate if sylvanite; very little precipitate, or merely a turbidity, if calaverite.

IN round numbers the value of the gold mined or produced in the United States in the last calendar year was $88,000,000; the number of ounces of silver mined in the same time was 67,000,000; copper production, 300,000 long tons; tons of lead produced, 268,000,000; tons of zinc produced, 160,000,000.

STREAM TIN has been recently reported in southwestern Colorado, but not authoritatively. There is no doubt as to the discovery of stream tin on Buhner creek, near Cape Prince of Wales, Alaska, but not in commercial quantity, the matter being so far more of a curiosity than a profitable proposition.

THE contractor is merely a pieceworker on a larger scale. As he is paid by the job, it is to his interest to turn out his work as quickly as possible and to get as much work as he can from the men working for him. The system insures quantity. To insure quality requires rigid inspection and the holding of everybody to strict account.

THE staggering headache caused by giant powder smoke can be immediately relieved by tablets prepared especially for such use. If those prepared tablets can not be had, a combination of acetanilide, citrated caffeine, soda bromide and gelsemium will afford instant relief, but that combination should be prepared by a competent doctor or druggist.

THE recalescent point in forging steel is that at which the change of cooling rate takes place and when begins a change in the structure of the steel. The fluid steel begins to crystallize at the point of solidification. If the steel be heated slightly above the recalescent point when allowed to cool it will be found that the crystallization is much smaller than before.

CONCENTRATED BLENDE in carload lots from the Rob Roy mine at Joplin, Mo., has assayed as high as 65.46% zinc. Pure zinc sulphide contains 67.15% zinc. The Rob Roy concentrates' yield illustrates the high grade of the ore and the degree of efficiency in the work of concentrating. Lead and cadmium alloy with zinc, but iron does not make a true alloy.

VERY little dynamite is now made in which there is any free nitro-glycerine. In nearly all instances manufacturers now gelatinate the nitro-glycerine with soluble gun-cotton, and this jelly, and not nitro-glycerine, is mixed with the wood meal and nitrate of sodium. Picric acid is made from nitrating carbolic acid. It is worth from 22 cents to 26 cents per pound.

IT is not infrequent for commercial litharge and red lead to contain a trace of gold and noticeable quantities of silver. The best brands, however, contain no gold and but the slightest trace of silver. Pure granulated lead and lead foil are always available for assayers' use. The average loss of gold in crucible assays may be estimated to be about .3%, and of silver about 2.5%.

LAND may be taken up for a mill site or as a mill site, in connection with a lode claim, and held by use for purposes directly connected with mining even though it is not used as a mill site, the requirement being that it be used by the owner or locator for milling or mining uses. The five acres may thus be used as a boarding house for those employed in the mine or mill, or for ore bins, etc.

A POND of water the surface of which has an area of 765,000 square feet would be discharged through a conduit 15 feet below its surface, 15 inches in diameter and 50 feet in length, in ninety-two hours, fifty-four minutes and ten seconds. A pipe with a diameter of 9 inches, a length of 4750 feet, and under a head of 17.5 feet, will discharge, theoretically, 69.67 cubic feet water per minute.

IN one of the latest processes for the electro-metallurgical production of zinc, the ground ore is passed into a bath of molten zinc chloride, which acts on the silver and lead sulphides. Chlorine is then passed through and acts upon the zinc sulphide, converting it into chloride. The chlorides of lead, silver and other metals are thus produced, and the metals can be fractionally electrolyzed out.

IN riveted joints for steam boilers there is a possibility that the joint may fail by shearing the plate between the first row of rivets and the edge of the plate, especially if the first row is the only one put in. To insure proper strength at that point, the rivets should be set back from the edge of the plate far enough to provide at least as much metal as the rivet contains, and, if slightly more, so much the better.

AN approximate rule for determining the diameter of rivets is to extract the square root of the thickness of plate and multiply it by 1.25. The actual diameter of rivet may be varied slightly from the results secured by this rule in order to use standard sizes. For illustration, take a plate .5 inch thick, the square root of which is .71. Then .71 multiplied by 1.25 equals .8875 inch. The nearest standard size is ⅞-inch, which would be used in such a case.

THE legal responsibility of the Idaho labor union is a matter that can not be disposed of in a "concentrate." The question is still one of energetic legal discussion. There can be no serious wrong without a corresponding legal remedy, and wherever there is great power there must be an equal degree of responsibility. In the case cited, however, the question would seem to turn upon the point as to whether an unincorporated union could sue or be sued.

IT IS difficult to correctly assure accuracy in the fire assay for lead. In the volumetric methods the ferrocyanide and molybdate methods are considered quick and accurate. The ferrocyanide is best performed with a 1% solution of potassium ferrocyanide. The solution to be titrated should be about 100 c. c. in volume, should contain 10 c. c. of 50% acetic acid, and should be at temperature of about 60° C. The correction for indicator is about 0.8 c. c.

CARBIDE OF IRON contains three atoms of iron to one of carbon and occurs in all steel of ordinary use. In metallurgy it is called cementite. There is about 0.8% carbon in ordinary commercial steel and about 0.89% in pure carbon steel. The most commonly accepted theory of how the addition of carbon to iron creates the alloy known as steel, is that by getting between the iron crystals it stiffens the whole mass up, thus producing the great increase of strength.

STEEL is coming into favor in some localities for shaft lining. The question is entirely an economic one. Whichever costs less is the best, the question of "cost" to be considered in all its bearings. In this regard too much attention can not be justly given to statistics that do not take all the facts into consideration. Nothing is more misleading than statistical information when one or two important factors are omitted. Both steel and wood have their places in shaft lining, and local surroundings determine which is the cheapest. In the case from whence comes the inquiry (northern Montana), timber would undoubtedly be the cheaper.

TO COMPUTE the form of an irregular body weigh it in and out of fresh water, and note the difference in pounds: then as 62.5 (the weight of a cubic foot of fresh water) is to this difference, so is 1728 (the number of inches in a cubic foot) to the number of cubic inches in the body. Or, divide the difference in pounds by 62.5, and the quotient will give the volume in cubic feet. Thus if the irregular-shaped body weighs fifteen pounds in water and thirty out, it has a volume of 414.72 cubic inches.

ELECTRICAL POWER has attained its highest development, so far as transmission is concerned, in the western part of America. In Colorado, Utah and California are some notable long distance electric transmissions. In the latter State as a successful paying proposition sixty thousand volts are transmissible over 200 miles. In Mexico the Guanajuato Power & Electric Co.'s line now in process of completion is 105 miles long, and will work at 60,000 volts three-phase. In this latter instance it is designed to minimize the possibility of insular weakness by using steel towers and long spans of conductor between supports.

IN parting with nitric or sulphuric acid the gold almost invariably retains a small percentage of silver. Because of this the weight of gold resultant is usually a little more than it actually ought to be, and that of silver a little less. When nitric acid is used for parting, the error is partly balanced or even transposed in character by the solution of a little gold, the latter case generally occurring when the proportion of silver to gold is large. With ordinary work the possible error is very slight and the matter is of consequence only in the assay of bullion. Ordinarily the silver retained by the gold after parting will not amount to more than .3%. In bullion assays the parted gold will retain, as a general thing, about .1% or less of silver. The exact amount of error in any case can be determined by check assays with pure gold and silver.

THE weight of a cubic foot of compressed air at 85 pounds at 70° F. equals .58 pound. Nothing but the best grade of air cylinder oil should be used for lubricating air cylinders. Cheap or poor grades contain light unsuitable oils which will volatilize at high temperatures, especially in the case of simple compression to 100 pounds. Such oils also contain residue, which collects around the valve or in the discharge passages, and interferes with the proper operation of the compressor. Where oils are used which volatilize easily the gas formed collects in the discharge pipe and receiver, and when mixed with the air coming from the cylinder and contained in the receiver forms an explosive mixture under pressure and at a temperature which requires only a slight increase to cause spontaneous ignition, and a possibly serious explosion might thus result. The cylinder lubricators should always be closed the moment the compressor is shut down to prevent oil accumulating in the cylinder.

REFINING silver containing small amounts of gold and other impurities is now a common commercial proposition. Only the gold residues reach the mint. The scarcity of silver deposits at those government institutions is to the employes a serious inconvenience, since the usual acid refining methods require a large amount of that metal as parting material in treating the gold bullion received. The great mass of mint gold deposits contain some silver and are usually too impure for either coinage or industrial use without refining. Some contain platinum, which is lost in the usual wet processes. It has been the mint practice to alloy the gold in the deposits with two and one-third times its weight of silver, and subject this mixture to the action of nitric or sulphuric acid. In consequence of the very limited deposits of silver, it is necessary to use the same silver repeatedly as parting material, at a great expense for acid. If two and one-half times as much impure silver as of gold came to the U. S. mints, the parting process would not be so wasteful.

IT IS a necessary part of mining development in the long run that a United States patent be procured for the ground. It constitutes the only sure title, and in the case of a proposed sale the purchaser will consider the question of title next in importance only to the possible value and extent of the ore. True, it costs a good deal; costs more than it should, but it is of iron-clad potency and is a deterrent to litigation. In case of a stock company instances are not wanting where with every intent to be honest those in charge while spending considerable money in requisite development omitted to secure a patent, and when the money ran out and trouble came, the ground finally became subject to relocation, with the result that the innocent stockholders lost the property. It should be borne in mind that no matter if the ground has been steadily worked for twenty years, no matter how much in the way of improvements may be thereon, a failure to put a paltry $100 worth of annual improvement during any of the required time may cause the ground to revert to the government under the letter of the law, and thus be subject to relocation.

Some Structural Features of the California Gold Belt.

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS by W. H. STORMS.

It is a noticeable feature of the lode that the principal fissures occur generally along a gulch or valley. Where this is the exception, the rocks forming the country adjacent to the lode have generally been protected from erosion by ancient river channels, overlain by a heavy deposit of volcanic material, the general course of which is across the lode. At Jackson a valley half a mile or more in width runs parallel with the lode for nearly 2 miles. On the east side of the valley the dolomitic vein reappears with all of its usual features, and, like the greater part of the lode elsewhere, is low grade in gold. On the west side and along the bottom of the valley the fissures are largely in black clay slate or partly at contact with the slates and amphibolite schist. In the Kennedy and Argonaut mines, which are the most extensively developed in Jackson district, the vein occupies the plane of a reverse fault in its upper portion, but in the lower levels it splits up and large masses of gold-bearing quartz are formed in the amphibolite schist. In the Kennedy mine, on the 2100 level, a somewhat anomalous occurrence is noticed in the formation of a large vein in the foot wall diabase. This vein strikes approximately with the main fissure, but dips easterly and southerly at 0° to 30°, and at one place has a slight west dip, the dip of the main fissure varying from 60° to 70° below the 800-foot level, being somewhat flatter above. In some of the lower levels of the Kennedy and Argonaut mines veins of solid quartz occur 25 to 30 feet in width. Usually several feet of the foot wall portion—7 to 10 feet—are high-grade ore and the balance is low grade. The foot wall portion is usually banded. In these mines the structure of the veins, as influenced by the rock in which they occur, is particularly noticeable, though, generally speaking, similar conditions produce like results elsewhere. In those portions of the vein occurring in slate, the vein is usually banded and forms that type of vein structure known to miners as "ribbon rock." Often in these veins the movement of the walls has been communicated to the vein itself, and polished faces within the vein, due to these movements, are not uncommon. Where one wall is composed of slate and the other of amphibolite schist, the slaty side of the vein usually develops the banded structure, the schist side showing a more massive condition, with usually more or less of the schist included in the vein. A sharp line of demarkation usually distinguishes the separation of these two types of structure, with the smooth, polished faces of quartz at the line of junction. This structural condition suggests that the mineralization has extended outward from a single fissure or crack, the slate being gradually silicified on one side and the schist similarly altered on the other. The heavy, putty-like gouges which nearly always accompany the veins of this portion of the lode seem to have been formed almost entirely by movement subsequent to the formation of the vein. This is evidenced by the occurrence within the gouge of fractured pieces of vein quartz, ground up and broken pieces of iron sulphide and other conditions which clearly indicate that these fissures have been planes of movement during a long period, both prior to vein formation and subsequent thereto. In some instances well-formed veins are found crushed and brecciated and recemented by silica. These often include black fragments of slate or schist and give to the ore a peculiar spotted appearance. For this character of rock the miners have various local names —"bull quartz," "boulder quartz" and "magpie" are the names most commonly heard. This character of rock is usually low grade and often worthless. It often occurs in large masses up to 150 feet in thickness. It occurs to a greater or less extent throughout the lode, and elsewhere in California, and may be ascribed to similar conditions as to structure and movement of surrounding rocks wherever found.

Northward from the Argonaut and Kennedy mines the vein passes beneath an ancient river channel, reappearing a few thousand feet northward at the Oneida mine. Here the lode is practically reduced to a singe fissure in the slates. The mine is developed to a depth of 2200 feet and exhibits the usual characteristics, just described, as being representative of the Kennedy. Northward of the Oneida mine, the lode again is buried beneath an ancient channel, and is found beyond in the South Eureka mine. It should be understood, however, that the vein is here continuous throughout, and that the mine workings extend for thousands of feet beneath the old river channels.

In the South Eureka mine the vein is much shifted and contorted, and faults—called by the miners crossheads—are numerous, rendering the mine difficult to work and expensive to keep open. All of the mines in this portion of the lode in black slate walls have heavy, swelling ground, and the expense incident to keeping up this kind of ground is almost equal to the first cost of opening the mine workings, owing to the mining methods in general use, and if the workings are required to be kept open for long periods, the cost greatly exceeds the original expense of cutting and timbering a drift or other workings. The method of making all permanent excavations, such as shafts and the main gangways in the wall rocks, at a distance from the vein sufficient to avoid the swelling ground, has been repeatedly suggested, but with few exceptions has not been put into actual practice; but these isolated exceptions readily prove the advantage that this system of mining would afford. This applies with emphatic force to the large three-compartment shafts, which, when sunk in the fissures, prove to be very expensive to maintain. Rapid winding through such shafts is extremely dangerous, if not impossible, owing to shifting of the position of shaft timbers. All such shafts are sunk on an incline usually approximating 63°. Several deep vertical shafts have been sunk within the past few years to depths of 2000 to 2700 feet. The most noted of these are the Oneida, down 2200 feet, which cut the vein at 1900 feet, and the Kennedy, down nearly 2700 feet, which is calculated to reach the vein at about 3500 feet.

These shafts are sunk through the hanging wall country through diabase, amphibolite schist and black slate. The Argonaut, some years since, sunk an inclined shaft in the hanging wall schists, and passed through the fissure at about 450 feet, again cutting the vein below the 1000-foot level, the vein having taken a steeper pitch, while the shaft was maintained at a uniform angle of 63°. These shafts, expensive in first cost, have proven already far cheaper than any of the shafts sunk on the vein fissure, for the reasons above given.

From the north end of the South Eureka southward, on the divide between Jackson and Sutter Creek, the fissure system, as previously explained, consists of a number of approximately parallel veins; but in the Central Eureka, joining the South Eureka on the north, and in the Badger and Eureka, which lie immediately north of the Central Eureka, the vein system is reduced, as far as development has gone, to practically a simple fissure, with a few small branches which extend into the hanging wall.

The black slates which accompany the main fissures for a distance of nearly 3 miles, with greatly varying width, and often split up by the intrusive diabase, and, possibly, by faulting, into several separate tongues of slate, are here not over 100 feet wide.

The Central Eureka mine is developed to a depth of over 2000 feet through an inclined shaft. The vein varies from 4 or 5 feet to 20 feet or more in thickness, with lenses of quartz ore from a few inches to large masses nearly filling the fissure. The fissure is more simple than in any of the several mines above described, and may be considered an ideal vein in this respect. The quartz is partly banded and partly massive, as in the other mines of the vicinity.

North of the Central Eureka, the Amador Consolidated (Badger and Eureka), which has been idle for thirty or more years, is worked to a depth of about 2100 feet and has a record of producing $18,000,000. It is said to be geologically similar to the Central Eureka—a simple fissure vein, though of greatly varying width. The Wolverine, at Sutter Creek, adjoins the Eureka, and was developed to a depth of 1000 feet with extensive levels, but it never proved largely profitable. This fissure extends uninterruptedly northward, so far as known, into the Wildman mine, in the town of Sutter Creek, and in its southern portion it is supposed to maintain the character developed in the Eureka and Central mines; but in the south end of the Mahoney mine the vein splits, one branch extending northerly through the Mahoney or Hector mine into the Belmont, and the other, the west branch, runs through the southern portion of the Mahoney into the Lincoln mine.

The northern end of the Wildman and southern part of the Mahoney are greatly disturbed by faults and flextures down as far as the 1200 level of the former, at least. (See Fig. 1.) This is particularly interesting in view of the fact that for a mile to the southward (to the north end of the South Eureka mine), the fissure is comparatively undisturbed. The ore bodies of the Wildman-Mahoney lie between two reefs of black slate, though these slates do not come in direct contact with the ore bodies. The splitting of the fissure into two distinct veins in the Mahoney is not duplicated, as far as known, on any other portion of the gold belt, for the two branches do not reunite. There are numerous instances southward where the veins split and in a greater or less distance are reunited, but such is not the case here.

(TO BE CONTINUED.)

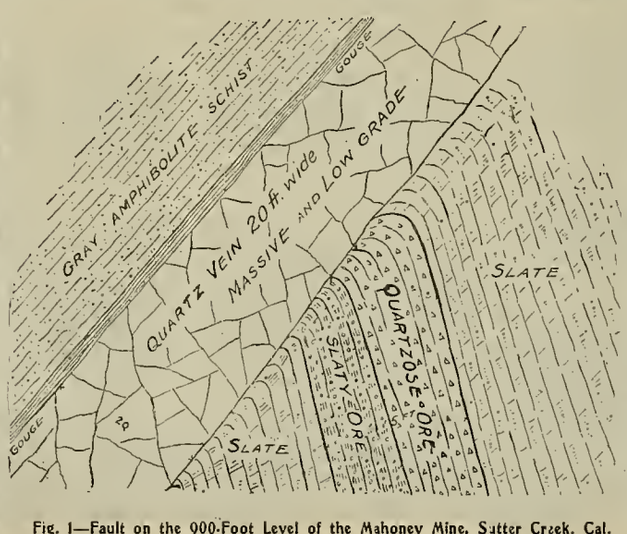


Fig. 1—Fault on the 900-Foot Level of the Mahoney Mine, Sutter Creek, Cal.

Parting Gold and Silver Bullion.

There are three methods of parting gold and silver: The nitric acid, the sulphuric acid, and the electrolytic process, respectively. The latter is well adapted to large smelting works. The nitric acid process is the oldest. It is thoroughly satisfactory, but the comparatively high price of nitric acid and the necessity of using either platinum or porcelain vessels has led to its being superseded in many modern refineries by the sulphuric acid parting process. Diluted sulphuric acid has no action on silver, but the strong acid, when heated, is decomposed by that metal, giving off sulphurous acid and forming silver oxide, which passes into solution in the excess of acid as silver sulphate. If gold is present in percentage, not to exceed one-third of the whole, strong sulphuric acid will extract the silver and leave the gold as a granular brown sediment. Should the bullion contain one-half gold, the latter metal will protect the silver against acid attack, and the result will be failure. It is the business of the refiner to adjust for the melting pot gold deposits with those of silver carrying small quantities of gold, or to add fine silver so as to have from two to three parts of silver for each part of gold. Such an admixture is melted in a large crucible, thoroughly mixed, and then with a dipping cup, is poured into cold water. Most bullion contains varying quantities of copper, and this metal works very badly in strong sulphuric acid. While decomposing the acid with formation of copper sulphate, the latter, unlike the silver sulphate, is insoluble in oil of vitriol, hence, if present in any considerable quantity, copper soon acts as a protector to the bullion and the chemical action either ceases or becomes tediously slow. Besides apportioning the silver to gold, it is necessary, therefore, to so combine deposits that the granulations do not contain more than 6% to 8% of copper. The success of this process really depends upon the fact that while weak sulphuric acid rapidly dissolves iron, yet, if the acid be strong enough, it has no appreciable action—just the reverse of its relations to silver. Cast iron vessels may, therefore, be employed. Large iron kettles are used, weighing half a ton, mounted over a furnace. Into this a charge of 300 to 400 pounds of granulated bullion is placed, and covered with three or four times its weight of acid—66 B. Heat is applied, when a lively evolution of sulphurous acid sets in, which, if too violent, must be checked by the addition of a little cold acid and slackening of the fire. This boiling is continued for several hours, during which time the escaping and consumed acids are gradually replaced. When the solution is complete the fire is withdrawn and the contents of the kettle allowed to quietly settle. A little cold acid is added to aid the precipitation of any suspended gold. Hoods over the kettles carry off the fumes to condensing and suppression apparatus. The strongly acid solution, while still hot, is siphoned off into the reducing houses. These are long, rectangular vats lined with lead, and provided with sloping covers. Slabs or ingots of metallic copper are placed on the bottom and sides of these vats, which are then partly filled with cold water. The hot silver solution is then run in, with resultant crackling and spluttering. The result is a weak solution of silver sulphate, rendered milky by the separation of fine crystals of that salt, the soluhility of which is very slight in pure water. The copper immediately begins to precipitate the silver as a crystalline mass, easily detachable from the plates when the operation is complete. This requires about twenty-four hours. Meanwhile the copper has taken the place of silver, leaving a strong solution of copper sulphate (blue vitriol). This blue solution is drawn off for crystallization, and the spongy silver carefully transferred to leaching tubs for thorough sweetening with fresh water. The silver, now in the form of minute, flaky crystals, is compacted into cakes by means of hydraulic pressure and these cakes dried in a current of warm water, after which a simple fusion in a black-lead crucible without fluxes gives a bullion 0.998 or 0.999 fine. If silenium or tellurium is present in the bullion, it will pass into solution with the silver and he deposited with it by the copper plates. In this case the spongy

silver will be dark colored and the melt will he brittle. It must then be fluxed with niter. The sulphate of copper is then carefully prepared for the market, the proceeds thus materially reducing the expense.

Electrolytic Leaching of Copper Ore.

A low-grade copper ore can he leached; the commercial results may not he wholly satisfactory. If there are large quantities of ore and one has money, he may make a commercial success. The process itself does not offer many great difficulties. The copper must he transformed into a sulphate, if water is to he had cheap enough. If sulphuric acid can be used, a simple oxidizing roasting will hring the copper to a condition where it will dissolve in diluted sulphuric acid. If the copper in the ore is a carhonate, the roasting, of course, can he omitted in the acid leaching. It is a common practice in such case to pile the ore, allowing the rain and air to oxidize the copper sulphides, forming copper sulphate, which water will extract from the ores; hut this is a very tedious process, involving a long wait for returns.

The ore carrying a little gold and copper can be leached with a hot solution of cupric chloride in a rotating harrel, through which a slow alternating current of electricity is passed. This cupric chloride solution is prepared with a saturated solution of calcium or magnesium, chloride or salt, so that the combined chemical and electrical action extracts all the copper from the ore. The clear solution is run through a harrel containing copper oxides or hydrates, which will remove all the iron and similar impurities from the solution, leaving in it only pure copper. This solution is then passed into rectangular vats containing porous ashestos partitions with electrodes for conveying the current to the solution as it passes in the vats. As the copper is deposited the solution is pumped back to a reservoir for further use, this being made to last indefinitely, a little water heing added to make up for evaporation and a little chemical to supply losses by leakage. The ore being freed from copper is then in condition for cyaniding. So far as known, however, the above described process has not been tried on a scale that would entitle it to endorsement from a commercial standpoint. Carhonate copper ore can be leached with sulphuric acid and deposition by electrolysis.

A generator of 100 amperes, through a series of 320 vats or plates, will, theoretically, deposit 2000 pounds of copper per twenty-four hours from a sulphate solution, and nearly 4000 pounds from chloride solution. The per cent of hluestone is proportionate to the increase or decrease of surface; with 8% it would he 10 feet. Where sulphate is used and insoluhle anodes, lead or carhon would do for the anodes. The vats in such case should he small, so that the slimes deposited from aeration of the solution could he easily cleaned out without disturhing too much of the series. A convenient size would be 4 feet square on each end and from 5 to 8 feet in length if a simple series is used, or 15 feet if tandem series; anodes 36x40, or with common series can be composed of smaller pieces. With such plate service the generator should have ahout 125 voltage.

The Cripple Creek Drainage Tunnel.

Written for the MINING AND SCIENTIFIC PRESS.

The more extensive development of Cripple Creek mines has heen greatly retarded in some sections by encountering heavy flows of water, which in some instances was greater than the pumping plants were ahle to handle, though of great capacity. As an outcome of this condition, the expedient, which had been successful elsewhere, that of driving a drainage tunnel, was suggested and finally undertaken hy the El Paso Mining Company of Beacon Hill under the direction of William Bainbridge, manager and superintendent of the El Paso mine. A. C. Jaquith is the engineer in charge of the enterprise. The sum of $80,000 was suhscribed by the several companies whose interests were directly affected hy the success of the enterprise. The suhscribers were as follows:

Frank F. Castello, for the Mary McKinney Co.	$15,000
J. Arthur Connell, for the Work M. & M. Co.	1,500
J. R. McKinnie, for the Moon-Anchor Co.	1,500
F. J. Campbell, for the Anaconda Co.	4 000
Irving Howhert, for the Anchoria-Leland Co.	2,500
Sherwood Aldrich, for the Elkton G. M. Co.	15,000
Horace Granfield, for the C., K & N. Co.	3,500
Sam S. Bernard, for the El Paso Co.	25,000
Frank G. Peck, for the Midget Co.	1,500
A. E. Carlton, for the Doctor-Jack Pot Co.	5,000
Midland Terminal and F. & C. C. Railway	2,500
Taylor & Brunton, sampler	1,000
C. M. MacNelll, for U. S. Reduction & Refining Co.	2,500
Total	$80,500

This subscription was equal to the estimated cost. Work was hegun on the tunnel Jan. 25, 1903, the entrance heing near the confluence of Cripple Creek and Arequa gulch, north of Grouse mountain.

The level of the drainage tunnel is 250 feet helow the Standard tunnel. An idea of the relative position of these tunnels may be gained by referring to the accompanying sketch. (Fig. 1.) The hlack line at the hase shows the line of the tunnel, the unfinished portion of which at the time of the beginning of the recent strike is indicated by the cross.

Prior to the beginning of the tunnel, an estimate was made for the Elkton Co. of the amount of coming water in the Elkton and other mines of the vicinity, with a view to determining the advisahility of continuing pumping operations. Investigations were made covering a period of several weeks, and these showed that the quantity of water varied from a minimum of 40,000,000 gallons to 170,000,000 gallons daily, and it was concluded that it would be far cheaper to drive a long drainage tunnel than to undertake to drain the area by pumping to the depth the tunnel could reach.

With the exception of the small uncompleted section which remained a few days ago, the tunnel is in ahout 5230 feet, which includes that portion of the El Paso workings on the line of the tunnel. The accompanying sketch map (Fig. 2) of the several properties through which the tunnel passes, shows the direction of its alignment. A large amount of work has been accomplished from the El Paso shaft, and two other shafts were sunk on the tunnel line to facilitate the work. These are shown in the vertical section. If the tunnel be continued under Raven and Globe hills, its length will exceed 12,000 feet, or ahout 2½ miles, without counting lateral hranches.

Upon the success of this enterprise depends the driving of a second drainage tunnel at a lower level. Shou'd this latter project he undertaken, it will douhtless be well under way hefore the reserves made availahle hy the present tunnel are worked out.

The first tunnel to drain the mines of the district to a marked extent was the Moffat, driven into Gold hill. The amount of water flowing from this tunnel reached as high as 3000 gallons per minute. The Standard tunnel was driven about 200 feet lower, which completely drained the Moffat tunnel. The present tunnel, driven in the common interest of all the mines of that vicinity, is called the Cripple Creek drainage tunnel. The site for a second syndicate tunnel has not yet been selected.

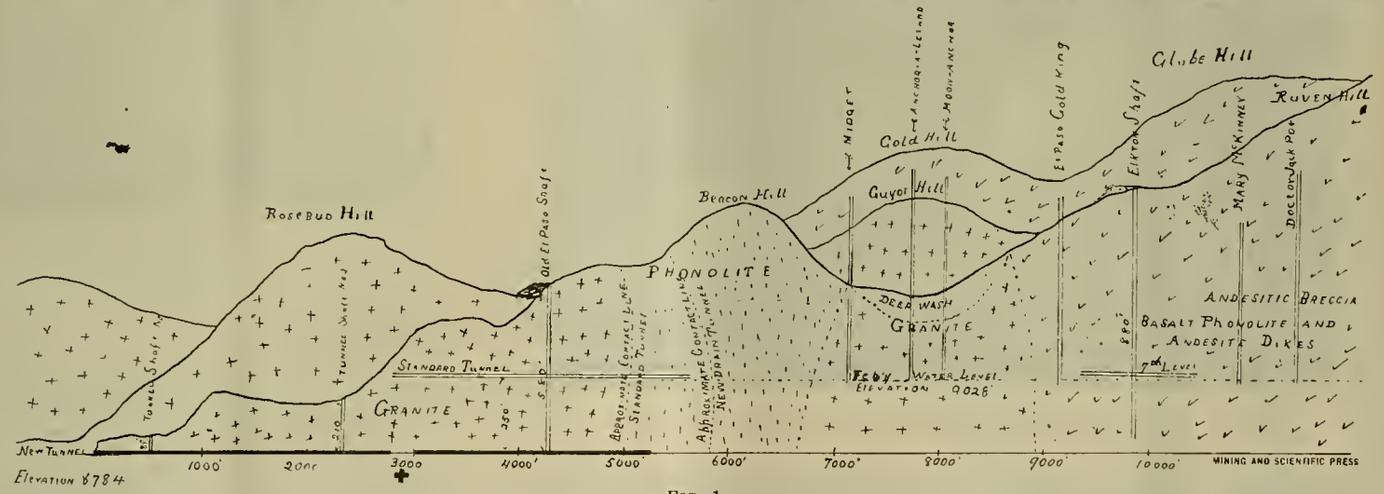


FIG. 1.

Production of Platinum in 1902.

The report for 1902 to the United States Geological Survey on the production of platinum in 1902 is now in press. The report is in two parts—the first heing the report proper, by Dr. Joseph Struthers, and the second heing a paper hy Prof. J. F. Kemp on platinum in the Rambler mine, Wyoming.

The production of platinum from domestic ores in the United States decreased from 1408 ounces, valued at $27,526, in 1901—the largest output recorded hy the Geological Survey since 1880—to 94 ounces, valued at $1814—the smallest production since 1893. In connection with the platinum, there were also ohtained from the ores 20 fine ounces of iridium, as against 253 ounces in 1901. The domestic supply of platinum in recent years has been ohtained as a secondary product chiefly from gold placer deposits in Trinity and Shasta counties, Cal. It is reported that the metal occurs, though not in commercially rich deposits, in many other gold placers of California, as well as in Washington, Oregon, Idaho, Montana, Colorado and Alaska. The Rambler mine, Wyoming, continues to attract attention, and during the year, a considerable quantity of the metal was collected, hut not marketed, hy the Waratah Minerals Co. at Kerhy, near Grants Pass, Josephine county, Oregon.

The Russian sources of platinum supply, which furnish about 90% of the total consumption of the world, are comparatively limited. The platinum-hearing ores extend along the eastern watershed of the Ural mountains in Eastern Perm and along the watershed farther south.

The imports of platinum into the United States during 1902 were valued at $1,987,980 as compared with $1,695,895 in 1901.

SELIUM is the latest metal discovered. E. Mollard, a Frenchman, reports its discovery hy him, and claims that it will cost only one-twelfth as much as aluminum; that it is lighter and stronger than that metal. The further claims that it is rustless would indicate its value for mine, ship and railway work.



FIG. 2.

Mining Aqueducts.

The ditch and flume of the hydraulic miner is finely supplemented in many cases by preparatory work of great magnitude and expense, carrying immense volume of water through unusually large pipes over hills and across valleys at a difference in height sometimes as high as 400 feet. In several Colorado, California and Idaho enterprises 48-inch pipe, thousands of feet in length, is in use.

To some of these mining aqueducts the term "inverted siphon" is applied. The first contrivance of the kind to which that name was applied is believed to have been that put in by the Spring Valley Mining Co., at Cherokee, Butte county, Cal., in 1871, a wrought iron, riveted, 30-inch pipe, 14,000 feet long, across a depression of about 950 feet. The structure was described in the MINING AND SCIENTIFIC PRESS at the time. Since then the size and make of the pipe has been considerably changed, the pipe being often now made with an expansion joint, and at times being 48 inches in diameter.

The term "inverted siphon" is not technically correct, as these aqueducts do not work on the principle of the siphon. Their mission is to utilize the pressure of the water at the inlet to maintain a regular, steady flow, forcing the water of the outlet branch or arm of a V-shaped pipe line out at a point slightly below the level of the inlet, thus carrying water at great head and enormous pressure across rivers, under roads, and up and down steep bluffs to where it is needed for hydraulic mining. It is not uncommon to thus spend $300,000 or $400,000 in preparatory work.

The accompanying engravings show how water is



Flume and Hydraulic Work, Boise River, Idaho.



Carrying Water in a 48-Inch Pipe, 1700 Feet Long, Over Boise River, Idaho.

thus conveyed in an "inverted siphon" in an Idaho hydraulic mine, Boise river; the upper picture shows where the water is brought from Sheep creek, across the Boise river, that part of the pipe being 1700 feet in length and 48 inches in diameter. The lower engraving shows the flume and ditch work in the latter part of the system, where the water finally reaches its work on the gold gravel deposits.

A NEW ALLOY for bearings subjected to heavy loads, such as those of railway axles, is described by G. H. Clamer as consisting of 64 parts of copper, 5 of tin, 30 of lead and 1 of nickel. The metal casts well and is easily worked. Its large proportion of lead greatly reduces wear, and when used as a bearing for a journal 3¾ inches in diameter by 3½ long, run at 525 revolutions per minute and loaded to 1000 pounds per square inch, the loss in weight was but a fifth of a grain in 100,000 revolutions. Under the same conditions, the wear of gunmetal of varying proportions of copper and tin was from 2½ to 4 grains.

Sulphide Treatment.

In the Carmichael-Bradford process gypsum is dehydrated—turned into what is really plaster of Paris—then well mixed with sulphide concentrates (or slimes), the percentage of gypsum used being about 20%. Water is added, and when the mixture is thorough it is set out to dry, crushed small to an average size of 1½ to ¾ inch. The dust is sieved out and set aside to be again mixed. After being crushed the mass is ready for the converter; size, 3 feet 9 inches across top, 3 feet 1 inch deep, V-shaped, bottom plate well covered with red-hot coal, of equal redness all over, to a depth of 2 inches. The pot is filled with the rough mixture—the rougher at the bottom and the finest on top—a hood is placed on the top and 1½ ounce of air turned on. After a quarter of an hour the air current is increased to 2½ to 3 ounces, which is kept going until the pot is cooked. The pot used in recent experiments contained 12 cwts., average time occupied in a thorough cooking 1½ to 2 hours. Slimes take no longer than concentrates. The gist of the process is in the use of the gypsum, the knowledge of the percentage necessary and the proportional sizes of the machinery necessary for the charges. The machinery is simple—a converter and a blower, the latter part of the ordinary type in every-day use. The air is conveyed into the converter from the bottom. If the process is used on a large scale, various mechanical devices will be adopted for saving time and labor in respect of charging, tipping, cleaning, and so on. The product is a rough, homogeneous mass. The difficulties stated to be overcome are incomplete desulphurization, loss of metals by volatilization and the fine condition of metals to be fed to the blast furnaces.

The process may prove valuable in the treatment of zinc. Further value may be derived in distilling sulphuric acid, as the sulphur from the pots can be liquefied and turned into the acid.

A Test for Gold and Silver.

To test quartz for the presence of both gold and silver by the use of nitric or muriatic acid, the ore should be reduced to a powder sufficiently fine to pass through a No. 60 sieve. Place this pulp, when screened, in some flat iron vessel over a fire, so as to burn out those elements which readily sublime or burn. The pulp, when cool, should be placed in a glass vessel and covered with nitric acid, pure or slightly diluted with water. To facilitate the action of the acid, the vessel containing the acid and pulp should be set in a pan partially filled with sand; then heat the pan. The sand will prevent the glass vessel from bursting by rapid expansion. As soon as the acid begins to boil set it off the fire and let remain standing for several hours. Add about as much again water as there is acid and pulp, then shake or stir thoroughly and filter off the liquid. The liquid thus obtained is a solution of the nitrates of all the metals that the rock contained and that are soluble in nitric acid. Add drop by drop a strong solution of common salt. If a white precipitate appears after adding the salt, it is either oxychloride of bismuth, mercurous chloride (calomel, a salt of quicksilver), or chloride of silver. To tell to which of these three classes the salt belongs, pour off the fluid above; if it dissolves it is bismuth, and neither silver nor quicksilver. If it does not dissolve pour off the acid and to the precipitate add strong ammonia. If the precipitate dissolves the salt, it is silver chloride. If it does not dissolve, it is quicksilver chloride or calomel. To the dried silver chloride add an equal amount of washing soda or borax, then it can be melted to a "button" of bullion.

As to the gold, take the pulp and filter saved from the first part of the experiment and put into a crucible and heat. The filter will completely burn. Next put the pulp through a very fine screen. Now soak for two days in an acid consisting of a mixure of four parts nitric and fifteen parts muriatic acid, which has been prepared at least two weeks before. This will convert any gold present into a perchloride of gold. Platinum will also be converted into a perchloride. Again filter; take the liquid that filters through and evaporate to dryness, either in a porcelain dish or glass flask in the sand, as before decribed. This is done to remove the acid. Dissolve the dry residue in water, simply by adding warm water to the flask as soon as it is sufficiently cool not to burst when adding the water. When the salt which remained in the flask after evaporating is thoroughly dissolved again, add a solution of ferrous sulphate (copperas) or of oxalic acid and set aside. Let stand for two or three days. A fine brown powder precipitated to the bottom of the flask is pure powdered gold. Pour off the liquid above the powder, wash thoroughly and dry. These precipitates may be melted into a gold "button," but it requires great heat.

The following is a simple test for gold which may fill ordinary requirements so far as gold is concerned: For gold in oxidized ores, pulverize the sample and place in a porcelain-lined vessel or tea cup, cover with iodine and allow it to stand for two or three hours. Then dip into it a piece of white filter paper, dry and burn it, and if it gives a purple color gold is present, and the deeper the purple the richer the ore. For other ores with this test, such as pyrites, the ore must be roasted. Where lime is present the ore must be roasted twice, the second time adding carbonate of ammonia. After roasting, test as with oxidized ores.

THE "grub stake" proposition is always a good one. It can be called a mine hunt, or a mining partnership, or anything else, but the original name expresses the idea. Just how it works is exemplified in the case of C. M. Taylor of Phœnix, Arizona, who started prospecting this week in northern Mexico. His arrangement is with the Mexican Mining & Development Co. He has the States of Sonora and Sinaloa, Mexico. He gets $3000 for expense money, $1000 down, the remainder in installments of $200 per month. He has the right to form a company of his own, and confine his work to prospecting or investigation of and options on mining properties. He reports to the head company, who send an expert to report on the property or prospect. Upon the expert's recommendation the company undertakes to promote the property. On every share of stock so sold Mr. Taylor and his company receive a percentage.

THE manufacturers of the United States imported nearly $500,000,000 worth of materials for use in manufacturing in the fiscal year just ended. Materials for use in manufacturing thus formed nearly one-half of the total imports of the United States last year. The Department of Commerce and Labor, through its Bureau of Statistics, in a table just completed, shows that the total value of manufacturers' materials imported in the fiscal year 1903 was $489,471,667, and that this formed 47.73% of the total imports. In the preceding year the total value of the manufacturers' materials imported was $415,000,000, and formed 46.14% of the total. In 1898 the total importation of manufacturers' materials was $247,000,000 and formed 42.07% of the total.

Mines of Randsburg, Cal.*

From an Occasional Correspondent.

When the present labor troubles in Randsburg, Cal., are settled the camp will enter upon a new period of prosperity. Many independent mine operators are at work. Several of these are men who are on strike; and the properties on whicb they are at work are showing up so well tbat some of the operators may not return to their former work.

Ten miles north of Randsburg, in the Goler mountains, H. J. Short has a low-grade smelting ore property. Still farther to the nortb and east are several low-grade properties which could be handled with profit were there a cheaper method of sbipment.

In the canyons at Goler gold is being extracted from the washes by the aid of tbe dry washer. This is not a satisfactory method in this section, as much cemented gravel is found. Several are working on a machine to disintegrate this hard mass of sand by the aid of water.

The Yellow Aster showed up better and better tbe deeper the shafts and winzes were suuk. The latest ledge struck, at a deptb of 1260 feet, is the richest ever found in this camp. Unfortunately this and several of the other properties here are now tied up by a strike.

The Butte Lode, which controls the Butte and Kinyon-Wedge mines, at the time of the strike was taking out better ore than had been struck for years. Wben the strike was declared this company



Drift, 480-Foot Level, Little Butte Mine, Randsburg, Cal.

was preparing to do extensive development work, to sink to greater depth than at present. This work will be pushed when tbings start up again.

I note in several mining journals that tbe Johannesburg Gold Mines Co. expect to declare a dividend in October, and stock is offered for sale. As far as can be learned the output of bullion from this property did not pay expenses, and as it bas been tied up by the strike for over two months it would seem that the only way the directors can declare a dividend would be from the money received from tbe sale of stock.

The War Eagle Co. announced some montbs ago that it was going to sink a double-compartment shaft to a deptb of 600 feet. Altbough this property

*See illustrations front page.

adjoins the Yellow Aster, and claims that several of the latter company's ledges run tbrough their property, very little work has been done.

Several men are now working the placer deposits



Drift and Stope, 321-Foot Level, Little Butte Mine, Randsburg, Cal.

in Red Rock canyon and making good money.

The stamp mill in Mesquite canyon is still idle. It is called "The Monument to Folly." The company first built the mill and then went prospecting for ore. Tbey met with the usual fate.

The Pearl Wedge, owned by Balschweid & Pierce, although not very large is quite rich. Ore taken from it runs $100 to the ton. There are a number of men now at work on it.

Tbe Santa Ana, owned partly by the owners of the Red Dog mill and partly by Superintendent Layton, is also a rich proposition, averaging $100 per ton.

Jobnson & Jensen are placer mining in the Stringer district, 2 miles from Randsburg. Tbey struck bedrock at 40 feet.

The Baltic mine, in Stringer, is developing into one of the good properties of the camp. At tbe time of the strike twelve men were employed in the mine and mill (ten stamps). Some good ore was being taken out. C. H. Wynn was superintendent.

An attempt will be made to work the tailings of the Garlock mill. A plant is being installed for that purpose.

A. Castro et Cie are placering in Iron gulcb. They sank one shaft 110 feet in an endeavor to strike bedrock. They then moved up farther in the channel and are down about 60 feet.

Wiggins & Short are taking $90 ore out of the La Crosse claim.

White's Camp is flourishing under the superintendence of Superintendent Boucbard. Mucb development work is being done.

The Sunshine mine was first located in 1896, but nothing was done in the way of development work for eighteen months. The mine is owned by T. W. & B. M. Atkinson, who are pushing operations. The vein varies from 2 inches to over 2 feet thick and the ore is rich. The Atkinson Bros. also own the Hatchet and Bully Boy claims, on which they have given a number of leases.

A rich stringer has been struck in the Wells-Fargo, situated southeast of town. W. Logan is working it for the owner, Mr. Warner.

White's Camp, or more properly the Sydney group, is active. Tbe main shaft is down 100 feet; two drifts are being run from the lowest level. Another shaft is being sunk 175 feet from the main sbaft to connect witb the stope on the 70-foot level to get a good supply of air.

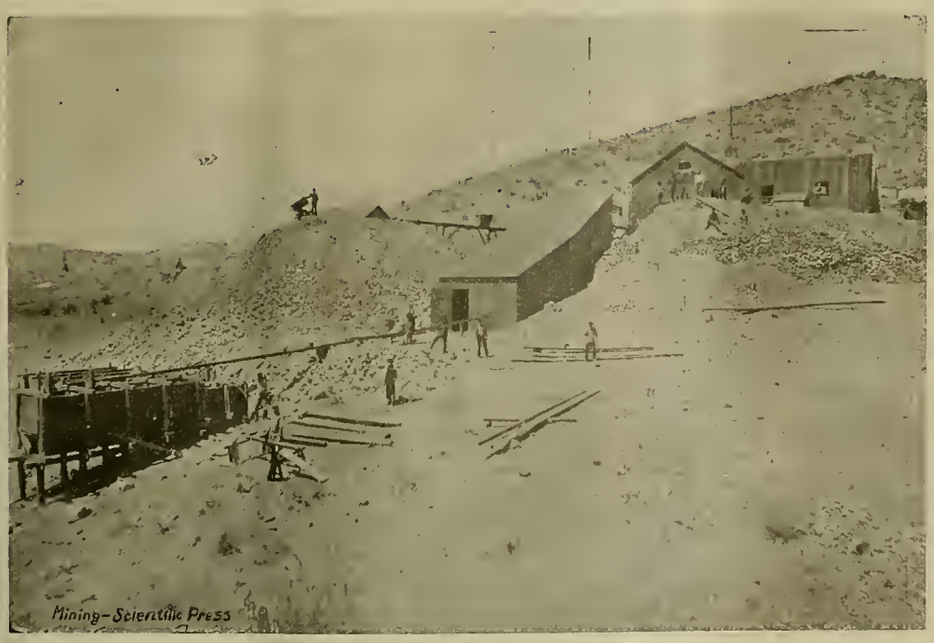
L. & G. Kane have invented a new placering machine. Water is to be used in it to disintegrate the cemented gravel, and unlike the other one mentioned in this correspodence a plate is used.

It is a pity that more active development work cannot be done in Colorado canyon, northwest of Randsburg. Tbere is a large vein of good coal there.

E Hammond and S. Oakley are down 140 feet on the Orphan Girl and are now drifting on tbe 130-foot level.

G. A. Fudickar, of the Mattie mine, has suspended operations until cool weather.

(More recent reports from Randsburg are to the effect that the negotiations for the settlement of the miners' strike bave not resulted satisfactorily. The Desert Mine Owners' Association, in conference with the Miners' Union, refused to pay more than the old scale, $3.50 for sinking shafts, and $3 for stoping and drifting; the union insists upon a straight $3.50 a day for all miners, regardless of the class of work, and $3 for shovelers. It is stated that 200 non-union men are to be sent to the Yellow Aster.)



Little Butte Mine, Randsburg, Cal

Value of Mexican Exports.

The following statement sbows amount in Mexican silver dollars of Mexico's export trade eacb fiscal year from 1881-82 to 1901-02, average value of the Mexican silver dollar in New York during each year of that period, and these annual amounts reduced from silver to gold at the corresponding yearly average value of tbe Mexican silver dollar in New York:

	Export. Silver Value.	Average Value Mexican Dollars in New York.	Export. Gold Value.
1881-82	$29,206,772	0.894	$26,110,854
1882-83	41,919,182	0.882	86,972,719
1883-84	46 861,117	0.875	41,004 477
1884-85	56.811.958	0.864	40.445.532
1885-86	43 797.249	0.816	35,738.555
1886-87	49,329.015	0.790	38,970,633
1887-88	40,078,717	0.759	87.232,746
1888-89	60.380.287	0.739	44,621,032
1889-90	62,680,539	0.758	47,511,849
1890-91	63,425,746	0.837	53.087,349
1891-92	75 660,880	0.837	63 328,157
1892-93	88,044 624	0.657	57.845 318
1893-94	80,083 944	0 539	43 165,246
1894-95	95,020 326	0 514	48 840,448
1895-96	110,022 356	0.536	58 971,983
1896-97	117,784 092	0.506	59,127 614
1897-98	138 068 504	0.448	61,854,690
1898-99	148 453 834	0 471	70,070,210
1899-1900	158 247,933	0.476	75,326 016
1900-01	158 009,437	0.488	77,266,639
1901-02	168,041,272	0.441	74,106,201

The silver value of Mexico's exports in twenty-one years increased; the gold value did not increase in corresponding proportion. The increase in Mexico's exports in silver value in 1901-02 is $138,834,500 over exports in 1881-82; apparent increase in gold value, $47,995,345, applying average value of the Mexican dollar in each respective year. If the average value of the Mexican dollar in 1881-82, namely, 0.894, be applied to the silver value of the exports in 1901-02, the result is a gold value of $150,000,000 in round numbers, as compared witb $74,000,000 in gold value which results from the average value of the Mexican dollar in 1901-02, namely, 0 441, showing a loss for Mexico in her own silver dollars of $76,000,000.

Production of Chromite in 1902.

The report to the United States Geological Survey on chromite for 1902 by J. H. Pratt is now in press.

California was the only State producing any chromite during 1902, the quantity being 315 long tons, valued at $4725. This is a decrease of 53 tons in quantity and of $1065 in value as compared with tbe production in 1901, whicb was 368 long tons, valued at $5790.

The Pacific coast offers a promising field for the erection of a chemical plant to treat chrome ores in the manufacture of various chromium salts, as these ores can be obtained in California.

With the completion of the railroad from Erwin, Tenn., to Marion, N. C., the chromite deposits of Yancey county, N. C., will undoubtedly be thoroughly exploited and may become producers.

There is a large amount of chromite ore imported each year into this country, the most of which is from Turkey, with smaller amounts from New Caledonia and Canada. The imports of chrome ore and chromic acid in 1902 were valued at $593,712. The principal chromite deposits of Canada are in the vicinity of Black Lake and Colraine, Quebec province. The Canada production for 1902 was 900 long tons, valued at $13,000.

Notes on the Metallurgy of Copper of Montana.*

NUMBER V.

Written by H. O. HOFMAN.

The hearth in some plants is supported by jack-screws, in others it is built up solid from the foundations. It rises some distance above the furnace floor in order to furnish the height necessary for the forehearth or settler and the disposal of the waste slag. The hearth is lined to a depth of 24 to 30 inches with firebrick, or only with one or two courses of firebrick, and then with a mixture of quartz and clay. The crucibles have a depth varying from 8 to 28 inches. Although deep crucibles last rarely longer than three months and shallow crucibles have a longer life, the former are more common. Preliminary experiments with lining deep crucibles with chrome brick have given promising results in preventing break-outs of matte. There appears to be no a priori reason for having a continuously discharging crucible as deep as 28 inches; 8 to 10 inches would seem to be sufficient to furnish the matte bath necessary to cover the bottom satisfactorily, but this is disputed by the best of authority. In treating zinckose ores the deep crucible would probably soon fill up with mushy matte and cause indefinite trouble, but the ores smelted, fortunately, contain very little zinc.

It is claimed that with a deep crucible a furnace puts through more charges, but this has, so far, not been proved. As far as the strength of the jackets is concerned, the deep crucible is preferable, as with a shallow crucible the tuyeres are located higher up (viz., 24 and 12 inches—see table), in order to furnish a smelting zone of some height, and the water-cooled breast has to be built in the jacket, while with the deep crucible it is placed underneath the jacket.

The slag-matte mixture is usually discharged from the center of one of the sides of a furnace. The water-cooled tymp is made of cast iron or, preferably, of copper. Experiments with copper and copper alloys gave the following data:

Life, Days.	Cu. Per Ct.	Zn. Per Ct.	Al. Per Ct.	P. Per Ct.	Sn. Per Ct.
365	100	....	....	Some.	....
144	90	....	0.5	....	10
75	89	3.0	0.25	....	8

The solid cast iron spout with water-cooled nose is very common. Wrought iron pipe surrounded by cast iron has proved unsatisfactory. A water-cooled wrought iron spout with a cast copper removable nose lasts about 120 days, and is often preferred to cast iron.

The tuyere stock in common use consists of a cast iron tuyere box firmly attached to the jacket and connected by a sheet iron tuyere pipe, having a gate, with the bustle pipe.

The large size of the roofless forehearth in which the matte settles out from the overflowing slag is a development of Montana practice, caused by the necessity of storing considerable quantity of liquid matte for the converters. As far as the settling of matte is concerned, oval and oblong hearths are sufficient, as the freedom of copper in waste-slag depends to a large extent upon the length of the path the slag can travel before it overflows. In regard to storage capacity and strength of vessel, the circular hearth is preferable, hence it is only with a comparatively small blast furnace not furnishing direct matte that we find the oval or oblong forehearth. The circular forehearth, 14 feet in diameter and 56 inches high, with a 9-inch brick lining and a 9-inch brasque backing, holds about 60 tons of matte when new. In order to prevent breaking out, the shell is sprayed with water. After being about three months in use its capacity has decreased by building that it becomes necessary to renew it. The 9-inch course of brick sometimes has a 3-inch backing of sand, which seems to be sufficient. The smaller oblong hearth has, as a rule, cast iron water jackets on the sides; it has a 9-inch bottom, which crusts up about 6 inches. The sides are lined with a half course of brick, a 1-inch air space being left at the water jacket. All forehearths have, of course, a tapping slot for matte. It is closed in a few instances by a cast iron plate, but more commonly by a solid copper plate with tap hole. The matte is tapped from the forehearth into a ladle, which discharges its contents either into flat cast iron moulds, holding about 3000 pounds, or into the converter. The practice of bringing the converter to the forehearth of the blast furnace has become obsolete. The blast furnace forehearth, if of large size, is of great assistance to the reverberatory matting furnaces in a plant which converts matte, as it makes little difference whether the forehearth contains much or little matte. It can be allowed to fill near the top, or it can be tapped nearly dry. With the reverberatory furnace this is not the case. The aim there is to allow the level of the matte to fluctuate as little up and down as possible. This means that only a certain quantity of matte can be tapped at stated intervals. If, therefore, the converter calls for matte, and the reverberatory furnace can furnish only an insufficient amount, there is the blast furnace forehearth, forming a kind of balance wheel, to help over the difficulty. The waste-slag is caught in tilting waste-slag pots of 5 to 6 tons capacity and hauled up to the dump, or it is granulated. Near the bottom of the launder carrying the slag granules there is found often a mechanical sampler, driven by the granulating water, which takes out the whole of the stream of granules at stated intervals and furnishes thus a true sample of all waste-slag made.

The coke used around Butte comes from different parts of the country. Most of it, however, is made from Montana coal.

In the management of a blast furnace the tendency has been toward large tonnages, with production of 50% copper matte, and slag low enough in copper to be waste product. Tonnage had to contend with siliceous ores low in iron, and with limestone as the only available flux, which caused the making of slags of high melting temperatures. As, furth r, large amounts of limestone are required to make slags that are at all fusible, the formation temperatures lie higher than when there is a more intimate contact of acid and base. Tonnage was, therefore, obtained mainly by increasing the size of the furnace. The combination of siliceous slags low in iron, with much air, has been the cause of as much as 70% of the sulphur in the charge being burnt off in its descent through the furnace. But even with the large elimination of sulphur in a comparatively dense charge, it is often not possible to obtain the 50% matte demanded by the converter plant, hence blast furnace matte is sometimes tapped from the forehearth into a ladle and poured into the reverberatory matting furnace to raise the percentage of copper by mixing with higher grade matte. The following table gives in percentages some idea of how the charges are made up, and the succeeding table shows partial analyses of flue dust and briquettes, giving an idea of their general character.

BLAST FURNACE CHARGES.

PLANT.	First-Class Ore	Coarse Concentrates	Matte*	Converter Slag†	Briquettes‡	Limestone	Coke
A	22.4	20.5	4.0	17.8	4.0	22.8	8.5
B	52.5	....	2.3	8.9	..	25.6	10.7
C	15.5	25.0	22.5		0.2	27.6	9 2

ANALYSES OF FLUE DUST AND BRIQUETTES.

FLUE DUST FROM	Cu. Total	Cu. Sol. in H_2O	Cu. Sol. in H_2SO_4	SiO_2 Total	SiO_2 Sol. in HCl	CaO	Al_2O_3	Fe	SiO_2	As. and Sb	Ag. Ozs. per Ton
Flue near MacDougall furnace	13.3	.....	.....	12.0	.....	.....	.....	11.9	47.9	.....	4.2
Flue near MacDougall furnace	11.8	.....	.....	7.9	.....	.....	.....	11.0	52.0	.....	4.8
Blast furnace	10.6	.....	.....	10.7	.....	.....	.....	18.7	33.2	.....	5.3
Blast furnace	10.4	4.2	5.7	7.3	5.3	4.2	37.7	13.9	26.5	.....	.....
Blast furnace	12.85	.....	.....	13.3	.....	.....	.....	16.3	34.8	1.6	.....
Dust chamber	13.3	.....	5.4	7.6	.....	0.5	15.8	8.3	31.7	9.1	.....
Dust chamber	7.2	1.6	.....	7.27	.....	.....	13.3	11.9	34.3	.....	3.4
Stack	.....	.....	.....	.....	.....	.....	.....	.....	.....	14.3	.....
Briquettes (dust and slimes)	6.3	.....	.....	9.3	.....	.....	.....	20.8	40.0	.....	54.0
Briquettes (dust)	6.5	.....	H_2O 13.05	8.0	Insol. 45.6	2.7	5.3	13.0	63.0	.....	.....
	12.5	MgO. 0.8		8.96			11.0	13.9	36.0	0.66	5.0

*The matte comes in part from the reverberatory matting furnace, which had to be tapped when the converter plant was not ready. In part it is purchased matte to be remelted for the converter.

†The converter slag always goes to the blast furnaces, as it furnishes coarse material, aids the smelting, in having been already once smelted, and acts as a basic flux. Experience has shown that it not only does little good in the reverberatory matting furnace, but that it does harm, in that it increases the amount of slag to be skimmed, and reverberatory furnace slags run higher in copper than blast furnace slags.

‡The briquettes are a mixture of flue dust with 3% to 4% slacked lime. Sometimes slimes from the ore dressing works are added to make up the mixture.

(TO BE CONTINUED.)

*Trans. Am. Inst. Min. Engs. (Condensed).

Modern Methods in Ore Treatment by Cyanidation.*

NUMBER II.

Written by EDWIN O. WATT.

Experiments made by Mr. Dunstan on the Associated Gold Mines indicated that it was not necessary to raise the air pipe as high as the bottom of the lift column, and that the escaping air readily passed up the lift column rather than through the outer well. This result was confirmed on the Hainault mine. On the Hainault mine a 4-inch 27-foot lift, working from a 20-foot well, would take only two-thirds of the pulp from a 10-stamp battery. Fig. 4 illustrates the

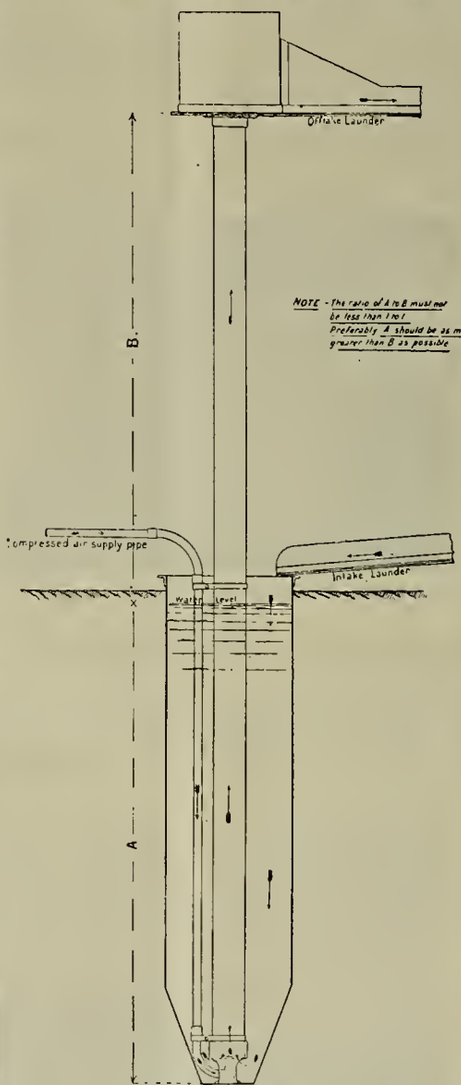


Fig. 4.—Air Lift.

air lift and Figs. 5 and 6 the arrangement of spitzkasten. A 5-inch column gave better results, but a 6-inch column proved much more satisfactory. On the Kalgurli mine an 8-inch lift is raising about 130 tons dry weight of sand and slime per twenty-four hours. This ore has a specific gravity of three. It has been found that on this product the lift will not work at all unless there are four parts of water by weight to one of ore, and it will not work satisfactorily unless the water is in the proportion of five to one; when the proportion of water falls below this point the lift works irregularly and immediately belches air heavily at the top of the column, and soon ceases to work altogether. These proportions have been determined by a series of accurate tests. I think that on more slimy pulp a less proportion of water would suffice. Under all the circumstances with which I am familiar, air lifts have been worked as a portion of an ore treatment plant, and have drawn their supply of compressed air from the general service supply; in no case within my experience have air lifts alone been worked off any compressor, but in every case the compressed air has been split up and used for other services at the same time, and under these circumstances it has not been found possible to

*Trans. Australian Inst. Min. Engrs. (Condensed.)

collect exact data as to working costs. The arrangement of spitzlutten is shown in Fig. 7. At the Kalgurli mine a pressure of thirty pounds per square inch was required for the agitators and filter presses, while the maximum pressure required for air lifts alone was only ten pounds. Thus, although the maximum air pressure required was not as great as usually obtains when rock drills are supplied off the same service, yet even this pressure was unfair to the air lifts, as on all the air supplied to them the power required to compress the air from ten to thirty pounds per square inch was lost. One of the objections to the air lifts is that in order to obtain the best efficiency they should be supplied from a special low service compressor, and under most conditions this is not convenient.

Some of the advantages of air lifts are that they are cheap of installation, and can under many conditions be worked where it is almost impossible to work pumps. On the Kalgurli mine the precipitation from the pulp of sulphate of lime clogs up the pumps, causing serious delay and heavy wear and tear of the parts, and although this accretion forms also in the air lifts, by installing them in duplicate there is no loss of time, and only a slight expense in effecting repairs. Then, again, for air lifts the only connection necessary with the power of the plant is a small pipe, and the loss of power in transmission is very slight. In my experience of air lifts I have never known any of the parts wear out, and I have not seen a lift, when properly served, cease working from any cause that could be charged against the lift itself. Although they do not show a high percentage of efficiency, they might, under certain circumstances, when the continuity of the operation is an essential factor, prove as economical as pumps, when loss of time and wear and tear are fully allowed for.

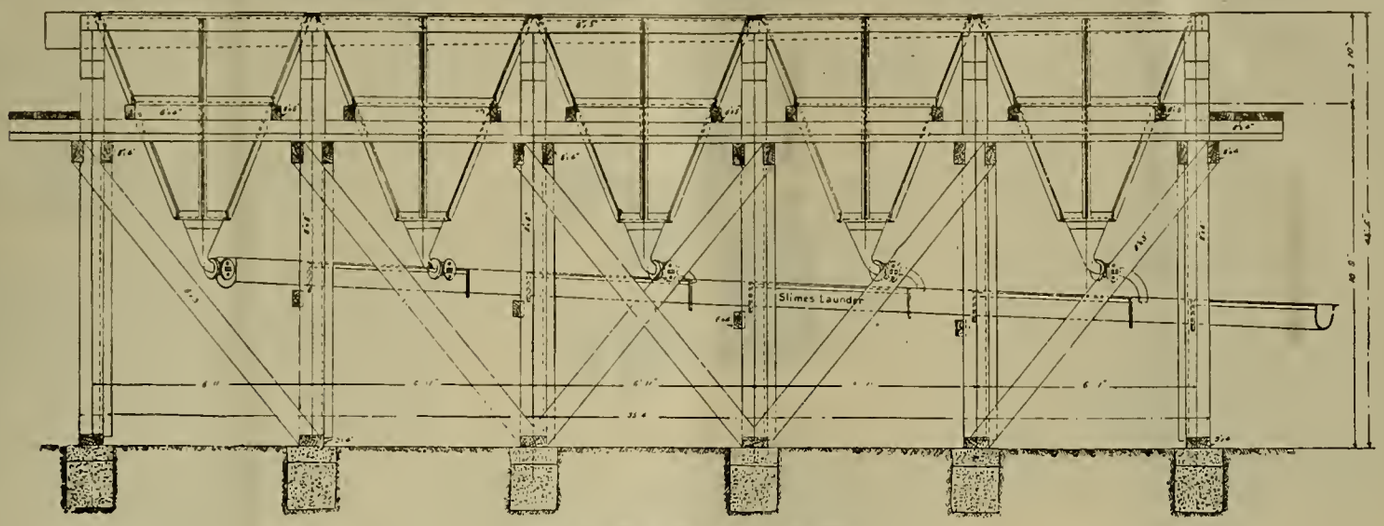


Fig. 5.—Timber Stand for Five Spitzkasten.

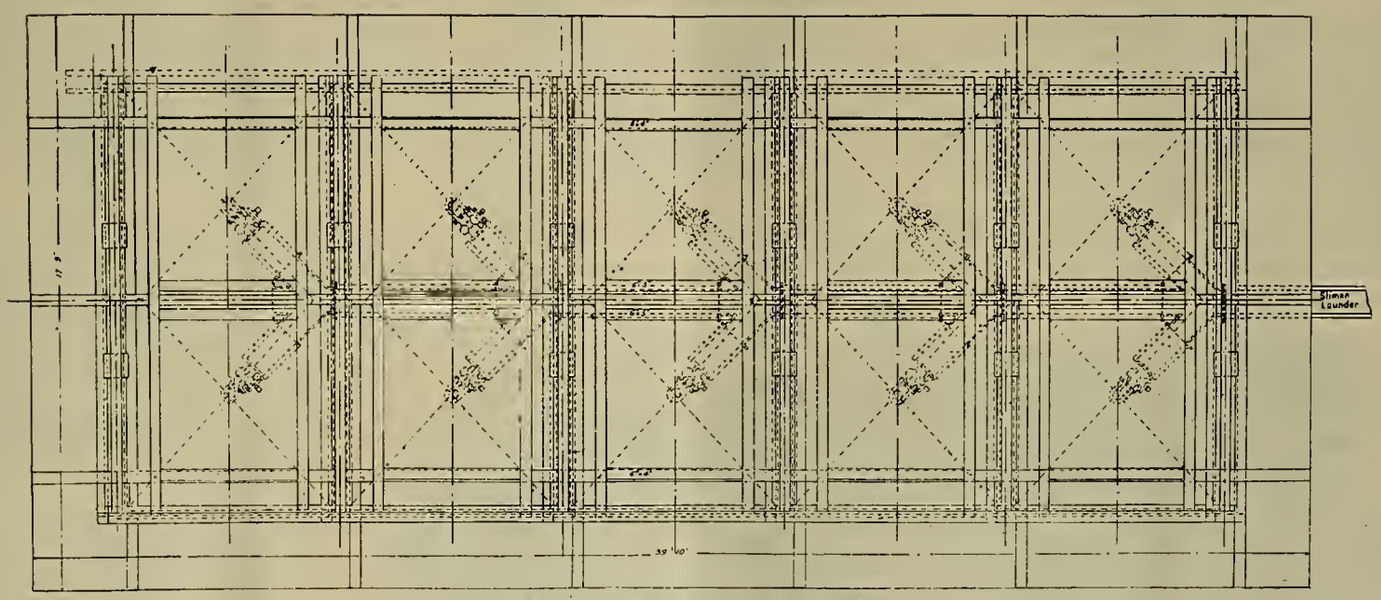


Fig. 6.—Arrangement of Series of Spitzkasten.

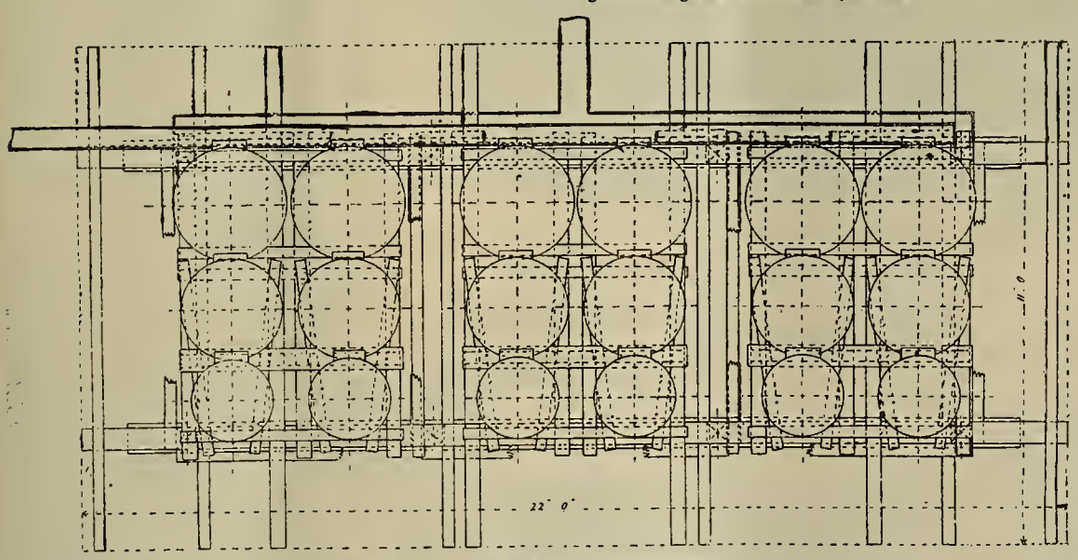


Fig. 7.—Arrangement of Series of Spitzkasten.

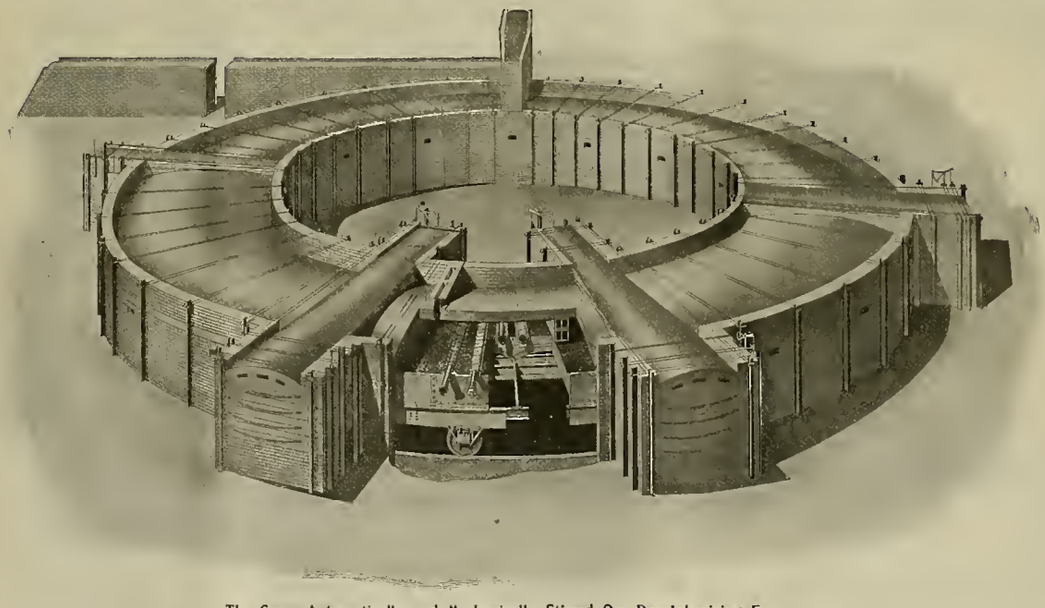
PNEUMATIC AGITATORS.—On the Kalgoorlie field the usual practice for the treatment of auriferous slimes is to stir it with cyanide or bromo-cyanide solutions in steel vats with mechanical agitators for a period of from sixteen to twenty-four hours, afterwards charging it into pressure tanks and thence to filter presses. On the larger mines there are two exceptions to this rule, viz., on the Golden Horseshoe mine, where the slime is pumped direct into filter presses, and cyanide solutions are afterwards pumped through at high pressure, and on the Kalgurli mine, where the slime is agitated by compressed air for three hours. It is with the latter process I wish to deal. The advisability of introducing oxygen in some form to the solutions during cyanidation is generally recognized by all metallurgists and cyaniders, and many experiments have been made of late years with the object of obtaining a cheap and reliable method of accomplishing this end. About twelve months ago experiments were started on the Kalgurli mine with the object of determining whether or not the pressure tanks for the charging of the filter presses could not also be utilized with advantage as pneumatic agitators. It had been previously noted, that when slime was allowed to stand in the pressure tank and compressed air was allowed to flow through the pulp to prevent its settling, a higher percentage of gold was extracted from the slime thus treated, than if it were allowed to pass directly through from the mechanical agitators to the filter presses. Slime pulp, previously untreated by cyanide, was then allowed to run into the pressure tanks, where cyanide solution was added, and the whole pulp gently agitated by a stream of air for five hours. Some idea of the amount of air being used for this purpose may be formed when I say that it was about as much as

would be blown from a good blacksmith's bellows. It was found that after five hours' treatment in this way the extraction of the gold contents was about 5% higher than when the slime was agitated by mechanical stirring for twenty-four hours, and that the cyanide solution came away 35% richer in available cyanide than was the case after stirring. The time of agitation was then reduced to three hours, and an equally good gold extraction was obtained with a somewhat smaller consumption of cyanide. After two hours' agitation the gold extraction was not so good, but further experiments showed that an equally good result could be obtained in two hours when a larger volume of air was allowed to pass through the slime. A sample of concentrated sand was then treated in the same way. Before treatment 87% of this sample remained on a screen of 110 holes to the lineal inch, and the gold contents were equal to four ounces seventeen pennyweights per ton. After three hours' treatment only 34.7% of the sample remained on the same screen, and the residues assayed under three pennyweights per ton, thus showing that in three hours 32.3% of the sand had been reduced to slime, and a gold extraction equal to nearly 97% had been obtained. The exhaust air from the treatment of this sample came away warm in consequence of the friction generated by the sand particles grinding against each other. Subsequent grading analysis showed that this grinding action was always very marked when the pulp contained a large proportion of sand, but that, when fine separated slime was under treatment, there was only a slight diminution in the size of the particles, and under these circumstances the air came away cool. All these experiments were made on roasted sulpho-telluride ore.

(TO BE CONTINUED.)

The Gross Automatic and Mechanically Stirred Ore Desulphurizing Furnace.

Illustrated herewith is the Gross automatic and mechanically stirred ore desulphurizing furnace, manufactured and furnished by the Colorado Iron Works Co., of Denver, Colo. In their latest trade treatise on smelting practice and equipments they instance one of the main difficulties encountered in mechanically stirred roasters in custom smelters, as being the lack of flexibility of manipulations to accommodate various grades of ores or mixtures, and state that the object of designing the Gross automatic and mechanically stirred desulphurizing furnace has been for the purpose of desulphurizing a great variety of ores now being roasted in the hand reverberatory furnace. In an automatic and mechanically stirred roaster, this demands flexibility of manipulations as in the hand roaster.

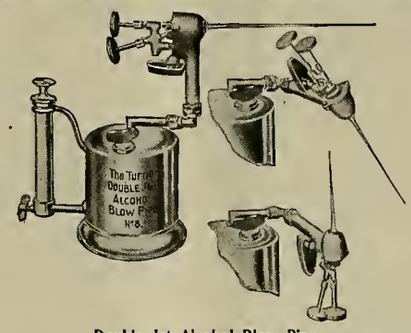


The Gross Automatically and Mechanically Stirred Ore Desulphurizing Furnace.

It will be noted that the circular hearth is carried upon I-beams and car wheels, revolving on a circular track. The stirring and discharging device remains stationary, the stirring, rabbling and discharging being carried on in a compartment in which it is designed that the ore may be stirred as violently as desired and practically no loss of dust. In this furnace the manufacturers state that ore may be retained on the hearth as long as necessary, the furnace not being a continuous discharge, and that this makes it a desirable machine where different ores require more or less time to accomplish certain work. All stirring and rabbling being carried on in the compartment above alluded to, the ore as it passes through the fire and draught remains quiet, with minimum amount of loss in dust. The stirring and discharging device being in combination, the one set of rabbles discharges the roasted ore from the hearth whenever desired. By a simple attachment, the stirring device can be immediately adjusted so as to leave a given surface of ore exposed to the heat any length of time desired. In stirring continuously, ore surfaces are stirred every two minutes, more or less, the speed of hearth and motors driving same being regulated by a speed-controlling rheostat.

Double Jet Alcohol Blow Pipe.

The Turner Brass Works, 53 North Franklin street, Chicago, are manufacturers of the Turner double jet alcohol blow pipe illustrated herewith. This article is just being placed upon the market. The high



Double Jet Alcohol Blow Pipe.

temperature generated by this blow pipe, together with the needle point non-oxidizing flame, makes it valuable to any one who requires a hot clean needle flame for fine soldering. It is designed to replace the oxy-hydrogen blow pipe for lead burning in the connecting of lead storage batteries, and proves the cleanness and non-oxidizing quality of the flame.

The blow pipe is started by pumping a strong pressure into the reservoir by means of the pump contained in the handle, then opening the lower valve and allowing the alcohol to flow into the cup below the burner. The valve is then closed and the alcohol in the cup lighted with a match. Its burning heats the burner sufficiently to generate gas, which is ignited by opening the lower valve again and holding a lighted match in front of the burner. The flame is then regulated by opening the upper valve to the desired extent.

This blow pipe generates a temperature of over 3000° F., and has the capacity to melt pure gold. It will also flow 25% platinum solder.

Full descriptive circulars, prices, etc., will be furnished by the manufacturers of these blow pipes on application.

Cedros Island Ores.

From Mr. George S. Binckley, consulting engineer, Mills building, San Francisco, Cal., is received an unusually fine specimen of native sulphur, taken from the Sulphur Point mine, Cedros island, Lower California, at a depth of about 10 meters below the surface. The surrounding ore is highly oxidized, no fissure structure of vein apparent, but the streak of sulphur is comparatively continuous, on a dip of about 45°. Different assays of this material have given results varying from $16 to $60 per ton of gold. Sulphur contents are not determined, but the ore burns readily with a match. The gold in this ore does not amalgamate at all readily, and is, although free, probably coated with sulphur, as in many of the ores from the adjoining mines this is the case.

Among the ores found in these mines, all within a radius of 500 meters, are the following: Oxidized gold ores, being in many cases siliceous skeletons, very light and friable, retaining some fine iron sulphides, and carrying a small amount of copper in the shape of finely disseminated sulphate. These ores also carry sometimes from 10% to 17% of free sulphur: Oxidized ores consisting of mineralized volcanic breccia, carrying a very variable value in gold and silver, and generally a very small amount of copper: Sulphide ores of same class as above, carrying values from a few cents to $250 per ton in gold: Higher values of this class are generally more siliceous, but not always, as some of these ores which appear to be black shale (due to movement in the plane of the deposit), carry over $100 per ton: Native copper, with a siliceous skeleton, carrying from $16 to $60 per ton gold: Bornite, with gold and silver, gold often free and visible to the eye, but in this case is found in siliceous veinlets in the body of the bornite—appears to have been secondary deposition, as well as the bornite itself: Bornite associated with galena, gold and silver, in this case generally free.

A complex ore of lead is also found as galena, with iron and zinc sulphides, carrying high values in gold and silver. This ore is taken from the same stope and streak as some of the purest bornite—in fact, the bornite is found within a streak of lead carbonate, more or less mixed with waste, in which occurs the lead sulphide ore described above. Value of this ore is from $45 to $78 per ton in gold and silver. There is likewise found chalcopyrite, with little value in gold or silver; a copper ore very high in iron, but very low in silica, about 12% cu., besides a very peculiar sulphide ore, carrying often high values in gold, some copper, and iron in an unusual form, very refractory, and often high in zinc sulphides, not siliceous, and slimes badly, although hard to drill and crush.

Besides these there are a mineralized breccia, often high in gold, but very heavy in zinc; an ore having a matrix of more or less pure barium sulphate, carrying excellent values in gold and silver, but in which the vein falls in continuity at a depth of about 12 meters; copper silicate, natural sulphate, black oxide, carbonate high in gold ($100), and native copper in the interstices of diabase country rock.

Points on Placer Locations.

Written for the MINING AND SCIENTIFIC PRESS.

Under the United States placer mining laws one person may make a single location containing 20 acres of placer mining land; two persons may make a single location containing not more than 40 acres in a compact body; three may locate 60 acres, etc., but no single location, whether made by eight persons or more, can exceed 160 acres.

It has been decided that a single location of placer mining ground may embrace 20, 40, 60, 80, 100, 120, 140 or 160 acres in a compact body, according to the number of locations.

If eight persons should make eight distinct and separate locations of 20 acres each, and seven of the locators should convey their claims to the other, it would require annual assessment work of the value of $800 to maintain the possessory right to all the claims; but, in the case of a single location, embracing 160 acres of placer mining land, the owner thereof, in order to maintain his possessory right thereto, would not be required to expend $100 worth of mining labor on each 20 acres thereof, but his possessory right to the entire 160 acres might be maintained by performing thereon $100 worth of actual mining work designed in good faith for the improvement of the 160-acre location as a single mining claim.

The law permits a single person to take as many placer claims of 20 acres (no more) each as he may desire, and they may be contiguous or not, but requires a separate discovery for each separate 20-acre tract. Where more than one person (not exceeding eight) participates, an area equivalent to 20 acres for each is permitted, but they locate the area jointly and are not required to locate each particular 20-acre tract, becoming tenants in common of the entire area. Placer ground so taken also requires separate discovery for each 20-acre tract of 160 acres. A single member of the party may act as agent for each of the others and locate each of the several tracts.

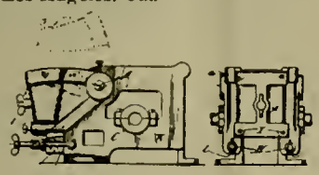
If several persons locate contiguous claims in common, such act would in itself constitute copartnership, and the proceeds of such operation should be equally divided, unless stipulations to the contrary were entered into by all the members of the party holding such claims jointly. Where the land has been legally subdivided, tracts of 40 acres may be subdivided into 10-acre tracts; but where no legal subdivision of the public lands has been made, claims may be located with reference to the stream or bank along which the placer occurs. Any one member of such association may, if legally constituted an attorney-in-fact, transfer the property to another individual or company.

Mining and Metallurgical Patents.

PATENTS ISSUED AUGUST 18, 1903.

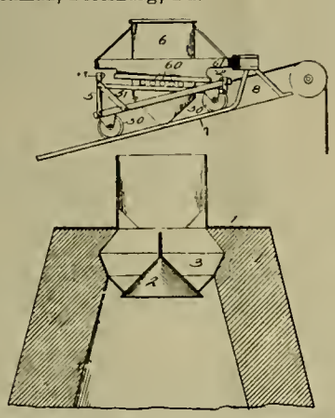
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

ASSAYER'S ORE-CRUSHER.—No. 735,942; A. C. Calkins, Los Angeles, Cal.



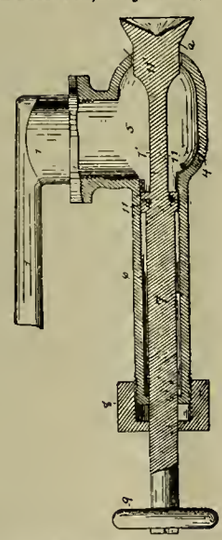
An ore crusher comprising main casing, movable jaw, relatively stationary jaw having side pieces to form crushing chamber, side pieces being hinged respectively at upper ends to main casing so as to be turned outwardly and up over other jaw.

CHARGING CAR FOR BLAST FURNACES.—No. 736,352; G. W. Bollman, Pittsburg, Pa.



In dumping car, combination of car frame, part adapted to contain load, being free to move back and forth on car frame, means for keeping part which contains load normally at one end of car frame, means for stopping part which contains load at fixed point near end of travel of car frame.

OIL BURNER NOZZLE.—No. 736,487; H. E. Brunner and E. J. Patterson, Haywards, Cal.

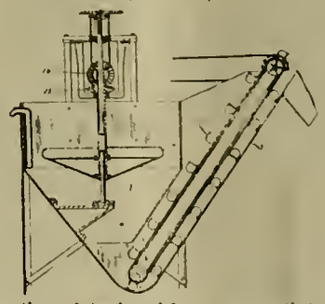


Oil nozzle comprising shell casing having enlarged chamber for oil, provided with outlet opening, operating stem passing through oil chamber, elongated plug carried by stem working loosely through outlet opening of casing to provide unobstructed passage around plug between same and inner surface of casing, plug of uniform diameter throughout, enlarged relative to diameter of stem, a spreader carried by outer end of plug arranged to constitute valve for outlet opening.

PROCESS OF MAKING NICKEL IRON ALLOYS DIRECTLY FROM ORES.—No. 736,400; N. V. Hyhinette, Bayonne, N. J.

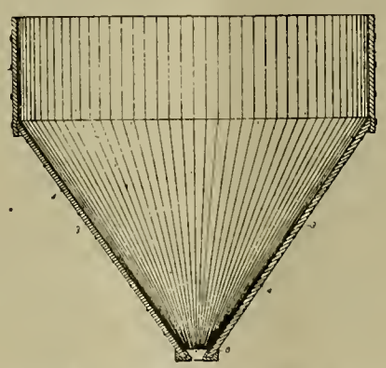
Of producing nickel-steel from ores composed mainly of sulphides of iron, nickel and copper, consisting in roasting ore with salt, heating material so as to decompose chlorides of iron and nickel, leaching out chloride of copper, then reducing residue directly into nickel-steel.

GOLD WASHING MACHINE.—No. 736,464; T. F. Turner and H. B. Stewart, Canton, Ohio.



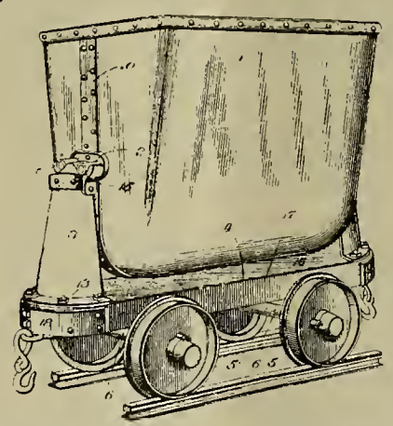
Combination of tank with upper outlet passage, extended into tank to point below surface of water in tank, provided with concave bottom, elevating buckets located upon elevating chains, extended into bottom of tank, movable concentrically over concave bottom, an inclined way extended from concave bottom and submerged centrifugal pan located in tank, means for rotating centrifugal pan.

TANK.—No. 736,520; A. Holtgen, San Francisco, Cal.



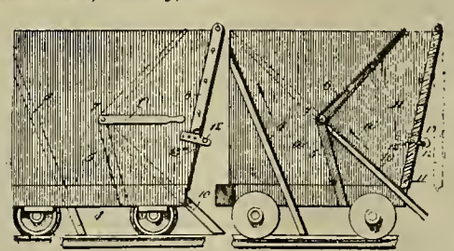
Tank of character described formed of plurality of staves and hoops for securing same in place, provided with knock-down substantially funnel-shaped bottom formed of radial staves, and series of removable hoops exterior to bottom staves fitting grooves therein for temporarily securing staves in place, in combination with auxiliary means for closing opening at lower edges of bottom staves.

MINE CAR.—No. 736,561; T. Stagg, Columbus, Ohio.



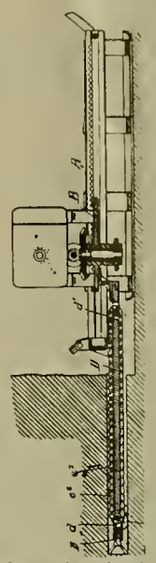
Combination of body having trunnions, standards having trunnion bearings, longitudinal base from which standards project upwardly, base forged from wrought metal into flat top having rounded ends and continuous vertical flange integral with and conforming to outline of top, rounded ends provided with reinforcing buffer plates.

ORE DUMPING APPARATUS.—No. 736,882; N. A. H. Salomonson, Norway, Mich.



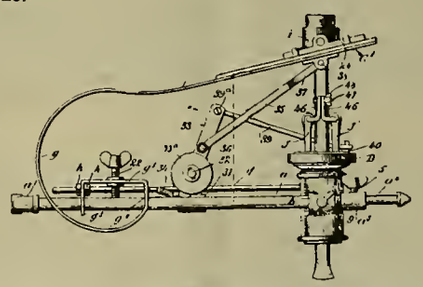
Ore dumping car comprising body having fixed rear side, front partition arranged transversely extending to point near center of car, movable partition journaled at that point adapted to be shifted front or rear, front door hinged at upper end adapted, when closed, to engage partition, when released, to hang free to allow discharge of material received upon partition, means for locking door.

MINING MACHINE.—No. 736,705; H. B. Dierdorff, Columbus, Ohio.



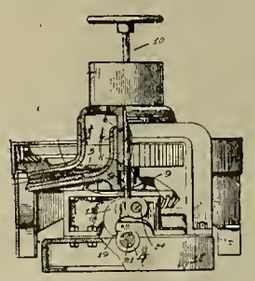
Combination with carriage having portion arranged to enter kerf cut by machine, series of cutters carried by carriage, holding device for carriage consisting of endless chain adapted to engage with wall of kerf, provided with flanges e^4, chain being arranged with one portion or limb above carriage and another portion or limb below carriage, supporting means for lower limb or portion of holding chain arranged to engage with flanges e^4 and support chain.

ROCK DRILL.—No. 736,758; C. Mead, Murray, Idaho.



In rock drill, combination with casing and tool guided therein, of bars slidably fitted in casing, springs connected with bars to draw them toward casing, clamp attached to bars having means for tightening same, corrugated gripping rollers supported by clamp engaging with tool, dogs to restrain rollers from rotating in one direction.

QUARTZ MILL.—No. 736,519; C. J. Hodge, Houghton, Mich.



In quartz mill combination of two relatively movable grinding cones, one provided with vertical sleeve, the other with pivot arranged in sleeve, nut located in sleeve supporting pivot, screw passing through pivot and nut, pivoted lever supporting screw, driving shaft, and cam engaging lever.

A LAROE steam turbine is to be installed in the Rheno Westphalian generating station at Essen, Germany, to run a 5000-kilowatt alternator and a 1500-kilowatt direct current generator at the same time. The turbine must supply 7500 kilowatts of output to run the two machines. The makers say that the new turbine will operate with but 15.5 pounds of steam per net kilowatt hour. The whole set—turbine, alternator and generator—measures 58 feet long, 10 feet wide and the same height; this includes the length of the turbine which measures only 23 feet long for a capacity of 7500 kilowatts.

Mining Summary.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ARKANSAS.

MARION COUNTY.

Near Yellville, E. Stettnich of Lawton, Ok. Ty., has bought a half interest in the Ike Emory mine for $5500 and arrangements are being made to resume work preparatory to shipping ore.

ALASKA.

An oil strike is reported made between Fort Hamilton and Andreafsky, on the Yukon river.

At Windham Bay the Yellow Jacket mine has its mill ready for operation, says the Juneau Dispatch. The Windham Chief Con. and the California-Alaska have built a corduroy road to the third basin and from there a mule pack trail up under the glacier. Both companies are driving tunnels. The Jennie Reid C. M. Co. has put up buildings and is driving a tunnel on pay ore, showing free gold. The Helvetia G. M. & M. Co. started operations on June 9th and have so far put up several buildings, built a road from the corduroy to its millsite, the millsite and a trail for the water flumes and pipe cleared, foundation for the crusher blasted, and 35 feet of tunnel driven on pay streak.

The Alaska-Treadwell G. M. Co., at Treadwell, on Douglas island, reports for the month ending August 1: The 240-stamp mill ran 28⅞ days and the 300 stamp mill 28⅞ days, crushing 79,384 tons of ore; value of bullion, $80,025. There were 1690 tons of sulphurets obtained, estimated realizable value of the same being $92,182. Working expenses for the month were $79,110.

Because of continued disasters resulting in loss of life, 100 men are reported to have quit work in the Treadwell mine on Douglas island. The men do not make any charge of mismanagement or an unsafe condition of the mine.

Last week at Juneau the Treadwell G. M. Co. and a company headed by D. O. Mills of San Francisco, Cal., bought a group of twenty gold-bearing quartz claims on Berner's bay, near Juneau. The price is stated to be $2,000,000. They will start development work and it is expected a stamp mill will be built this winter.

ARIZONA.

COCHISE COUNTY.

The diamond drill has been put in operation at the Junction Dev. Co.'s property near Bisbee.

F. E. Kennedy of Duluth, Minn., manager of the Kansas City group of claims, adjoining the Gold Reef group in Tombstone canyon, 1½ mile from Bisbee, says development work will begin and a two-compartment shaft sunk.

GILA COUNTY.

President C. S. Smith of the Old Dominion C. M. & S. Co., at Globe, says the effects of the flooding of the mine, due to breaking of a dam, which has cost the company over $200,000, have been nearly overcome.

N. S. Berray has bought the Golconda, Red Hot and Barranca mining claims on the San Carlos segregated strip, adjoining the property of the San Carlos C. Co., near Globe.

Superintendent A. C. Sieboth says that at the Arizona-Hancock mine, near Globe, the shaft has been completed 450 feet in depth, the station cut and the east crosscut on that level driven 40 feet. The west crosscut has not been started, as an increased flow of water is expected from that direction, and a pump will first be put in.

GRAHAM COUNTY.

The Sierra de Oro M. Co. is working a number of miners on its claims 5 miles above Clifton on the Frisco river.

MARICOPA COUNTY.

(Special Correspondence). — Burson & Langley, who recently erected a stamp mill at Buckeye, will put it in operation this week.

Manager Welch of Phœnix has gone to the White Tank mountains to get out ore from his claims. He will have the ore hauled 5 miles to the mill at Buckeye.

The Grijalva Coarse G. M. Co., in which a number of Phœnix parties are interested, report development work in rapid progress, with excellent showings.

G. Hamlin is contemplating the erection of a stamp mill at the Relief mine.

Phœnix, August 24.

G. B. Upton, manager of the Oro Grande mine, near Wickenburg, says he will put in a heavier hoist and build a 5-stamp mill to give the ores a thorough working test, after which a 100-stamp mill will be installed.

MOHAVE COUNTY.

(Special Correspondence).—Work will be resumed on the Tennessee mine. In addition to increased development work underground, the mine will be enlarged and new machinery added.——The Argo mine, on Sherum's peak, is outputting shipping ore. The shaft is being sunk below the 200-foot level, going to 300 feet. Two levels in the mine are producing two carloads of ore per month.

The Elkbart M. Co. proposes to resume work on the mine next week. It is said the 600-foot shaft is in bad shape and work will have to be started elsewhere. There is milling ore in the old workings, but it is intended to open up a new body of ore below the present 600-foot mark.

Superintendent L. Hoffman of the Samoa mine, near Cbloride, reports the mine outputting high-grade silver ore from a new point of opening on the 350-foot level. Besides silver, it also carries values in gold and copper. A 20-jack train makes two trips a day with ore from the mine to the depot of the A. & U. Railroad, the output being four carloads a month.

At the Home Pastime mine, Mineral Park, work is suspended for the present. There is a considerable tonnage of ore of below shipping grade on the dump. Cyaniding is proposed.——S. W. Toby reports a gold find in his and W. Alger's Great West mine.

At the gold strike of Dempsey & O'Dea at Prilgrim, work is progressing on the three 100 foot prospecting shafts in the vein.

Men continue going to the scene of the recent gold find near Kingman, and the ground is monumented for several miles in the line of the mineral out from McConnico Junction.——Mining is quiet at Union Pass, although G. Richardson, owner of a group of gold claims, is doing a little work, with a view of transferring his properties to a company.

The 10-stamp mill at the Virginia mine, 25 miles west of Chloride, is in operation with satisfactory results. The capacity of the mill is not up to the output of ore.

Chloride, Aug. 24.

SANTA CRUZ COUNTY.

The Hermosa M. Co. has been incorporated and has taken over the Hermosa mine at Harshaw. E. E. Conklin, W. S Frasier, H. F. Burt, H. W. Penecost, C. C. Kneisley, N. D McGinley, H. E. Allen, C. B. Adams, B. S. McGuire of Oklahoma and J. S Cunningham of Harshaw are incorporators.

YAVAPAI COUNTY.

The Denver Onyx & Marble Co. has bought the beds of the Arizona Onyx Co. at Mayer, which adjoins their property, says Superintendent Eaton. The two groups will be operated in conjunction. The quarrying of stone continues and the first shipment to Eastern points was made this week.

Bars of gold bullion are being shipped regularly from the Henrietta mine of the Braganza M. Co, near Bigbug, says Superintendent Johns. He has twenty stamps dropping and fifty men at work. A 30 H. P. boiler has been added to the pumping plant.

Superintendent Rankin of the Henrietta mine, having secured a bond on the Nevada group, near Prescott, has started work. The shaft on the Nevada is being retimbered and sunk deeper.

The Monte Cristo mine, near Prescott, has been unwatered and men are being put to work in the mine. The mill is expected to be in operation next month.

The Model G. M. Co. at McCabe is putting in additional machinery. The two 80 H. P. boilers are in place, the gallows-frame completed and the shaft retimbered down 65 feet (as far as it was damaged by the fire which destroyed the mill last spring) The mill is being built 200 feet from the hoisting plant. The ore will be trammed from ore bins at the hoist into the mill. The machinery in the mill will be run by a 35 H. P. gasoline engine, while a 65 H. P. steam hoist will be used at the shaft. The mine is filled with water up to the 500-foot level, but the pumps will be started this week.

It is reported deposits of gypsum have been found east of Mayer.

Seven and one-half miles south of Prescott, at the Home Run mine, Douglas, Lacey & Co. are preparing to build a milling plant. It will be of 6-stamp capacity.

The Mount Union group of mines at Mount Union, near Prescott, have been sold to the Arizona-Michigan M. Co. The company intends to put in machinery and start sinking.

CALIFORNIA.

BUTTE COUNTY.

(Special Correspondence).—The Feather Valley Gold Dredging Co, in the Feather River Valley district, have shipped a driller to their property to test the land in ½-acre tracts. Eight tests so far made run from 13 cents to $1 25 per cubic yard. This property is being tested to determine the exact values in the gravel bed before putting on a dredger.

Oroville, Aug. 24.

CALAVERAS COUNTY.

At the Melones mine, at Melones, sixty stamps are dropping in the mill. Some specimen rock is reported taken out of the Reserve cut last week.

Eighty stamps have been added to the mill at the Gwin mine, making a total of 100 stamps dropping regularly.

All the men were laid off at the Utica mine of the Utica G. M. Co., at Angels, on the 21st inst., and the mine abandoned, as being worked out. The car tracks, air pipes, drills and all machinery under ground have been taken out. The mill will be kept at work until the ore bins are emptied. The old Madison shaft is to be reopened, and some of the men taken out of the Utica will be employed there. The work at the Cross shaft and Stickle mill will not be interrupted. Pumps were taken to the Madison shaft and set up last week.

At the Silver Cup gravel claim, owned by Cuneo & Queirolo, at Fricot, near Sheep Ranch, a shaft has been sunk to depth of 45 feet and pay gravel struck. It is intended to put in a whim and sink an additional 75 feet.——Work is progressing at the Grape Brandy mine, owned by the Smith G. M. Co. of San Francisco, under Superintendent C. W. Saunders. A gasoline hoist has been set up and a shaft sunk to depth of 135 feet. Assays at this depth show $10 in gold.

The Emerald mine, on Indian creek, near Angels, and owned by J. F. Davis, will be reopened at the old shaft.

DEL NORTE COUNTY.

J. S. Crawford, manager of the Cleopatra group of copper mines near Smith River, says work is progressing and development is being increased.

EL DORADO COUNTY.

Work is progressing at the Noonday copper mine near Logtown. A boiler and a machine will have been put in. The property is bonded by the Pelton Chemical Co. and sixteen men are employed, says the Georgetown Gazette.

At the Crystal mine, on French creek, 2 miles south of Shingle, they are preparing to add five stamps to the 5 stamp mill.

It is reported work will be resumed at the Garfield mine, near Josephine, by Manager Chapman.

FRESNO COUNTY.

The New San Francisco Crude Oil Co well, near Coalinga, which was finished last week, is pumping at the rate of 150 barrels per day, says the Reporter.

INYO COUNTY.

The Pacific Coast Borax Co. has men at work on the roadway which it is building from Ivanpah, San Bernardino Co, to Ash Meadows. The road is being built to tap their borax deposits, near Death valley.

KERN COUNTY.

The Associated Oil Co. has completed ten wells on its Central Point lease, near Bakersfield, during the past month, some of which are proving good producers.

The Superior Oil Co. will drill its third well at Sunset after a suspension of one year, says Superintendent E. W. McCutcheon. The company already has two wells ready for pumping.

Machinery for the Karma mill, near Mojave, is on the ground and building will begin Sept. 1. More men will be put into the mine.

Near Randsburg T. McCarthy has begun development on the Teresa mine.——S. J. Montgomery and D. McEachan are working on the Annex mine.

Superintendent Bouchard reports he has begun stoping on the 100-foot level at White's Camp, near Randsburg, says the Miner.——E. Bergman has taken a lease on the Tam O'Shanter claim in Stringer district.

The Junction Oil Co. has started work on its No. 5 well at Kern river, near Bakersfield ——The East Puente Oil Co. started work last week on its No. 7 well. This company is owned by San Diego men. Its holdings amount to ten acres and its production is said to be 12,000 barrels a month, says the Californian.

The Associated Oil Co. has completed ten wells on its Central Point lease in Kern river field, near Bakersfield, during the last month, some of which are proving good producers. Drilling will continue until thirty-six wells have been finished, in accordance with the terms of the lease.

NEVADA COUNTY.

Operations are again under way at the Lecompton mine in Willow valley, near Nevada City. The 10-stamp mill was started last week. The mill and compressor are driven by two 6-foot impulse water wheels under a head of 310 feet, and the hoist is driven by a separate line under same pressure. The plant will be completed by addition of a dynamo and 150 electric lights in the shaft and buildings. The sand plant, capable of handling all the pulp of the mill, is expected to be ready next week, says W. H. Dunlap, superintendent.

G. C. Hayes, who has a bond on the Randolph Flat mine near Rough and Ready, is preparing to increase development work. A hoist and other machinery are going in.

The Sierra Queen mine, near Nevada City, after a short shut-down, has resumed. A larger pump will be put in later on and drifts run on the south side of the shaft to tap the ledge under Deer creek.

The mill of the New York-Grass Valley Con. Co., near Grass Valley, will start up this week. Forty tons of ore on the dump will be milled before rock from the reopened mine is tried. The company reports having a 5-foot ledge in the bottom of the shaft showing free gold.

A 10-stamp mill is proposed for the Zeibright mine, south of Grass Valley and near the Placer county line. F. Zeitler of Nevada City is manager.

J. A. Jeffery of San Francisco, president of the South Yuba M. & D. Co., and C. W. Porterfield, manager, report work begun on the company's gravel mines east of Omega. They have 1500 acres along and contiguous to the Omega channel and have bought the Blue Tent water rights and canal system. A sawmill plant has been set up and lumber is being cut. This fall and next summer they will build 5 miles of flume from the dam at Bear Valley, on the South Yuba river, to Omega.

At Town Talk, near Nevada City, a 2-stamp mill is crushing the gravel taken out of the mine of J. M. & H. Kitts. They are opening up a channel which exists in the Town Talk ridge and tapped it through a tunnel, says the Union.

SAN DIEGO COUNTY.

W. W. Boswell, superintendent of the Helvetia and High Peak mines, near Julian, reports a strike of free gold ore from the High Peak.

SAN LUIS OBISPO COUNTY.

The Tar Springs ranch, 8 miles east of Arroyo Grande, has been sold to W. W. Clapp of Pennsylvania, who has had a bond on the land for $60,000. He will develop the oil prospects.

SANTA BARBARA COUNTY.

A. Carter, of Los Angeles, has bought the wharf at Carpenteria, together with fourteen acres of land adjoining, for putting in a solar furnace plant for manufacture of salt from sea water. Besides making salt, Carter will also build a plant for manufacture of the solar furnaces.

SHASTA COUNTY.

The Eureka Tellurium mine, at Middle Creek, will be put in operation, says the Redding Free Press. The mine is 2½ miles from Redding and has several thousand feet of tunnels and shafts, showing a number of gold-bearing quartz ledges. The Eureka Tellurium vein carries tellurides. The group consists of 290 acres of patented land between Salt creek and the Shasta road.

The Quartz Hill mine, owned by the Original Quartz Hill G. M. Co, will be reopened and development work increased, says M. Maryanski, a director of the company. If satisfactory arrangements can not be made to handle the ore at the Keswick smelter, his company will put up a milling plant on the ground. The mine is in Old Diggings district, near Redding. A. Spetz of Chicago, Ill, is president.

The Iron Mountain Railroad, operated by the Mountain Copper Co. at Keswick, and extending from the smelter to the mine at Iron Mountain, has decided to use oil instead of wood as fuel on its five locomotives. This change closes the use of wood as fuel by the Mountain Copper Co. Four years ago it was using 20,000 cords a year. This change has been brought about by the substitution of electrical power furnished by the Northern California Power Co. for steam, the use of oil for fuel instead of wood in the hot-air blast and at the power houses, and the abandonment of the open-air system of roasting ores, which alone consumed several thousand cords of wood a year.

SIERRA COUNTY.

Suit has been brought in Los Angeles county by the Corotoman M. Co. against the Chinese lessees of the Golden Star mine to recover the sum of $10,000. The two mines are near Forest City. In the complaint the Corotoman Co. alleges the Golden Star Co. has encroached on its ground by means of tunnels and drifts and removed therefrom gold to the value of $10,000.

J. M. Harper of San Francisco, of the Columbia Channel G. M. Co., has begun operations at their mine at American Hill, near Forest City. He has eight men at work running a tunnel to tap the channel.

SISKIYOU COUNTY.

The Schroeder mine on Deadwood creek, near Fort Jones, has closed down temporarily, throwing thirty men out of work, says the Siskiyou News.

TRINITY COUNTY.

Twenty-five men are at work on the Integral quicksilver mine near Altoona, says Superintendent F. Mahon. The company is doing development work, driving shafts and tunnels, and last week a body of ore was struck.——The Altoona quicksilver mine, which was closed down several years ago, is being worked by a party of Swedes, who are working the dump.

There were fifteen lode locations filed last week for claims in Hayfork section.

TUOLUMNE COUNTY.

Dambacher & Co. have put in a hoist on the Telegraph Hill mine, on the Dambacher ranch, near Columbia.

The work of unwatering the Mt. Hood mine, owned by the Rawhide Extension G. M. Co., near Jamestown, is in progress.

A heavier pump is being put in by Superintendent Sharwood to handle the flow of water struck in cutting the ore shoot in the Soulsby mine, at Soulsbyville.

Superintendent Converse, at the Draper mine, near Soulsbyville, says operations will be resumed.

J. Phillips, managing the Los Angeles gold mines group of three claims south of the Tuolumne river, near Groveland, says the 10 stamp mill will be in operation next week. The number of men at work will be increased as soon as the mill starts.

COLORADO.

(Special Correspondence) — The Globe plant is resuming operations as fast as they can get ready. They now have several of their furnaces running.

There is talk of settling the strike at Cripple Creek, but the way things are shaping themselves the operators will have nothing to settle, as it is reported they are able to secure all the men they want. Some of the mines have resumed operations under guard.

Denver, Aug. 24.

CLEAR CREEK COUNTY.

In Upper Union district, near Empire, the St. Paul & Colorado M & M. Co. has bought the Mark Hanna lode and thirty-two other locations.

The Ella McKinney M. Co. of Idaho Springs has added another claim to its group in Cascade district, on Ute creek, buying the Victor lode. The Ella McKinney will be opened later by the Burns-Moore tunnel.

A large shipment of iron concentrates was made from the Mendota mill, near Silver Plume, last week, which had accumulated since the mill has been in operation, only the lead zinc products being shipped heretofore ——Southward & Cavanaugh have taken a lease on a block of ground on the Vulcan, and are opening up a shoot of ore, says the Silver Standard.

GILPIN COUNTY.

Karrigan & Sikes of Leonardsville, Kan., have bought the J. Ingram one-quarter interest in the International group of seven claims, near Central City, for $3000 cash.

It is reported that the Missouri mine, near Russell Gulch, will resume, with P. McCann as superintendent.

New York men are interested in the Gold Run M. & M. Co., operating near the head of South Boulder creek, near Nugget, and they have a tunnel in 200 feet, of which 50 feet is double track. They intend to put in an air compressor plant and drive the tunnel all winter, so they will be able to open up some of the lodes before next spring. W. Lewis is superintendent.

M. W. Tanner et al. of Idaho Springs have a lease and bond on the Gomer mine, near Russell Gulch, and machinery has been put in during the past week and the mine unwatered. The working shaft is down 100 feet and as soon as retimbered the lessees will sink another 100 feet and explore the former workings.——It is reported that the Lillian mine, in Russell district, has been leased to H. Banner of Idaho Springs, who will start developments next week. The shaft is 200 feet deep and it is expected will go deeper.

A sinking pump is being put in by the Powers M. & M. Co., Russell Gulch. After unwatering, the company expect to sink 200 feet from the 220-foot point. The ore bodies are said to be of enargite. Pennsylvanians are interested.

GUNNISON COUNTY.

The Waunita Con. G. M. & M. Co. has been incorporated to operate a group south of the Independent group in Bowerman district; J. F. Simpson, K. C. Sterling, J. H. O'Neill, S. Bell, J. B. Sanford, J. Kent, J. T. Ball and F. McMillan; S. Bell of Denver is president. The company's property consists of four claims a mile south of the Bowerman-Dunn group, being the Wabash and the B. & O. group. A shaft will be sunk on the line between the Wabash No. 1 and the B. & O. lodes. Besides the lode claims, the company owns 100 acres of placer ground which has a sufficient water supply.

The Ethel G. M. Co., owning the Jim John and other mining properties at the head of Yule creek, near Crested Butte, has men sinking a shaft on the Jim John, in which they have struck a 4½-foot vein carrying galena. A contract to run a tunnel which will cut the vein at depth has been let.

Turner & Cantrell of Denver will work the Hard Cash tunnel, near Crested Butte, making shipments to the Gothic mill.

The Augusta tunnel, near Crested Butte, after nineteen months of continuous driving has reached what is thought to be the main Augusta vein, says the Elk Mountain Pilot. The length is 2900 feet. The building of the proposed tram and mill is expected to be started next month. In the meantime drifting on the vein and opening up ore shoots will go ahead.

JEFFERSON COUNTY.

After a shutdown of two weeks the smelter at Golden was blown in again on the 20th inst. A new settler has been put in. Besides the cars of ore now on hand, the Golden smelter slack dump has been bought and will be worked.

LAKE COUNTY.

The repairs at the Resurrection mill, near Leadville, have been completed and shipments will be resumed. With the mill closed, repairs were made underground—retimbering the shaft and one or two drifts. It is thought that No 2 shaft will be sunk deeper to get under the ore shoot dipping to the northwest. Magnetic separators and table concentrators are used in the mill, making a clean product of lead, iron and zinc. The zinc ore is then passed over driers and then the magnetic separator is used, producing two commercial products—iron sulphides carrying the precious metals and a high-grade zinc. In the changes made during the repairing the ball grinders were taken out and Huntington mills put in. Six are set up.

The east end of Fryer hill, at Leadville, is active, says the Carbonate Chronicle. The Fitzhugh mine has resumed under lease to T. Kyle and R. B. Estey, who are opening it up at the 452-foot level. It is necessary to drive a drift 83 feet to reach a known ore body.

OURAY COUNTY.

Near Ouray a fifty-ton mill is going up at the Bob Tail mine, which is expected to be in operation by October 1st. The 14-foot ore body is showing values in gold and silver.——Meadville, Penn., men have leased the Yorktown lode in Red Mountain district, and development work has been started.——Three shifts are driving the tunnel in the Governor mine, and it is expected the gold-bearing vein of the upper workings will be cut this week. The tunnel is in 690 feet and the silver-bearing vein found in the upper workings has already been cut. Should the body of low-grade ore prove as large as in the upper workings, they propose to build a mill. The compressor and boiler, which were moved by a snowslide last winter, will be replaced on the millsite.——The Treasury tunnel is shipping ore.

SAN JUAN COUNTY.

A company, with F. C. Weiser of Nebraska as manager, has been organized to acquire mining territory in Ice Lake section, near Silverton, and last week bought the Emma group of mines for $40,000 The Emma group is in Ice Lake basin, between the Golden Horn mine and the fork of South Mineral creek. The sale included a stamp mill and water right and other mill sites.

SAN MIGUEL COUNTY.

Robbins & Field, who have a lease from the Smuggler-Union M. Co. on all the dumps at the Sheridan mine, in Marshall basin, near Telluride, started their 10-stamp mill last week and are treating twenty-five to thirty tons per day. It is built close to the dumps and the ore is hauled by wagons. Twenty men are at work. The average value of the ore is said to run $10 per ton.

SUMMIT COUNTY.

(Special Correspondence) —The Ten Mile-M. & L. Co. have 179 acres, and the ore shoot is supposed to run a distance of 2600 feet on their ground. They have been operating two and one-half years and recently struck a good body of ore. They are now taking out twenty-five tons of ore per day and shipping to the Leadville smelter. They are crosscutting at present. When they commence stoping they will be able to produce seventy-five tons per day. The ore body is 5 to 7 feet thick and averages $22 per ton. H. M. Shepard, manager of the company, is unwatering an old shaft on the property to take out some ore left there in 1893, which they were unable to get out at that time. As soon as the task of unwatering this shaft is accomplished, it is the intention of the company to install an air compressor for supplying air for both shafts. Sixteen men are employed at present. F. Hurd is secretary and treasurer.

Robinson, Aug. 25.

TELLER COUNTY.

The Mountain Boy M. Co., operating on Raven hill, Cripple Creek, has secured additional working funds and resumed sinking the main shaft. It is intended to continue to depth of 400 feet. A level was extended at the 150-foot point and considerable development work done, but it was found that depth was needed. The territory of the company will be cut by the Ophelia tunnel at depth of 800 feet.

E. S. Johnson of Colorado Springs, sole owner of the Blue Bird mine, on Battle mountain, near Cripple Creek, has decided to equip his property with a steam plant good for from 2000 feet, says the Gazette. The plant will be similar to that in operation over the main shaft of the Vindicator mine, but with the addition of heavier boilers. Johnson has developed the mine to depth of 1350 feet, having opened a number of veins in ore all the way down. The principal ore deposits, however, occur below the 1000-foot point.

R. Young of the Quentin Investment Co. of Denver says the Calera M. Co has taken a bond and lease on the Colorado mine, ¼ mile from the Calera mine, in Cripple Creek district. They will increase developments.

The Savage G. & C. Co. says the monthly report of the work done by Lessee J. D Rankin, operating the Gold King claim on Gold hill, Cripple Creek, shows the lessee will put in air drills and will operate the mine, carrying out development work in the Good Will tunnel, which cuts the property at depth of 600 feet. He will crosscut from the tunnel 250 feet to open the vein at 600 feet.

Lessees Grant & Hart, operating on the Currency claim, on Beacon hill, Cripple Creek, have sunk the shaft to a depth of 110 feet and are drifting on the vein, which is reported showing good values. Drifts have been run 30 feet each way—east and west—from the bottom of the shaft, and an ore body 3 feet wide has been uncovered. At the present time they are operating a whim, but as soon as the ore body warrants they will put up a plant of machinery.

The Globe cyanide mill, near Cripple Creek, is treating an average of fifty tons of ore per day.

IDAHO.

BLAINE COUNTY.

The Gold Star hoist and mill, owned by H. R. Plughoff and H. Allen, were burned last week; loss, $30,000; insurance, $12,000. The property was 14 miles from Hailey.

BOISE COUNTY.

In Deer Creek district, near Idaho City, the Big Bear and Bed Bug claims were bonded last week to G. E. Spencer et al. for $50,000, and development work will be started next week.

IDAHO COUNTY.

It is reported a group of seven quartz and four placer claims in Thunder Mountain district, near Roosevelt and near the headwaters of Profile creek, have been taken over by Lucas & Zsenk of St. Louis, Mo., and W. J. Evans of Terre Haute, Ind., for $100 000.

A 2-stamp mill will be put in on the Lucky Lad, an extension of the Big Buffalo mine, in Hump camp, says H C. Beattie of Seattle, Wash. The plant will be put in to test values. The property is developed by open cuts to 50 feet deep, and the ledge is 27 feet wide. A steam hoist has been set up. The property is owned by the Buffalo Lake Co., of Seattle.——There are 95 men at work on the Jumbo, 30 on the Crackerjack, 4 on the Hamilton, 16 on the Big Buffalo, 6 on the Buffalo Chief, 12 on the Mother Lode, 20 on the Concord and 15 on the Atlas mines.

G. Brant, of the Brant M. & M. Co., near Roosevelt, says they propose to build a stamp mill this fall.

LEMHI COUNTY.

The Lemhi M. Co. is to be incorporated, having taken over the Ramey mines on Silver creek and the Vulcan group of nickel-cobalt claims at the Meadows on Blackbird creek, near Salmon City. Manager W. P. Carter has started development upon both properties. The Ramey mines consist of five quartz and seven placer claims, carrying gold. The company will sink a shaft on the main vein, and will put up hoisting works.

OWYHEE COUNTY.

R. C. Facer, manager of the Golden Opportunity M. & M. Co., operating near Silver City, says work has begun. His company owns fifteen claims in Sugar Loaf district, and the ledge is 11 feet in width, averaging $5 per ton in gold.

SHOSHONE COUNTY.

(Special Correspondence) —The lower crosscut of the Snow Storm property will reach the lead September 1st and will be 1850 feet long. It will tap the vein at a depth of 1160 feet. The upper crosscut, which was completed about fifteen months ago, opened up a 40-foot lead of copper carbonates which will average 4½% copper with a by-product of 6 to 10 ounces of silver.

Superintendent Roof of the Reindeer says the 800-foot crosscut on that property will be completed September 1st. At the face of the preliminary tunnel was exposed a vein of good concentrating ore, 18 feet wide. The ore is chalcopyrite, carrying a good by-product of silver.

The new slime plant of Larson & Greenough at Mullan will soon be in operation. The object of the management is to retreat the tailings and debris from the slime machinery and floors of their 900-ton concentrator. The plant will have 500 feet of settling surface. Water power will be used.

Mullan, Aug. 24.

Wardner reports say it is expected that the electric power brought from Spokane, Wash., by the Washington Water Power Co. to operate the mines of the Cœur d'Alenes will be ready for the properties of that section by September 1st. The equipment is in place in the transforming station of the Silver King mine, the Empire State-Idaho mill at Sweeny, the Bunker Hill & Sullivan and the Last Chance mines. The men stringing the wires are between Kingston and Sweeny. The crew, although somewhat smaller than formerly, is making rapid progress and will undoubtedly have the power ready for some of the stations by September 1st. The electricians placing the transformer equipment are at the stations of the Tiger-Poorman, the Mammoth, the Standard and the Hecla mines. The Frisco and the Hercules are the only mines of the producers outside of Mullan that will be without the power. The Hercules Co. is said to be considering the installation of a complete electric plant. The total horse power received by the mines will be about 4000. Of this amount the Tiger-Poorman will have the greatest—1200—and the rest is divided as follows: Standard, 1000; Bunker Hill & Sullivan, 364; Mammoth, 350; Silver King, Last Chance, Hecla, Empire State-Idaho mill, 200 each. Some of these mines have water or steam power, which will furnish part of the required power.

Manager E. P. Spalding of the Monarch M. Co., driving the Monarch tunnel, 5 miles east of Murray, says the tunnel is in 2300 feet and progressing at the rate of 50 feet a week. It was started a year ago. According to the survey it will have to be driven 600 feet farther to get under the tunnel and into the ledge which has the showing of ore near the surface. It will then be 1400 feet below the upper works.

A compressor plant and a 200-ton concentrator are to be put in at the Highland Chief mine on Pine creek, near Wardner, says C. W. Stanton of St. Paul, Minn., who is part owner with F. J. Meyst of Minneapolis and C. C. Whitney of St. Paul. The foundations of the mill will be laid out so that it can be readily enlarged to 400 tons.

MICHIGAN.

HOUGHTON COUNTY.

Last week fire destroyed the A shaft house at the Atlantic mine, south of Houghton; loss $40,000, fully covered by insurance. The engine house was not damaged. This month's production will be slightly curtailed, but the number of men will not be reduced. Hoisting will continue through the other shafts. Below the collar the shafts will not be damaged.

MISSOURI.

JASPER COUNTY.

The Sarcoxie M. & D. Co. has abandoned its mine and lease east of Sarcoxie (formerly the Sangamo), and has begun sinking on an adjoining lease, known as the Boyd lease, where three drill holes have shown good ore. The company intends to move its mill as soon as its shaft is down to mineral.

The Hayseed mine, north of Joplin, is drifting into ore, says A. Myers. Samples average 20% zinc.

Joplin reports state that the powder famine last week closed down 10% of the mines and more will close down unless the situation is relieved.

LAWRENCE COUNTY.

The John Bull mine and plant, near Aurora, is expected to be in operation next week.——C. Porter & Co. are unwatering the Jack Rabbit mine, and expect to get to work in the ground next week.

J. Hale & Co. are drifting into a good body of jack at their mine south of the Ozark range, near Aurora.

NEWTON COUNTY.

M. L. Ward & Co., who have a four-acre lease at Saginaw, are sinking a shaft which is down 80 feet. At 90 feet the drill showed lead ore for 9 feet which they expect to reach by Sept. 10th, says B. C. Davies, superintendent.

MONTANA.

BROADWATER COUNTY.

Members of the Chicago Electric Light Co. of Chicago, Ill., have bonded the New Era, Vulture, Switzerland, Little Annie and Sitting Bull claims in Park district. ——The Sparta M. Co. has been incorporated by O. Sparta of Hassel and G. Hays, H. Rickards and J. Hibbard of Helena, to work the Bedford Nos. 1 and 2, the Bullion, Gray Eagle and Mammoth claims in Park district. There is a mill and water right with the property. A concentrator and cyanide plant will be built.

FERGUS COUNTY.

At the sapphire mines at Yogo the New Syndicate Co.'s mines have only sixteen men employed at present, says C. T. Gadsden, superintendent. Mining has been suspended temporarily to permit sluicing of the large amount of matrix that was extracted from the mines during last winter. Most of the men employed are sluicing, but a few are making repairs and preparations for resuming mining next month. The first development work will be drifting on the vein from the bottom of a 100-foot shaft. Two dams for holding the tailings from the sluice boxes have been built this summer.

D. J. Burr has bought a one-fourth interest for $1500 in three claims in North Moccasin district, near Lewistown, being the Good Luck, Handicap and Old Flint Rock. They are on Dog creek, between Plum creek and the Barnes-King group.

B. F. Lindsey of Kendall has bought a one-half interest in a group of claims comprising the Gray Hound, Black Bird, Sweepstakes, Blue Bird, Triumph, Troy and Mendota, one-half mile from the head of Plum creek and one and one-half mile from the Kendall mill. Considerable work has been done on them and the ore shows gold values.

The Surprise group, in the Judith mountains, near Lewiston, has been bonded to A. P. Pendleton for the Judith M. Co. for $17,000, says the Argus.

FLATHEAD COUNTY.

W. A. Hillis, N. R. Burlingham and A. Davidson have bonded the Batcheler group of claims in West Fisher district, near Cabinet, for $30,000. There are seven claims in the group and they are on Blacktail mountain.——The A. K. Co. are running their mill on ore broken earlier in the season from the Gold Bug ledge, says the Western News. The tunnel is being driven ahead in the Gold King. When the surplus ore is run out more miners will be put to work and stopes opened, says Manager S. J. Morris.

A strike of ore is reported at the Illinois & Montana G. M. Co. mine in West Fisher district, near Cabinet. The ore shows free gold. It is intended to put a mill on this property this fall.

GRANITE COUNTY.

The Crescent G. M. Co., operating on Stony creek, 20 miles west of Philipsburg, is putting in an air compressor plant at the mine, which will be operated by water power from Stony creek. The main tunnel is in 1020 feet and will go to 1800 feet. E. L. Christensen of Ann Arbor, Mich., is manager.

The Willow Creek M. Co. was organized at Philipsburg last week to develop and operate a group of claims on upper Willow creek. The officers are J. H. Grant, A. H. Wahl, T. J. Haugeberg and D. Olson, who is manager.

A number of lessees are at work on the Nancy Hanks mine at Garnet, owned by S. Ritchey. On the Cascade, another of Ritchey's claims, which adjoins the Nancy Hanks, a tunnel is being driven to tap the Nancy Hanks vein and is in 530 feet. It is expected at 100 feet farther the vein will be cut ——Crawford, Mueller & Baker are leasing the International mine of the Mussigbrod group and are taking out ore.

L. U. Loomis, of the Gold Reef M. Co., operating on the south fork of Boulder creek, 7 miles northeast of Philipsburg, says development work will be increased. He has twelve men at work building a wagon road up South Boulder creek to the mines. Loomis last week bought five adjoining claims—the Mayflower group—which gives the company a tract of 160 acres, with good mill site and a spring flowing 75,000 gallons of water per day.

JEFFERSON COUNTY.

The Lincoln C. M. Co. has been incorporated by J. A. Talbot, P. Mullins, R. B. Smith, J. F. Finlan, J. B. McClernan, W. Y. Pemberton of Butte and T. H. Carter of Helena. The company has acquired a group of quartz claims in Little Boulder district, 12 miles from Boulder. Development work will be started.

G. H. Kent of Helena has a lease and bond on the Mollie McGregor mine near Basin for $50,000 and for eighteen months.

LEWIS AND CLARKE COUNTY.

M. Malm of Cleveland, Ohio, who is interested in the Yellow Jacket properties, 4 miles from Helena, says he is preparing to resume work in the mines and mill.

The Drlebert mill, in Dry Gulch, 4 miles from Helena, has been put in operation.

The Gold Ridge M. Co. has been incorporated by H. Klein, F. K. Turner, E. C. Day, J. A. Walsh and J. O. Briscoe, of Helena. They will develop and work a group of seven quartz claims and eighty-three acres of placer ground and 1500 miner's inches of water in the Prickly Pear river, near the Big Indian mine. The Northern Pacific and the Great Northern railroads and the line of the Missouri Power Co. all run through the placer ground. The company will start work next week, and will put up a 100-stamp mill at the mouth of Jackson creek on the power line, bringing the ore from the mines by a wire tramway, says the Inter-Mountain.

MADISON COUNTY.

The Clipper mine, near Pony, is closed down.

At Brandon, near Virginia City, the mill and smelter of the Bismarck-Nugget Gulch Con. M. Co. are ready, awaiting completion of the power plant. The mill has capacity of 100 tons per day. It is equipped with Blake crusher, roughing rolls, to which is attached with automatic feeder two sets of finishing rolls, two trommels, hydraulic classifiers, two four-compartment jigs, settling tanks and table concentrators. The ore is conveyed from the mines, a distance of 1⅛ mile, with elevation 800 feet above the mill, to the mill by aerial, double-rope tramway having capacity of 500 tons per day. The tram is supported by twenty-one towers, varying in height from 16 to 45 feet. At the mill the ore is automatically dumped onto grizzly bars, from which it is automatically fed to a crusher. The concentrates are elevated automatically to the drying floor of the smelter, from which they go to the charging floor by gravity. The furnace is a fifty-ton water jacket lead furnace. An electric road connecting the company's mill and smelter with the N. P. railway at Sheridan will be built.

MISSOULA COUNTY.

Vermillion reports state that the concentrator and nearly the entire plant of the Kentucky-Vermillion M. & Concentrating Co. was destroyed by fire last week. The loss is estimated at $125,000, with $30,000 insurance. The property was owned by Spokane, Wash., men, being E. J. Dyer, E. H. Belden, J. Lawyer and J. E. Branscombe.

PARK COUNTY.

Manager Byrne of the Sheep Mountain M. Co., near Cooke City, says arrangements are being made to build two mechanical roasting furnaces.

POWELL COUNTY.

The Missouri & Montana M. Co. has bonded for $25,000 two claims on Nigger Hill, near Elliston, called the Whitetail and No. 2. They have 4 feet of gold-silver-lead ore, averaging $25 per ton, says the Inter-Mountain. The company has three shifts sinking a shaft and driving a tunnel, and shipping ore is being taken out.

NEVADA.

ESMERALDA COUNTY.

J. H. Rae, of Dayton, has bonded the Lottie group of claims in Garfield district for $3500. The ore carries values in silver, gold and lead. The claims are 6 miles from the C. & C. railroad. Developments will be started.

HUMBOLDT COUNTY.

The Zelda mine, 30 miles southwest of Lovelock, started up last week with sixteen men.

LINCOLN COUNTY.

The strike situation at Searchlight, after two and a half months, seems to show little or no change. The owners and operators are still in Los Angeles, Cal. Contract work is in progress on the Cyrus Noble; the Ione is working a few men, paying the union scale of wages, and the New Era is building a mill. In general, the union is said to be sanctioning all prospect and development work, producing properties alone being under the ban.

The Wagner Bros. group at Knoh Hill, near Searchlight, have been sold to F. L. Winters, J. B. Anderson and F. Siegel for $5000. It consists of the Daisy, Daisy Bell and Oakland and the Daisy Bell mill-site. There is a small stamp mill on the ground. The main difficulty in the past has been lack of sufficient water.

NYE COUNTY.

(Special Correspondence).—In the Charm mine here, owned by Martin Murray, president; Dennis M. O'Sullivan, vice-president; Paul Desmond, secretary; John S. Merrill, treasurer; W. R. Whittier and N. N. Wilson, an assay of ore, 8 feet from the surface, this week showed gold, 15.35 ounces, $315; silver, 40c.

Butler, Aug. 24.

The Atwood M. & D. Co. has leased to the Inman Co. two claims of their group at Atwood, near Tonopah.

At the Ohio-Tonopah mine at Tonopah the air compressor plant and machine drills are in operation.——At the Tonopah & California mine the main working shaft, on which sinking was resumed August 1, has been sunk 25 feet below the 450-foot level. They are working eighteen men, says President Blythe.

The Montana-Tonopah M. Co. at Tonopah reports a recent shipment of sixty-three tons of ore which netted $14,428.

At the Rescue mine, near Tonopah, the pump was started last week, the shaft unwatered, and sinking has resumed.

The McNamara mine at Tonopah closed down last week, having reached a depth of 500 feet. Superintendent A. P. Canters says it is expected the closedown will be of short duration.

STOREY COUNTY.

The fluming of the tailings near the Ward tunnel through the boxes to the Butters' cyanide plant, near Virginia City, has begun. Little trouble has been experienced in carrying the tailings a distance of 3 miles with the flow of water available. The new tanks being put in at the plant are about completed.

All the Comstock mining properties at Gold Hill and the middle mines, as far north as the Savage, inclusive, have entered into an agreement to put the Foreman shaft, which was damaged by fire last spring, in repair from its collar down to the level of the south lateral branch of the Sutro tunnel. The Foreman shaft being a downcast, the ventilation of all these mines will be greatly improved, says the Territorial Enterprise.

At a meeting of the presidents of the following mining companies operating on the Comstock, held in San Francisco last week, the Ward Shaft Association was organized: Gould & Curry, Savage, Challar, Potosi, Bullion, Exchequer, Alpha Con. and Julia Con. C. Hirschfeld is president, J. W. Twiggs secretary and L. M. Hall of San Francisco, Cal., superintendent. The object of this association is to put the Ward shaft in repair and resume prospecting work in the lower levels of the mines mentioned. This will involve lowering the water in that part of the Comstock. It is expected operations will begin September 1st. The Julia Con. and Bullion companies own the Ward shaft, but they have agreed to grant a perpetual right to work through the shaft to the other companies.

WASHOE COUNTY.

There are 125 men on the payrolls of the mining companies in Olinghouse canyon, near Wadsworth.

WHITE PINE COUNTY.

The White Pine C. Co. has bonded the Last Hope and Columbia copper mines, which join the Ruth group on the north, near Ely, for $9000. M. L. Requa of San Francisco, Cal., is manager of the White Pine C. Co.

NEW MEXICO.

COLFAX COUNTY.

The 50-ton cyanide plant of the Thelma M. Co., near Baldy, is being overhauled preparatory to resuming.

GRANT COUNTY.

T. N. Stebbins, having bought the Casino mine 9 miles southwest of Silver City, is doing development work. Grading for the mill is in progress, and it is thought the cyanide process will be also added.

LUNA COUNTY.

J. Allard and D. Michael of Deming have secured the McComus group of claims in the Florida mountains on which they intend to start development work.

SIERRA COUNTY.

Work is being resumed on the Ready Pay mill at Hillsboro. Operations had been delayed by non-arrival of machinery. The pumping plant is working.

D. S. Miller of Lake valley and L. Sly have bonded their partners' interests in the Log Cabin mine at Tierra Blanca, says the New Mexican.

SOCORRO COUNTY.

M. Thomas reports having men at work opening up a copper prospect near San Acacia, 7 miles from the railroad and the Rio Grande river. The property is the Jerome group in San Lorenzo mining district, in Magdalena mountains. A shaft has been sunk to depth of 60 feet and a drift run out 40 feet, showing a 6-foot vein of copper ore, assaying 20% copper and $5 in gold per ton. The vein is said to be between walls of porphyry and limestone.

TAOS COUNTY.

At Anchor, near the Red river, the Cashier M. & M. Co. is making arrangements to develop a group of four claims, and one lead is said to be 90 feet wide. Over 450 feet of shafts and crosscuts are made. The company has started a tunnel that will cross the leads at depth of 300 feet, and which will also drain the mine of surface water, which has given some trouble in the past. A mill to treat 300 tons of ore a day will be built, says the New Mexican.

OREGON.

BAKER COUNTY.

A half interest in the Leonard, Emma W., Gold Dollar and Gold King claims, in the Greenhorn mountains, near Sumpter, has been sold to C. M. Johnson of Gelser for $2,000.

T. W. Davidson, manager of the Don Juan mine, near Sumpter, says he has started unwatering the mine, and development work will be resumed next week. The Don Juan is owned in Bay City, Mich.

Superintendent J. E. Reed of the Auburn Deep M. Co., at Auburn, states the shaft being sunk is down 209 feet, and it is thought to be near bedrock.

It is locally reported from the Stices Gulch placers, near Sumpter, that opals have been discovered at the diggings.

Arrangements are being made for a 10-stamp mill on the Snow Creek mine, Greenhorn district, near Sumpter, says Manager F. D. Smith. The mill will have a steam plant, ten stamps, three table concentrators, and will be near the mouth of the Zelda tunnel.

COLUMBIA COUNTY.

W. A. Gray, superintendent of the Polar Star and Dixie Queen mines, near St. Helens, says they have a tunnel driven on the ledge of the Polar Star for 600 feet and on the dump are 2500 tons of ore which will average $25 per ton. The group consists of twenty-one claims, and several ledges show on the surface. Ore is being blocked out for the stamp mill which it is proposed to build. A chlorination plant will also be used. On the Dixie Queen men are driving a tunnel which is opening up a ledge. This property is also owned by Portland men.

CROOK COUNTY.

After two years' idleness due to litigation Cartwright & Edwards, owners of the Oregon King mine, will resume operations this fall. The Oregon King is near Hay creek. They propose building a 20-stamp mill, so that bullion and concentrates only will have to be shipped out. The mine is down to depth of 500 feet and partly filled with water. A pumping plant will be put in.

DOUGLAS COUNTY.

I. D. Davidson of Portland, treasurer of the Gold Hill & Bohemia M. Co, near Bohemia, says work will be started September 1 on their Wall Street group. Later a mill will be erected. The ore is copper, gold and silver.

The Oregon Securities Co. has bought the Broadway group of mines, adjoining the Champion basin, near Bohemia. This gives the company a continuous strip of 3 miles of ground. L. Y. Keady, C. H. Thompson, A. W. Goddard, J. B. Glover and J. H. McNicholas of Portland are interested. Improvements and increased developments are under way. There are forty men at work on a 30-stamp mill (the combining of the three 10-atamp mills that have been on different parts of the property). These mills have been idle for some time owing to the scarcity of water, but, combined, will be operated by electricity, generated by water power. A gravity double-track tramway will convey the ore to the mill. Air drills will be used in development, and a tunnel 1400 feet long will be driven. Three saw mills are running steadily on the company's property, says the Portland Telegram.

It is reported M. O. Warner of Eugene and J. D. Heard of Medford are arranging to build a smelter at Bohemia, work to begin next month.

JOSEPHINE COUNTY.

J. M. Marks of Seattle, Wash., has a bond on the Gold Mining King group of claims and will build a mill thereon. He will also put in a pumping plant and other machinery.

Two carloads of hydraulic pipe for the Simmons-Cameron placer of Waldo are on the ground, says Manager J. T. Logan. The pipe is in three sizes, 24, 20 and 18 inches in diameter. Last season's work gave satisfactory results with the hydraulic elevator in operation. This year he intends to raise the gravel to height of 34 feet.

The Galice Greek H. M. Co., on Galice creek, near Grant's Pass, has men at work digging ditches and building the flume, as well as operating the sawmill and building a reservoir. The sawmill is cutting 5000 feet of lumber from fir and

pine timber. This lumber could not he bought on the outside for less than $30 per 1000 feet, but the company operating its own mill cuts it for $7, says Manager A. B. Cousin. A rock-filled dam 22 feet high has been built at the head of the main ditch. Besides the flume, which will carry the gravel, there will be five giants at work.

LANE COUNTY.

S. R. Jones of Oregon City reports the building of a 40-stamp mill on the Lucky Boy mine, near Blue river. A cyanide plant will treat the tailings.

MALHEUR COUNTY.

T. A. Kelly and J. T. Lennox of Lynn, Mass., have leased the Basin, Star and Sulphuret claims, in Humholdt basin, 6 miles from Malheur City. The bond calls for $35,000 if a sale is made.

MARION COUNTY.

A. W. Dawes and H. H. Lempker of Mill City, directors of the Lewis & Clarke M. & M. Co., with headquarters at Silverton, report work progressing on their holdings on a fork of the North Santiam river. The ore carries gold, silver, copper and lead. The group consists of three claims near Elkhorn. The company is preparing to build a mill, which it is intended to have in operation next summer.

MULTNOMAH COUNTY.

It is reported W. A. Clark of Butte, Montana, has decided to build a smelter at Portland, chiefly for smelting the ores of his lead mines in Cœur d'Alene district, Idaho.

SOUTH DAKOTA.

CUSTER COUNTY.

The Crown Mica M. Co., near Custer, is preparing to resume work, when shipments will he made.——The Black Hills Porcelain, Clay and Marhle Co. is planning to reopen its properties. The Inter States M. Co. is working steadily and the Grantz is also.

LAWRENCE COUNTY.

A. Fillion, superintendent of the Pluma G. M. Co., says his company has crosscut the ledge on the 300-foot level for a distance of 120 feet and is still in ore, which averages $3.50 per ton in gold.

The Lexington G. M. Co. is dropping ten stamps in the old Highland Chief mill of Spruce Gulch, 2 miles from Deadwood. The company has added an engine and a larger boller. The assay office is being enlarged. The company is experimenting with a process for treatment of sand and slimes without separating.

Dorr & Wilson have hegun huilding their cyanide mill near Terry. It will he on the slope a short distance from the mine. All ore will be moved by gravlty. The machinery will consist of a number of Chilian mills for crushing ore in a solution, the power to he supplied from the Belt Electric Light & Power Co. Water will he pumped from some of the old workings on the ground.

The grade is finished, foundation work under way and lumber is on the ground at the site of Lundberg, Dorr & Wilson's cyanide mill at Terry, says the Black Hills Revlew. The new plant will he ready to run this fall. It will employ electricity for power entirely and will crush the ore in Chilian mills.

PENNINGTON COUNTY.

The cyanide plant huilt at Pactola for extracting values from fine sands of placer gravel is a success. The system is to save the free gold, first, hy amalgamating plates, and then cyanide the tailings, which saves a large percentage of the values. The company expects to enlarge the mill's capacity.

It is reported the Horseshoe M. Co. propose starting up their smelter at Rapid City hy September 10th. It has two furnaces.

UTAH.

GRAND COUNTY.

The litigation involving the Paradox-La Sal mines, near Basin, is reported settled and operations will be resumed.

L. Taylor, manager of the Big Indian and Blue Jay mines, near Moah, says at Big Indian the ore bodies are to be opened up as soon as equipment is put in, while at the Blue Jay they are drifting on the ledge, showing high-grade copper ore.

W. A. King and F. Moorehouse of Salt Lake City, of the International G. & M. Co., operating in Beaver hasin, near Basin, in the La Sal mountains, report their intention to go ahead with work in the Chimney Sweep and Fortune Teller claims, where they have a mineral showing high-grade ore. A shaft is heing sunk on the Chimney Sweep in a vein of copper ore, and drifts will be run on the Fortune Teller.

The Interstate Co., in Gold Basin, near Basin, are getting machinery on the ground for their mill, which will be a chlorination and cyanide plant, says the Trihune. The ores will mill $11 per ton gold. They expect to have the mill in operation by Oct. 1.

IRON COUNTY.

The anthracite deposits at New Harmony, 8 miles from Iron mountain, near Kanarraville, are being opened up hy Superintendent R A. Kirker. In the main tunnel the work has passed through three veins, two of which show 4 feet of coal. The veins dip at an angle of 70°, and with a tunnel can be opened up to deptb of 600 feet, says the Tribune.

JUAB COUNTY.

The main shaft on the Centennial-Eureka mine, at Eureka, is down 1800 feet bolow its collar, and at that point another level will be estahlished, says Manager C. E. Allen. Meanwhile 200 tons of ore is coming daily from tbe mine to the furnaces of the United States smelter. Tho 1800-foot level is 2500 feet helow the apex of the zone, which rises 700 feet above the collar of the shaft, says the Tribune.

The Carisa ore shoot is reported opened in the Victor mine, near Eureka, this time on the 500 foot level, 600 feet south of the raise that was made to the surface. A drift which was being extended to connect with a winze from tbe 400 foot level struck ore, which shows 10% copper, containing twelve ounces of silver per ton.

PIUTE COUNTY.

(Special Correspondence) —A gold strike has been made in the Gold Vein M. Co.'s property in Horse Heaven district, 10 miles from Marysvale. The vein is 9 feet in width, with a pay streak of 5 feet. The property is owned hy Salt Lake and Eastern men and is under the management of G. F. Dalton. The company is putting in extensive improvements and has a large force of men at work.

Marysvale, Aug. 22.

A strike of gold bearing quartz is reported made in Horse Heaven district, 10 miles southwest from Marysvale, hy the Gold Vein M. Co. The ledge is 9 feet in width, and the pay streak 5 feet. The quartz shows free gold. G. F. Dalton of Salt Lake City is manager.

SALT LAKE COUNTY.

After two years' suspension of shipments the Silver Shield mine, near Bingham, is again sending out ore, the tunnel having reached the junction of the cross fissure and main veins.

D. H. Peery & Co. of Salt Lake City and H. Joseph have filed with the State Engineer an application which shall entitle them to use of the waters of Little Cottonwood creek above and east of Alta; the waters issuing from the Bryan tunnel; the waters of Peruvian gulch and those of White Pine creek, the latter all tributary to Cottonwood creek, the same to be used in the generation of power and light for mining and milling purposes. This will afford energy equivalent to 1000 H. P., says Joseph.

The Collins group at Alta has heen sold to J. A. Kirby, A. Colbath and L. A. Jeffs. The group includes four claims and three fractions, lying west and north of the Albion Co.'s ground.

The Falco group of mines, at Bingham, of the Cluster M. Co., has been sold to W. M. Perry and W. H. Walker of Salt Lake City, and with C. A. Falco as manager will he extensively developed. The group is between the Old Telegraph and Dalton & Lark mines.

Work on enlargements at the Highland Boy smelter, at Bingham, was started this week, says Manager R. H. Channing. The enlarging will begin on the main stack, which will he elevated 50 feet or to a total height of 250 feet. Two furnaces will he added.

SUMMIT COUNTY.

The Daly-Judge mine, at Park City, is sending out between 300 and 400 tons of concentrates to the smelters weekly.

Operations have heen resumed at the Corona mine of the Donovan group, near Park City, and sinking is under way. J. Hasson is superintendent.

Superintendent B. E. Hartwell of the East Ontario M. Co., near Park City, reports operations again under way. A hlower is being set up in the tunnel.

TOOELE COUNTY.

The Honorine tunnel at Stockton is being advanced at the rate of 10 feet per day and has been completed to length of 4280 feet, says Superintendent Raddatz.

J. B. McGee, superintendent of the Sacramento M. Co.'s retorts at Mercur, says from 2400 pounds of rock that was reduced on the 17th inst. he ohtained 233 pounds of quicksilver and 1400 pounds of gold-hearing slag, which latter is to he treated in the leaching tanks. With present equipment he says the product of the retorts should average 233 pounds daily.

The Merrill M. Co. has heen incorporated at Salt Lake City to operate near Dugway, in Deep Creek district. It has a group of six locations, on which 400 feet of work has been done, the ores showing values in silver and gold, occurring on the contact hetween the limestone and quartzite. They adjoin the Carrick group. H. H. Green, M. Merrill, J. G. Jacobs, D. McVichie and E. W. Gillette are directors Work is under way.

The hreaking of ground for the Honorine concentrator, near Stockton, has begun, says Superintendent E. J. Raddatz. The tunnel through which the ores are to be dellvered to the concentrator at Buhl, a few miles out of Stockton, has heen driven 4300 feet.

UTAH COUNTY.

C. Barrett of Salt Lake City, manager of the Paraffine mine, at Mill Fork, in Spanish Fork canyon, says a 6-inch hody of wax (elaterite) had been struck. Work was temporarily suspended because of the presence of quantities of gas, which is not a detrimental feature, but must he controlled, says Barrett.

M. J. Stewart of Salt Lake City has hought for $1000 tbe Erma-Fitz-Lone Pine group of claims in Silver Lake mining district.

WASHINGTON.

FERRY COUNTY.

Work will be resumed this week on the Apollo mine, near Republic, says Manager E H. Delhridge.

Superintendent N. Cochran of the Mountain Lion Mine, near Republic, says operations have resumed. He will at first ship 100 tons of ore per day to the smelter.

The Mountain Lion M. Co., operating at Repuhlic, has heen reorganized, witb A. E. Palmer of Spokane and J. M. Gearin, J. A. Cranston and G. Mallory of Portland, Or., as officers. President Palmer says preparations are heing made to increase ore shipments to 300 tons daily. N. Cochran is superintendent. Republic camp has heen shipping 700 tons of ore a week. With the Mountain Lion's increase its output will go up to 2500 tons a week.

Development work is expected to be under way next week on the Knoh Hill and Little Cove mines, near Repuhlic.—— The North San Poil mine is taking out good ore from the south drift on the 125-foot level.

OKANOGAN COUNTY.

C. P. Coey of Rockford says he will start work at the Ore Or No Go group at Wauconda.

STEVENS COUNTY.

J. Borgan, C. Miller, et al., have started work on the Last Chance tunnel, near Northport, which is in 300 feet. They will run 100 feet farther, when shipping of ore will he resumed.

WHATCOM COUNTY.

(Special Correspondence). — Superintendent L. Friede of the Post-Lambert mine, in Mount Baker district, north of Baker, Skagit county, reports shipping their first clean-up of gold, amounting to $27,000, the result of twenty-five days' run of the 10-stamp mill. The mill handles thirty-five tons of rock daily. The mill is of 1000-pound stamps, with concentrators helow plates. A 4000-foot aerial tram connects mill with mine and storage bins for handling an ore reserve. The vein is of quartz from 4 to 5 feet in width, with general strike to the west of north, and dip of 40° to 45° west and into the mountain. The ore is said to carry tellurides and free gold throughout the gangue, though generally contained in a pay streak. The mine has heen developed hy 2000 feet of work, consisting of tunnels, drifts and raises, most all of which have been done in ore. Some stoping has been done to supply an ore reserve for mill.

Tacoma, Aug 26.

WYOMING.

CARBON COUNTY.

Superintendent J. Montague of the Goldwater's Wolverine mine, near Grand Encampment, reports opening up a sulphide shoot for a distance of 15 feet in a drift to the east from the shaft. The drift is being run from depth of 65 feet. If the shoot is of sufficient size the plant of machinery, which is in the upper shaft house, will be hrought down and set on the new shaft.

FOREIGN.

AFRICA.

RHODESIA.

The Beatrice, at Bulawayo, Aug. 5, report July cyanide return: 1100 tons treated, yielding 247 ounces gold.——Geelong Gold, Ltd., July output was: Forty stamps (26 days) crushed 3698 tons, for 1619 ounces ——The Rezende Co. report, Aug. 7: Twenty stamps, running 29 days, crushed 3000 tons, yielding, from mill, 751 ounces, from tailings hy cyanide, 158 ounces; total, 909 ounces fine gold; also, 8 tons concentrates, containing 28 ounces. ——The Transvaal G. M. Estates for month of July are reported at: Mill crushed 5317 tons, yielding 1982 ounces; cyanide works treated 3470 tons for 1322 ounces; slimes works treated 1800 tons for 370 ounces.

TRANSVAAL.

The Cassel Coal Co. July output was 12,434 tons.——The Durhan-Roodepoort G. Co, at Johannesburg, report for month of July: Quartz milled, 5890 tons (40 and 45 stamps, four and sixteen days), for 2943 ounces; tailings treated, 4840 tons, (50 stamps, eight days), for 959 ounces; total, 3902 ounces. The shortage in the stamping power during the month was due to a large number of time expired natives having left, the new ones being unused to the work.——The Lancaster Gold Co. July result was: Fifty-five stamps, running twenty-nine days, crushed 8300 tons, yielding 1990 ounces fine gold; at cyanide works 6379 tons were treated for 1030 ounces fine gold.——The New Primrose Gold July production was 6731 ounces from 120 stamps dropping twenty-nine days ——The Transvaal & Delagoa Investment Co. colliery output for July was 38,500 tons.

WEST AFRICA.

The Ashanti Goldfields Co., Aug. 3, report: July crushings from Obuassi mine, 1710 tons of ore for 4000 ounces gold. Development cahle not received. —— The Ashanti Sansu mines July crushing was 1680 tons, producing 1630 ounces gold.

AUSTRALIA.

NEW SOUTH WALES.

The Lloyd Copper Co. production for July was 197 tons copper. They report the water supply now assured for more than twelve months ahead.

The Malacca Diamond Co. at Copeton, August 6th reports 102 loads washed, producing 132 carats diamonds and 2932 pounds of tin.

QUEENSLAND.

At the Day Dawn Block & Wyndham G. M. Co. at Charters Towers, for four weeks ended August 1 the battery crushed 2930 tons for yield of 1274 ounces of gold, valued at £4500. At the company's works at Burdekin river and Old Wyndham mills 3780 tons of tailings were treated for bullion valued at £3000.

SOUTH AUSTRALIA.

The Northern Territories M. & S. Co. report August 6th at the Mount Ellison mine. Total depth of shaft 120 feet. At the smelting works excavations for buildings, furnaces, flues and stacks are completed and water jacket smelting foundations finished, with iron work going up. Reverberatory furnaces and brick work are under way.

BRAZIL.

The St. John Del Rey mines report gold production during the month of July at £24,200, the yield per ton heing 0.59 ounce troy.

BRITISH COLUMBIA.

BOUNDARY DISTRICT.

The number of men at the Athlestan mine, a mile from the Winnipeg mine, in Wellington camp, has been increased, and it is expected shipments of ore to the Sunset smelter will be larger in the future, says Superintendent Oxley. The ore must be hauled in wagons to the Winnipeg spur of the C. P. R.

EAST KOOTENAY DISTRICT.

The mines at the three collieries of the Crow's Nest Coal Co. for the month ending Aug. 1st show a steady increase over all previous months, says the Rossland Miner. It is estimated that had there heen no hreak the total output would have heen 10,000 tons greater. The figures for the camps are as follows:

	Tons.
Coal Creek	24.793
Michel	28.569
Morrissey	18,10J
Total	71,462

The total for June was 71,253 tons.

The coke shipments for the month were:

	Tons
Fernie	8.696
Michel	7,639
Total	16,335

This also is on the increase. Work is going ahead at Coal Creek in No. 4 and No. 5. Coal has heen struck in No. 4 at 50 feet and in No. 5 at a short distance. The seam in No. 4 is 20 feet thick and No. 5 is 8 feet thick.

The Gold River M. & Power Co. has been formed in South Dakota to operate near Fort Steele. Manager D. S. Guinter says work will start this week on the Bull river water power; a surveying party will run lines for a ditch or flume and preparatory work will hegin on several placer claims which have heen leased from the government.

NELSON DISTRICT.

P. White, superintendent of the Wilcox

mine, 7 miles from Ymir, say he is arranging to add a 10-stamp mill to their equipment. At present there is a 2-stamp mill in operation. The tunnel is now in on from 8 to 9 feet of profitable milling ore, and the property is in the best shape it has ever been for turning out a large tonnage.

ROSSLAND DISTRICT.

A. MacLean of London, Eng, a director of the company, says there is no intention of closing down the Velvet mine, near Rossland, permanently as reported. It will resume when Superintendent Gray returns from England, about Oct. 15.

Underground work is under way at the Nickel Plate mine near Rossland. The difficulty between this mine and the Center Star, through the excessive seepage into the Center Star workings, is to be obviated by the construction of brick bulkheads at the western terminals of Nickel Plate drifts on the 490 foot and 600-foot levels.

SLOCAN DISTRICT.

Manager Garde, of the Payne mine at Sandon, says he has started building a flume from No. 8 tunnel on the McGuigan side of the mountain to tap the stream and secure a sufficient supply of water for mill power. The length of the flume will be 6200 feet and assures water for all purposes the year round.——There are fifty men in the Payne mine and twenty-seven in the mill. The operation of the zinc plant will be delayed several weeks, owing to the damage done the magnetic separator by the floods in Missouri while it was en route.

The Spokane company owning the Big Bob group, near Slocan City, will start work this week, after a period of inactivity. Development work is said to show two ledges, one of gold and copper ore and the other of silver and lead. Work has started on the Legal Tender mine in the same district.

VANCOUVER ISLAND.

A number of prospectors operating on the west coast of Vancouver island have gone to Ingersol river, which flows into Quatsino sound from the south, says the News-Advertiser. A lead of magnetic iron oxide carrying gold values has been found.

The Western Federation of Miners, with headquarters at Denver, Colo., has lost the strike of the coal miners at Cumberland against James Dunsmuir. Despite the high prices for coal he has preferred to let the mines lie idle nearly six months rather than recognize the Federation. W. Moore of the Federation is said to have reached Nanaimo last week from Denver with relief funds for distribution if the miners should not agree to Dunsmuir's final proposition. The miners have voted to accept Dunsmuir's terms, and have agreed to return to work on two-year individual contracts. Dunsmuir says he will increase the output of the Cumberland mines from 800 to 1500 tons daily. He will withdraw his colliers Wellington, Tellus and Hera from the San Francisco-Australian route and instead will ship coal by them from Nanaimo to San Francisco, Cal. He is also preparing plans for a car ferry capable of carrying twenty-eight carloads of coal and coke from Comox to Ladysmith and the Crofton smelters to the mainland.

WEST KOOTENAY DISTRICT.

At the Oyster-Criterion mill in Lardeau section, near Ferguson, the rock crushers and mortars are in place The compressor and power house are being roofed in and cables for the tramway are being strung from the upper terminal to the mill.

G. Stead, who owns the Lucky Jack, Horseshoe and other claims near Trout Lake, has bought the Alice mine in same section.

CHILE.

The Copiapo mines at Copiapo, in Atacama province, report the July production at 1000 tons of copper ore, averaging 16%.

The Santa Rosa Co., near Iquique, gives the production for July from the properties of the company at $11,500, and from leased properties $3500.

KLONDIKE.

The Ladue quartz mill, near Dawson, is being dismantled and the machinery removed. A number of quartz ledges were found on El Dorado and other creeks, carrying some free gold. Two quartz mills were built and the Yukon Government asked to establish a mill which would grind quartz, either free or at minimum expense. Later developments are said to show that quartz mining will be impracticable unless conducted on a large scale with cheap labor. Manager Bottsford, of the Ladue M. Co., says the mill is being taken down because the Dominion Government charges $5 per foot frontage for the land the mill occupies, besides heavy taxes. The Government declined the offer to buy the mill outright.

MEXICO.

CHIHUAHUA.

Superintendent F. A. Shneider says he is getting the Creel smelter at Terrazas camp in shape for starting up next week. Nine cars of coke have arrived and ore is being taken out.

E. L. Horner of Leadville, Colo, manager, says a company has been organized with Kansas men to take over the Santo Domingo placer mines on the Concho river, which he has under bond for $250,000 gold. Operations are suspended pending this deal. It is intended to put in machinery and have the mines in full operation by Jan. 1.

DURANGO.

At El Cobre mine, near La Trinidad, owned in part by Cushing & Walcup, they are building a matte smelter of fifty tons capacity, which is expected to be in operation next month. E. Bruckhold is manager and has 300 men employed.

SONORA.

The Graphic mine, owned by Captain Fitch, near Magdalena, is yielding zinc ore, 2000 tons having been recently shipped at a profit to Mineral Point, Wis., says Fitch. This ore is said to carry the mineral marionite, previously known only at Marion, Ark.

The mill of the Promontorio M. Co. at Promontorio, in Magdalena district, has been overhauled and operations resumed last week.

PERSONAL.

H H. COHEN, of London, England, is examining mines in Chihuahua, Mexico.

L. S. NOBLE is in Guanajuato, Mex., from Colorado Springs, Colo, examining mines.

W. H. KELLS is manager of the Knob Hill and Little Cove mines, near Republic, Wash.

DANIEL BEST, of the Best Mfg. Co., of San Leandro, Cal., has returned from a business trip.

A D. GASSAWAY, of North Bloomfield, Cal., has returned from a business visit to San Francisco.

A. B CHITTENDEN is now assayer for the 50-stamp mill of the Bayard M. & M. Co., Barstow, Cal.

J. W. PHILLIPS, managing a mill and cyanide plant at Silver City, Nev., is in San Francisco, Cal.

W. S. PETERS, secretary of the Best Mfg. Co., has returned from Monterey to San Leandro, Cal.

F. L. BARTLETT has returned to Denver, Colo, from a trip to the Lake Superior district, Mich.

N. COCHRAN of Rossland, B. C., is superintendent of the Mountain Lion mine, near Republic, Wash.

F. BURNS is in charge of the 240 and 300 stamp mills at the Treadwell mines on Douglas Island, Alaska.

J. J. MCSORLEY is in San Francisco, Cal., from San Andreas, Calaveras county, Cal., on mining business.

J. A. KIRBY, general superintendent of Daly-West mines of Park City, Utah, is visiting at Seattle, Wash.

W. GRAY, superintendent of the Velvet mine, near Rossland, B C, has gone to London, Eng., on business.

W. G. DODD, president of the Union Iron Works, has returned to San Francisco, Cal, from New York.

R. T. PIERCE, superintendent of the Crystal Lake G. M. Co., at Lundy, Mono county, Cal, has gone East.

R. C. FACER is manager of the Golden Opportunity M. & M. Co., near Silver City, Owyhee county, Idaho.

MANAGER G. L. MOATS of the Four Metals M. Co. is in Omaha, Neb., on business, from Salt Lake City, Utah.

WESLEY MERRITT, industrial commissioner of the Santa Fe Railway, has returned from New Mexico to Chicago.

F. LYMAN of New York City succeeds the late T. D. Rand as treasurer of the American Institute of Mining Engineers.

F. P. Sherwood, of the Con. Gold Fields M. Co, of London, Eng., operating on the West Coast, Africa, is in Spokane, Wash.

H. W. NELSON has resigned as superintendent of the Alpine mine near Sumpter, Or., on account of ill health and will go to California.

MANAGER R. H. CHANNING of the Highland Boy smelter, at Bingham, Utah, returned to Salt Lake City, Utah, last week from Montana.

T. H. LEGGETT has resigned as consulting engineer for Neumann & Co., of the Con. Main Reef gold mines at Johannesburg, South Africa.

I. SUTHERLAND of Brunswick, Me, secretary of the Big Creek G. M. Co., has returned from a visit to the mines near Groveland, Tuolumne county, Cal.

J. O. BONE of Tacoma, Wash., is at Nicola, B. C., examining the Western Coal & Iron Co.'s property, 45 miles east of Spence's Bridge, a point on the C. P. Railroad.

W. E. THORNE has gone to Georgetown, Cal., to inspect mining property there and gather ore specimens for the California exhibit at the St. Louis Exposition.

C. L. DIGNOWITZ is in Colorado from Utah and after an examination of his properties in Boulder county will go to Deadwood, S. D., to attend the Mining Congress.

PRESIDENT SHULER AND TREASURER BROWN, of the Chancellor G. M. Co., have returned to Illinois from an examination of their Pacific Coast mining properties.

WM. MAGENAU, until recently located in Guanajuato and Mexico City, is examining mines in the State of Oaxaca, Mexico, and expects to return to the United States shortly.

J. DUNRAVEN YOUNG, director of the Chicago School of Assaying, who has been examining and reporting on mining properties in the State of Washington, has returned to Chicago, Ill.

E R. MORFETT of the Standard Gas Engine Co, San Francisco, Cal., is in Eureka, Humboldt county, Cal, installing two engines (12 H. P. and 30 H. P.) for the Vance Redwood Lumber Co.

L L. TOVEY, Professor of Mining in the University of Tomsk, Siberia, who has been inspecting mining and milling methods in Colorado, is now in South Dakota on his way to New York.

GOVERNOR PARDEE has appointed as California's delegates to the American Mining Congress, at Deadwood, S. D., T. Ewing, D. Murphy, F. W. Braun, H. S. James and W. J. Trask of Los Angeles; F. Rexinger, W. C. Ralston, C. W. Merrill and E. H. Benjamin of San Francisco, and C. M. Belshaw of Contra Costa. The California State Miners' Association and the San Francisco Chamber of Commerce have also named the same parties as their representatives.

Obituary.

E. M. PECK, a Utah mining man, died August 22nd at Gosben, Utah. Deceased was born in Vermont, July 24, 1828 He was a member of the Mormon Battalion and was present at the first discovery of gold at Sutter's mill, California.

J. D. WILLIAMS, a pioneer miner of California, died at his home near Placerville, El Dorado county, Cal, on the 19th inst, of dropsy and heart failure. Deceased was a native of Cornwall, England, aged 78 years. and is survived by one son, a resident of Nevada, and a daughter.

COLONEL CHARLES E. TAYLOR, a prominent mine operator of Denver, Colo, died in New York August 20th. Colonel Taylor was once president of the May-Mazeppa mine near Gunnison, Colo., and was also president of the Mining Exchange a number of years ago in Denver.

G. W. CHEYNEY of Tucson, Ariz, and for several years identified with the Toughnut M. & M Co. at Tombstone, Ariz, died on the 14th inst, after a short illness. Deceased was 49 years of age and his birthplace Philadelphia, Pa. In 1890 he was a candidate for delegate to Congress. During the early '90s he was operating for Eastern people at the Old Glory mine, Oro Bianco district, and at same time was territorial superintendent of public instruction. He leaves a widow and six daughters.

Catalogues Received.

"Pumping by Compressed Air," standard size, 6x9 in, from the Pneumatic Engineering Co., New York City, the subject being treated under the heads of "The Air Lift Pump," "Displacement Pumps, Using Air Expansively," "Displacement Pumps, Using Direct Pressure of Air Without Expansion."

Commercial Paragraphs.

THE Oakland Iron Works has been succeeded by the United Iron Works, which will continue the business. Enoch Winsby is secretary and treasurer, with offices at 330 Market St., San Francisco, Cal.

THE Keystone Driller Co. of Beaver Falls, Pa., have lately shipped two of their placer testing machines to St. Petersburg, Russia. They this week ship two machines, with a number of tools, to Callao, Peru, a machine to Johannesburg, South Africa, and another to Brazil.

New Patents.

DEWEY, STRONG & CO.'s SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR WEEK ENDING AUGUST 18, 1903.

736,345.—RAILWAY SIGNAL—Ammann & Campbell, Spokane, Wash.
736,487.—OIL BURNER—Brunner & Patterson, Haywards, Cal.
736,588.—WATER TRAP—F. B. Charroin, Fairhaven, Wash.
736,695.—PLOW JOINTER—W. R. Criffield, Walla Walla, Wash
736,837.—FLY TRAP—E. F. Davison, Marysville, Wash.
736,513.—PIPE LINE VALVE—C. E. Fowler, Seattle, Wash.
736,847.—STRAP FOR ECCENTRICS—W. Harlog, Blaine. Wash.
736,849.—FRUIT DRIER—G W. Heakle, Vancouver, Wash.
736,850.—TANK—A. Holtgen, S F.
736,411.—LOCATING MINERALS—G I. Leonard, Pasadena, Cal.
736,752.—ELECTRIC RAILWAY—T. Mahoney, S. F
736,857.—BOILER FURNACES—G. Marlow, Sr., Spokane, Wash.
736,766.—PHOTO TRAY—G. T. McKinney, Walla Walla, Wash.
736,416.—STOVE PIPE HOLDER—W. H. Medloa, S F.
736,421.—PUMP—Miles & Storch, Alameda, Cal.
736,534.—SAW SET—J Morin, Seattle, Wash.
736,427.—FOOTSTOOL—Ruth M. Nidever, Myford, Cal.
736,871.—FOLDING CASE—J J. O'Brien, San Jose, Cal.
736,562.—SPOOL HOLDER—Carrie B. Starr, Wilbur, Wash.
736,797.—HAMMER—G J Steele. Canby, Cal.
736,563.—OIL BURNER—A. C. Stewart, Santa Paula, Cal.
736,893.—GARMENT—W. G. Turner, French Camp, Cal.
736,804.—FRUIT LADDER—S S Ward. Napa, Cal.
736,897.—TROLLEY CATCH—White & Duryea, Los Angeles, Cal.
736,557.—FEED MECHANISM—White & Duryea, Los Angeles, Cal.
736,864.—OIL BURNER—T. Williams, S. F.
736,907.—CASING SPEAR—E C. Wilson, Los Angeles, Cal.
736,470.—SAW SET AND GAGE—D. Worden, Whatcom. Wash.
36,495.—DESIGN—BADGE—K. Melrose, S. F.

Notice of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

IGNITING ATTACHMENTS FOR EXPLOSIVE ENGINES —No. 735,997. Aug. 11, 1903. J. D. McFarland, Jr., San Francisco, Cal. One-half assigned to John Bruckman of San Francisco, Cal. This invention relates to improvements in electric igniting devices for gas engines which employ an explosive mixture. One of its objects is to afford a simple, durable igniter of positive action that is particularly applicable for use with engines of the oscillating cylinder type. Another object of the invention is to utilize the oscillatory movement of the cylinder to effect the electrical contact within the cylinder necessary to cause the explosion which gives the impulse to the piston; and a further object is to provide a "breaker" that can be readily detached from the cylinder in case the electrodes become faulty in any respect. While the invention is designed mainly for oscillating engines, it may be readily adapted to engines of other forms.

APPARATUS FOR DISTRIBUTING POWDER UPON VINES, PLANTS, OR THE LIKE—No. 735,887. Aug. 11, 1903. Guiseppe Lagomarsino, San Francisco, Cal. This invention relates to improvements in devices for dusting grape vines, fruit trees, plants and the like with powdered sulphur or other suitable insecticide for the purpose of preserving them from the ravages of insects. Its object is to provide a light, compact, efficient apparatus capable of being easily carried upon the person and having convenient hand operated means for creating an air blast whereby the insecticide may be expelled, and also having means for assisting and for regulating the discharge thereof.

ELECTRIC RAILWAY SYSTEM.—No. 736,752. Aug. 18, 1903. T. Mahoney, San Francisco, Cal. This invention relates to improvements in means for operating electric railways, and pertains particularly to that type of railway in which the main conveying the current to propel the car is connected at intervals with sectional feeders normally out of circuit with the main and adapted to be energized momentarily and successively by the passing car The object of the invention is to improve upon the so called "underground conduit" systems by simplifying construction, affording perfect insulation, and operating the switch mechanism whereby the trolley sections are energized and de-energized magnetically instead of mechanically.

OIL BURNER —No. 736,864. Aug. 18, 1903. T. Williams, San Francisco, Cal. One-half assigned to C R Splivalo, San Francisco, Cal. This invention relates to an apparatus for the preparation and combustion of hydrocarbon oils. It consists in the combination of a shell with oil and steam supply nozzles, an anterior mixing chamber, a second large chamber with a contracted connection between the two, a final chamber and a nozzle discharge thereinto and a second steam inlet passage acting upon and with the products received at this point and previous to their delivery to the burner opening or discharge.

Latest Market Reports.

SAN FRANCISCO, August 28, 1903.

METALS.

SILVER.—Per oz., Troy: London, 26½d (standard ounce, 925 fine); New York, bar silver. 56½c, refined (1000 fine): San Francisco, 56½c; Mexican dollars, 43½c San Francisco, 44½c New York.

A report on the purchases of silver for coinage, up to August 1st, shows that in the new Philippine currency system the purchases have amounted to 9,711,506 96 ounces of huilion. for which $5,145,762 53 has heen paid. The Philippine peso contains three and one-half more grains than our silver dollar, or an amount of hullion worth slightly less than 42 cents. Its currency value on the new 32 to 1 hasis will he 50 cents.

The report of the French experts appointed to confer with the United States Monetary Exchange Commissioners indorses the principle of a gold standard for China and other silver-using countries, hut it points out that the plan is positive only under judicious control of the coinage by the Government and the creation of an adequate gold reserve. It favors a coinage ratio for the Orient, fixing the face value of silver slightly above its huilion value similar to the American system in the Philippines. The French Commission makes reservations upon the proposed purchases of silver, on the ground that it is impossible to foresee the country's need for subsidiary and colonial coinage. Semi-official advices from Russia indicate that the commission appointed by Finance Minister Witte has made a similar conclusion. The French and Russians considered it preferahle to estahlish a uniform system in China hy heginning on a silver hasis and afterward raising it to a fixed gold value, than to hegin on a gold standard immediately.

COPPER.—New York: Standard, $13.75; Lake, 1 to 3 casks, $13.75@13 87½; Electrolytic, 1 to 3 casks, $13.62½@13 75; Casting, 1 to 3 casks, $13.37½; San Francisco: $15 00. Mill copper plates, $17.00; hars, 18@24c. London: £58 17s 6d spot per ton.

LEAD.—New York, $4.25; Salt Lake City, $3.50; St. Louis, $4.00; San Francisco $4.50, carload lots; 4¾c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5¾c; pig, $4.75. London: £11 3s 9d per long ton=2.72c per lb.

SPELTER.—New York, $6 00; St. Louis, $5.00; London, £21 2s 6d per ton; San Francisco, ton lots, 6½c; 100-lb lots, 7c.

ANTIMONY.—New York, Cookson's, 7½c; Hallett's, 6¾c; San Francisco, 1000-lb. lots, 8¤; 300 to 500 lbs., 8½¤; 100-lb lots. 10½c.

TIN.—New York, pig, $27.80@28 00; San Francisco, ton lots, 28½c; 500 lbs., 29c; 200 lbs., 29½c; less, 30c; har tin, ℔ lb, 30c @32½c. London, £126 2s 6d spot.

Importations of pig tin into the United States in the past year were larger than in any preceding year. The statistics of the year's imports show that the importations of tin were 88,000,000 pounds, valued at more than $23,000,000. In 1890 the importations were 35,000,000 pounds, valued at about $7,000,000. An export duty of $30 per 133 pounds has been levied on the exportation of tin ore from the British colonies of the Malayan peninsula. The Malayan States produce more than half of the tin which enters into the commerce of the world, their total shipments in 1901 being 50,000 tons, out of a total of 89,000 tons entering the markets of the world in that year.

PLATINUM.—San Francisco, crude, $18.00 ℔ oz.; New York, ingot, $19.00 per Troy oz. Platinum ware, 75@80c per gram.

QUICKSILVER.—New York, $47 00@47.50; large lots; London, £8 12s; San Francisco, local, $44 50 ℔ flask of 76½ lbs.; Denver, $49.50. Export, $43.00.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 34c.

SOLDER.—Half-and-half, 100-lb. lots, 18.75c; San Francisco, Plumbers', 100-lb. lots, 15 50c.

NICKEL.—New York, 50@60c ℔ lb.; ton lots, 45@48c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, $18.50@18.75; gray forge, $17.10; San Francisco, bar, 3c ℔ lb., 3½c in small quantities.

STEEL.—Bessemer hillets, Pittsburg, $27.00@29.00; open hearth hillets, $28.00@30.00; San Francisco, bar, 7c to 12c per lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer	$18 50@19.00
Foundry Northern 1	18.00@18.25
Northern 2	17.50@17.75
Northern 3	17.00@17.50
Southern 1	16.85@ ——
Southern 2	16 35@ ——
Southern 3	15 85@ ——
Forge	15 35@ ——
Charcoal	20.50@21.00
Billets, Bessemer	28 00@29.00
Bars, Iron	1.60@ ——
Bars, steel	1.75@ 1.80
Ralls, standard	28.00@30.00
Ralls, light	34.00@40.00
Plates, holler	1.90@ 2.00
Tank	1.75@ 1.80
Sheets, 26 store	2.90@ 3 00
No. 27	2 90@ 3.00
No. 28	3.00@ 3.10
Angles	1.75@ ——
Beams	1.75@ ——
Tees	1.80@ ——
Zees	1.75@ ——
Channels	1.75@ ——
Steel melting scrap	14.50@15 50
Relaying ralls	29.00@30 00
Dealers forge	13.00@13.50
No. 1 railroad wrought	14.50@15.00
No. 1 cast, net ton	14.00@14 50
Iron ralls	19.00@20.00
Car wheels	19 00@20.00
Cast horings	5 50@ 6 50
Turnings	11.00@11.50

LUMBER.—(Retail): Pine, ordinary sizes, $20.00@22.00; extra sizes higher. redwood, $22.00@23.00; lath, 4 feet, $4.25 @4.50; pickets, $19.50; shingles, $2.35 for No. 1 and $2.00 for No. 2; shakes, $13.50 for split and $14.50 for sawed; rustic, $26.00 @32.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, $3.35; Cut, $3.55; 10d to 16d, Wire, $3.45; Cut, $3.35; 8d, Wire, $3.50; Cut, $3.50; 6d and 7d, Wire, $3.60; Cut, $3 60; 4d and 5d, Wire, $3.70; Cut, $3.70; 3d, Wire, $3.85; Cut, $3.85; 2d, Wire, $4.10; Cut, $4.10. Special rates for carload lots.

LIME.—Santa Cruz, $2.35; Roche Harbor, $2.35 per bbl.

GENERAL SUPPLIES.

POWDER.—F. o. b. San Francisco: No 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1**, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s. 10½c ℔ set; 14 oz., 40s., 9½c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 24@25c ℔ lb.: carloads, 23@24½c; in tins, 35c; soda ash, $2.00 ℔ 100 lbs.; hyposulphite of soda. 2½@2¾c ℔ lb.; caustic soda, in drums, 3@3¼c ℔ lb; Cal. s. soda, bbls., $1.25@1.50 ℔ 100 lbs.; sks., $1.05; chlorate of potash, 12@13c; nitrate of potash, hbls., 10c; caustic potash. 10c in 40-lb tins; borax concentrated, 7@8c ℔ lb.; roll sulphur, 4@6c; powdered sulphur, 2@3c; flour sulphur, French, 2@3c; alum, $2.00@2.25; California refined, 2@2½c; sulphide of iron, 9c ℔ lb; copper sulphate, 5@7c; chloride of lime, spot, $2 50@2.75; sulphuric acid, in carboys, 66% B, 2¼c ℔ lb.; nitric acid, in carhoys, 8c ℔ lb.

OILS.—Linseed, boiled, hbl., 44c; cs., 49¤; raw, bhl., 42c; cs., 47c; Lucol oil, boiled, hhl., 41c; cs, 46c; raw, bbl., 39c; cs, 44c. Kerosene—Pearl, per gal., 20½c; Astral, 20½c; Star, 20½c; Extra Star, 24½c; Eocene, 23½c; Elaine, 26½c; Water White, in bulk, 14½c; Mineral Seal, iron hhls., 18½c; wooden hbls., 21c; cs, 24c; Mineral Sperm, cs, 26½c; Deodorized Stove Gasoline, bulk, 17c; do., cs., 23½c; 86° Gasoline, bulk, 21c; do., cs., 27½c; 63° Naphtha or Benzine, deodorized, in hulk, per gal., 16c; do., in cs., 22½ c; Lard Oil, E. W. S., hbl., $1.00; cs., $1.05; Neats-foot Oil, pure, hhl., 75c; cs., 80c; Sperm, crude, 70@60c; Natural White, 65c; Bleached do, 50c; Whale Oil, cs, 50@55c.

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6c; less than 500 lbs., per lb., 6½c; in 25-lb. tin pails, ¼c per lb. above keg price; in 1 and 5 lb. tin cans, 100 lbs. per case, ½c per lb. above keg price. Dry Lead—In bhls., 1 ton and over, 6c; do. in kegs, 6½c.

BONE ASH.—Extra No. 1, 5@6c per lb. No. 1, 4@5c.

RED LEAD.—500 lbs. and over at one purchase, per lb., 6c; less than 500 lbs., 6½c.

LITHARGE.—Pure, in 25-lb. hags, 8 @9c per lb.

BORAX.—Concentrated, 7@9c per lb powdered, 9@12c; fused, 25@30c.

BORAX.—Crystal, 7c; calcined, 25c.

MANGANESE.—Pure, ℔ lh., 60c.

SODIUM.—Metal, ℔ lb., $1.00.

MOLYBDENUM.—$2 per lb.

CHROMIUM.—(90% and over) per lb., $1.00.

BISMUTH.—Subnitrate, per lb., $1.60.

MERCURY.—Bichloride, ℔ lb., 90c.

PHOSPHORUS.—(American) ℔ lb., 75c.

SILVER.—Chloride, ℔ oz., 90c@$1.00; nitrate, 55c.

ALUMINUM.—No. 1, 99%, small lots, 37c ℔ lb; 100 lbs., 35c; 1000 lbs, 34c; ton lots and over, 33c, Pittshurg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

URANIUM.—Oxide, ℔ lb., $3.50.

ZINC.—Metallic, chemically pure, ℔ lb., 50c; dust, ℔ lb., 10c; sulphate, ℔ lb., .04c.

(These prices are wholesale, f. o. h. San Francisco, unless otherwise noted.)

SITUATIONS WANTED.

A THOROUGHLY COMPETENT ASSAYER and Analyst, 15 years' experience, with a good practical knowledge of mining, milling and smelting, is open for engagement, with chance for advancement. Excellent references. Address "Everett" care of this office.

MINE SUPERINTENDENT WANTS POSITION with a substantial company that has a mill on property. A qualified mining engineer who can run a mine or mill, cyanide plant, assaying and surveying. Address "Mining," this office.

MINING ENGINEER NOW IN CHARGE COPper proposition desires charge of location. Management gold or copper proposition. State terms. Address Box 85, this office.

MINING ENGINEER AND METALLURGIST, at present general manager of a large mining concern in Mexico, desires to change his position. Would need four months' notice. Address F.B.A.S., care of this office.

MINING ENGINEER WISHES POSITION AS superintendent or assistant superintendent at metal mine. Has had eight years' experience in civil and mining engineering, and is surveyor, draughtsman and assayer. Also had practical experience in underground work and handling men. Can furnish transit and two sets halances. Age twenty-eight. References. Address Box 818, Salt Lake City, Utah.

MINING ENGINEER, GRADUATE GERMAN University, at present assistant manager of gold mining corporation and in charge of large amalgamating, concentrating and cyaniding mill, desires change. Thorough experience in treatment of refractory gold ores by all processes. Would like position as manager or assistant manager of producing company. Age 33; unmarried. Best references. Address R. R. 18, care of Mining and Scientific Press

POSITION BY PRACTICAL MINING ENGIneer; 20 years' experience in U. S., Alaska and Mexico. Reference Al. Specialty, commercial mining. Address W., care of this office.

WANTED—A POSITION AS MANAGER OF quartz mine; 20 years' practical experience. Would take charge of a promising, undeveloped property, and could invest some money in it. First-class references. Address "Reno," care of Mining and Scientific Press.

YOUNG GRADUATE WITH SOME EXPERIence in Assaying, Surveying and Draughting, wants position in mine. Salary not so much an object as advancement. Address H.N., this office.

WANTED.

Wanted, 1 First-Class Amalgamator for 20-Stamp Mill.

Wages $4 per day. Board $3.75 per week. Address, giving references,

CHELAN MINING CO., BLEWETT, WASH.

WANTED—A First-Class Assayer and Chemist,

with extended cyanide experience, for position of Assayer and Chemist with large gold mining company, with cyanide plant. Must have best of references. State age, experience and salary wanted. Address "Chemist," care of Mining and Scientific Press.

WANTED TO SELL This Machinery, Cheap.

Six-Drill Compressor; Double Cylinder Hoist, good for 800 feet; Large Double Reel Geared Hoist, good for 1500 feet; 60 H. P. Fire-box Boiler. All in good condition. Address "Machinery," this office.

TO TOOL SHARPENERS

and AMATEUR TOOL SHARPENERS! I will send formula, with full instructions, by which you can temper machine or hand steel so that it will stand in any kind of rock and not chip, hatter or break. Result of twenty years' practical experience in Rocky mountains. Price 50 cents. Satisfaction gusranteed or money refunded. C. H. BENNETT, 50 Mill St., Aspen, Colo.

ASSESSMENT NOTICE.

INYO MARBLE COMPANY OF CALIFORNIA.—Location of principal place of business, San Francisco, California: location of works, Inyo, Inyo County, California.

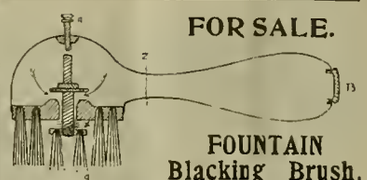
Notice is hereby given, that at a meeting of the Board of Directors, held on the 18th day of August, 1903 an assessment (No. 37) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 20, fifth floor, Mills Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of October, 1903, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 18th day of November, 1903, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES E. ANDERSON, Secretary.

Office—Room 20, fifth floor, Mills Building, San Francisco, California.



FOR SALE.

FOUNTAIN Blacking Brush.

A New and Cleanly Means of Applying Liquid Blacking.

With no pressure on bristles the small brush is kept in position shown by dotted lines Y, by the spring X. With pressure on bristles, as by rubbing, the small brush is raised to position shown in cut, opening the valve and allowing the blacking to flow onto the bristles as indicated by arrows. Thumb screw A securely locks valve, making brush absolutely tight. Bottle in which liquid blacking is sold can be made to fasten on brush at line Z and serve as a handle.

Pat. in U. S. and abroad. For sale separately or as a whole. For particulars, address E. R. KING, Lafayette, Contra Costa Co., Cal.

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FOR SALE.

:::: THE ::::

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IN LIQUIDATION.

The whole of the property belonging to The Bruce Copper Mines Ltd., with its equipment, for sale by private tender. Including the mineral rights of 20 square miles, modern concentrating mill (400 tons daily capacity), compressor, hoists, etc., in thorough condition.

Parties desiring to put in a tender should have their engineers on the ground without delay; tenders will be closed the 15th September, 1903.

For further particulars, apply to

LOUIS J. ABRAHAMS,
BRUCE MINES, ONT., CANADA.

MINING PROPERTY FOR SALE.
Consists of 13,000 tons of tailings, 25,000 tons of dump—both good values. Water for working same. Situated 3 miles from railroad. No crushing power required. Guarantee a saving of 80%. Partners cannot agree, so it will be sold cheap. Inquire of James McDermott, Brooklyn Hotel, San Francisco.

FOR SALE.
Large quantities of light Steel Rails—16-lb., 24-lb. and 35-lb. sections with fastenings.
MASTEN & MASTEN, 407 Henne Building, Los Angeles, Cal.

EXCEPTIONAL BARGAIN!
ONE FOUR-FOOT FRUE VANNER, fitted with Brownell Patent Lip Flange Belt. Vanner and Belt absolutely new. Address Frlcot & Miller, Latrobe, El Dorado Co., Cal.

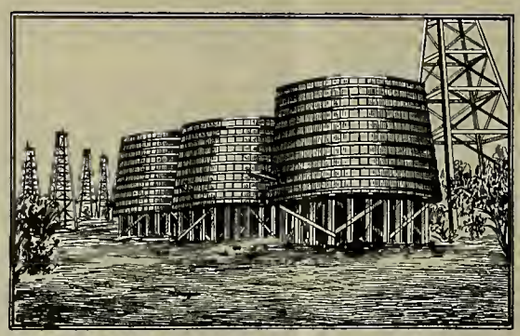
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NOTICE

of Receiver's Sale of the Electric Plant, Apparatus, and Other Property of the Cochiti Gold Mining Company.

Notice is hereby given that the Receiver, by appointment of the District Court of the Second Judicial District of the Territory of New Mexico, for the County of Bernalillo, in that certain cause pending therein wherein Raymond P. Ripley and others are defendants, will, under and by virtue of an order of said court made August 20, 1903, receive bids for the purchase and sale of all the property of the said Cochiti Gold Mining Company, now in his possession as such receiver. Said property consists of a complete cyanide mill of two hundred and fifty tons capacity, built of structural iron, various other buildings such as stores, boarding house, store house, bunk houses, etc., etc. The machinery consists of dry crushing apparatus, Davis and Allis finishing rolls, twenty steel leaching tanks of two hundred and one hundred and thirty tons capacity; also sixteen thousand dollars worth of mining and mill supplies; office furniture, etc. And also, situated at Madrid, N. M., an electric power plant and structural steel building, one eight hundred horse power engine, one 600 K. W. generator, complete switches etc., etc., for a twenty-thousand-volt transmission, and other property such as is generally used in connection with such a mill run by electricity, including one hundred miles of copper transmission wire.

Also the Alhemarle, Pamlico, Huron, Ontario patented mining properties, and the U. M. C. and three-fourths interest in the Red Cloud, containing in all almost one hundred acres and having five thousand feet on the strike of the vein. These mines and the mills are situated at Alhemarle, Sandoval County, New Mexico, twenty-four miles from Thornton on the A. T. & S. F. Ry.—the other property at Madrid on said railway.

Bids will be received by the undersigned for the sale of said property, or any part thereof, for sixty days from the date of this notice. For the Madrid power plant property, and the electrical machinery, bids must be itemized, fixing the price to be paid upon each separate article; and, also, separate bids must be submitted for the wire, on account of conflicting interests in the property. The buildings and other property may be removed by purchasers from the premises on which they are located.

A reasonable deposit, certified check or cash, must accompany each bid as a guaranty of good faith and responsibility.

Lists of the property and all other information requested will be furnished upon application to the Receiver.

WILLIAM SPENCER,
Receiver.

P. O Address: Albuquerque, New Mexico.
August 21, 1903

The Mines of Park City, Utah,
Have furnished 70% of the lead, 62% of the silver, 70% of the dividends of the State. Send 20 cents for 24-page illustrated edition of Park City Miner, with map. N. B. DRESSER, Park City, Utah.

It's THE BEST
(and WE make them.)



The above picture shows one of our Traction Engine outfits in use in Guatemala, C. A.; was used during late war by that Government for transportation of troops and supplies. Engine, 110 H. P.; car capacity, 16 tons each. Can be used on from 5 to 30 per cent grades, depending upon condition of roads. Over 150 in use on this coast alone, and every one a money maker. Let us know the kind of freight you are hauling, per cent of the grades, usual conditions of roads, and we will tell you how to save ½ to ⅓ of your present cost of hauling. You know we also make the best 2 to 75 H. P. Crude Oil Engine, with Improved Generator and Self-Starter, in the market.

Write for our new Catalogue No. 18, and we'll do the rest.

THE BEST MANUFACTURING COMPANY,
SAN LEANDRO, CALIFORNIA.

MINING AND SCIENTIFIC PRESS.

Whole No. 2250.—VOLUME LXXXVIII. Number 10. SAN FRANCISCO, CAL., SATURDAY, SEPTEMBER 5, 1903. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

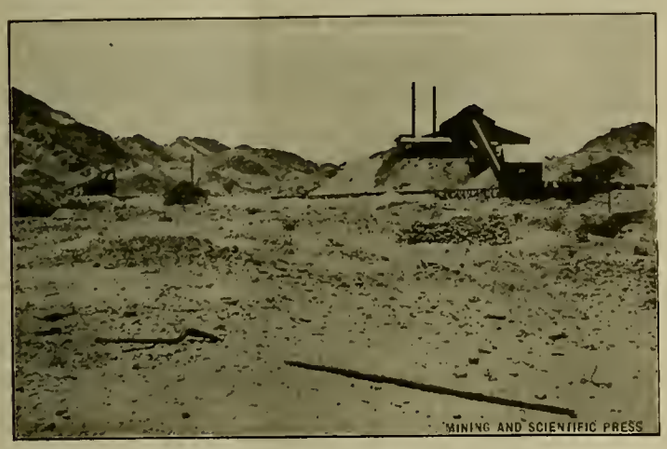


Fig 1.—100-Stamp Mill of Golden Cross Mine, San Diego Co., Cal.



Fig 2.—100 Stamp Mill Golden Cross Mine, San Diego Co., Cal. (Looking South.)

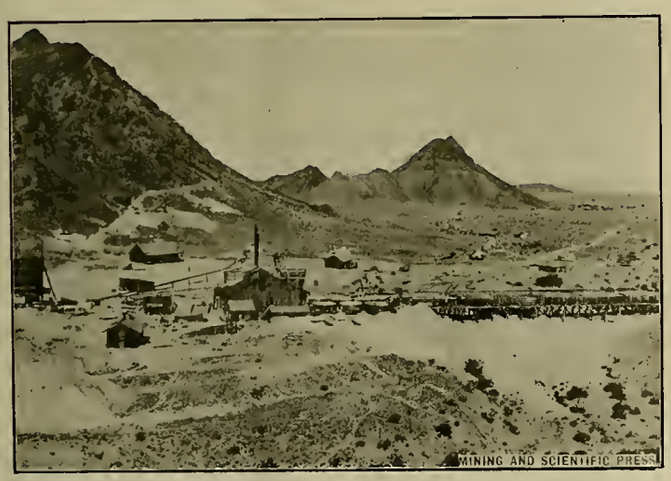


Fig. 3.—American Girl Mine, San Diego Co, Cal. (Looking West.)



Fig. 4.—Stonewall Mill and Mine, San Diego Co., Cal.

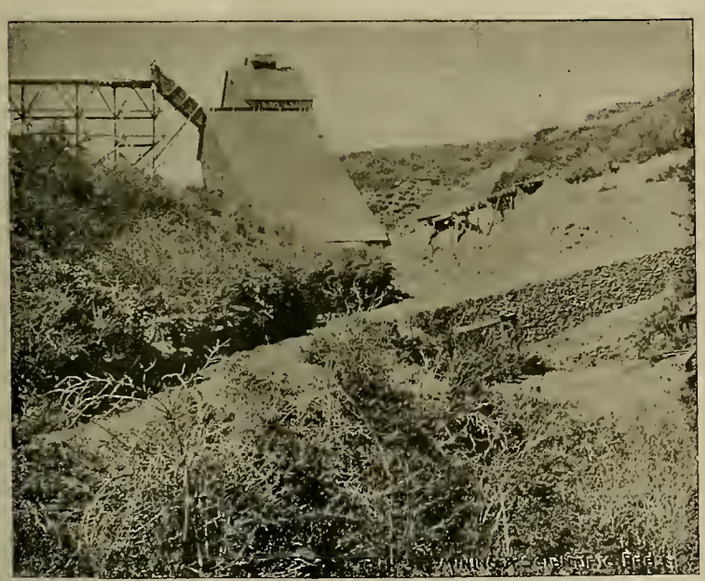


Fig. 5—Helvetia Hoist and Mill, Near Julian, San Diego Co, Cal.



Fig. 6.—Gold King Mine, Banner, San Diego Co., Cal.

Some Representative Gold Mines of San Diego Co., Cal. (See Page 150)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION.

United States, Mexico and Canada.....$3 00
All Other Countries in the Postal Union..... 6 00

Entered at the San Francisco Postoffice as second-class mail matter.

BRANCH OFFICES:

NEW YORK CITY, 720 Park Row Bldg. BOSTON, 42 Worcester Square.
CHICAGO, 1115 Monadnock Block. DENVER, 606 Mack Block.

J. F. HALLORAN.....Publisher

San Francisco, September 5, 1903.

TABLE OF CONTENTS.

Page.

ILLUSTRATIONS:

100-Stamp Mill of Golden Cross Mine, San Diego Co., Cal.....146
100-Stamp Mill Golden Cross Mine, Looking South.....145
American Girl Mine, San Diego Co, Cal., Looking West.....146
Stonewall Mill and Mine, San Diego Co., Cal.....146
Helvetia Hoist and Mill, Near Julian, San Diego Co., Cal.....146
Gold King Mine, Banner, San Diego Co, Cal.....146
Old Tract at Carterville, Mo., with Caved Ground and Abandoned Shafthouse.....148
A Prospecting Outfit.....148
Venus Mill, Prosperity, Mo, Showing Elevator and Launder for Tailings.....148
Mohawk Mill, Mine Buildings and Dumps.....148
Beasley Mine and Mill, Webb City, Mo, Showing Old Caved Ground in the Foreground.....148
Sketch Showing Fault in Lincoln Mine, Sutter Creek, Cal.....149
Vein System Near Sutter Creek, Cal.....149
The Dawson Reduction Furnace.....150
Santa Cruz, Cal., Bitumen Mine No 1, Medium Rock.....161
Santa Cruz, Cal, Bitumen Mine No 2, Soft Rock.....151
Portable Drilling Outfit.....152
Modern Methods in Ore Treatment by Cyanidation.....154
Mining and Metallurgical Patents.....156

EDITORIAL:

Advance in Machinery.....146
Silver on the Up-Grade.....146
An Ingenious Scheme.....146
Possibilities in Mechanical Industry.....146
Cabinet Department of Mines and Mining.....146
The American Mining Congress.....146
Annual Assessment Work.....146
Advertising in the "Mining and Scientific Press".....146

MINING SUMMARY.....156-167-158-159

LATEST MARKET REPORTS.....160

MISCELLANEOUS:

Concentrates.....147
New Century Drop Motion Jig.....148
Some Structural Features of the California Gold Belt.....149
Geologic Figures from the United States Survey.....149
A New Reduction Process.....150
Gold Mines of San Diego County, Cal.....160
Bituminous Rock in California.....161
Notes on the Metallurgy of Copper of Montana.....152
Application of Water in Rock Drilling.....152
How to Make Blue Prints, Etc.....153
Modern Methods in Ore Treatment by Cyanidation.....154
Coal Miners' Wages in Bohemia.....164
Mining and Metallurgical Patents.....155
Commercial Paragraphs.....159
Personal.....160
Catalogues Received.....160
Obituary.....160
New Patents.....160
Notices of Recent Patents.....160

TO indicate the advance in machinery in the last decade, it is worthy of note that at the St. Louis, Mo., Exposition next year there is promised to be exhibited a 3000 H. P. gas engine.

THE inevitable swing of the pendulum has started silver on the up-grade again, and the scepter of supremacy in its purchase is shifting from London to New York and San Francisco. It is expected that the international conference will adopt a ratio of 32 to 1, which would tend to bring the price up to 65 cents per ounce, with the usual quickening effect on its production, which of late years has materially declined, it having become more and more a by-product.

AN ingenious California mine superintendent is considering a scheme to build a water-tight bulkhead in an abandoned crosscut in his mine, and to utilize the chamber so created as an air receiver, connected with the compressor main line. There is some diversity of opinion as to the result. The plan may possibly be a success if the chamber is first allowed to fill with water in order that all the cracks may be silted up and thus become impervious to either air or water. Bulkheads are made essentially water-tight, then why not air-tight?

EIGHT years ago Oren Root, aged 22, was driving spikes on a New York street railway at $1 75 per day. To-day, the same Oren Root, aged 30, is general manager of the system with direct supervision of 14,000 men. That is a good example of the possibilities in every branch of mechanical industry and a good answer to the pessimist who says: "A poor man has no chance any more." Never in the world's history were there better chances than right now for a man who has it in him to go ahead. However "poor" he may be if he be rich in manhood he is bound to get ahead; and however rich he may be if he is poor in the qualities that make for material success he is certain to fall back. "Pull" or influence may get a man a fine position, but he must have merit to hold it. When Root was driving spikes for $1.75 a day he drove them well, and whenever he had a chance he showed the stuff that was in him. He didn't watch the clock, and wasn't afraid he was doing too much. Men of affairs are always on the lookout for such assistants and the world is theirs to have and to hold.

THE editorial in last week's issue on a cabinet department of mines and mining as being a national necessity has elicited a more than ordinary number of responses, mostly affirmative. A mining engineer furnishes an instance illustrative of just why, through the years, the plea has been made by this paper for a department of mines and mining: some modification of the requirements occasioned from either the whim or notion of a temporary clerk attached to the Interior Department of the United States Government: That portion of the United States statutes governing mining locations requires that the United States mineral monument shall be established where the mineral survey is more than 2 miles from a corner of the public survey and corner of each mineral location connected thereto. If within 2 miles, the connections are made with the public survey, but the California Surveyor-general now rules that each and every mining monument established must be connected with a corner of the public survey, regardless of distance. Every mining surveyor will realize what a hardship this ruling, if strictly enforced, will be to a locator should the essential point happen to be from 7 to 20 miles distant. This latest ruling of the California official is made mandatory on him, because of a letter received by him with instructions to that effect from Washington, though Surveyor-Generals in other States say they do not require such connection because they have had no such letter. In the absence of further present knowledge on the subject, it may be assumed in this case, as in others previously brought to our attention, that this latest "ruling" is based purely on the whim or notion of some $100 clerk at the national capital who never saw a mining location, and who wouldn't know it if he did see it, for, unfortunately—and to the shame of our government, it must be confessed—that all those matters pertaining to the nation's foremost industry have been relegated through the years to some desk in a corner of an overworked department, and whoever happens to be in charge of the desk at that time can usually rule or decide just as his whim suggests, regardless of the equities of the case and to the injury of the mining industry, the vexation of those who know better, and the expense and annoyance entailed on many who can often poorly afford to pay the extra money made necessary by the whimsical rulings of a Washington clerk.

THE Congress which meets next Monday at Deadwood, South Dakota, is the sixth gathering of that body. It was called together in Denver, Colo., in 1897, as the Gold Mining Convention. Its second annual session was in Salt Lake City, Utah, in July, 1898, when it was styled the International Mining Congress. At Milwaukee, Wis., June 19, 1899, was opened the third convention. The fourth was held in Butte, Mont., in 1901; the fifth at Boise, Idaho, in 1902, and the name was then changed to the American Mining Congress. It is the only organization of the kind, and as such has received much prominent mention from mining journals throughout the nation, the general estimate of the gathering being commensurate with its merits. If it has done little good, it certainly has done no harm, and is illustrative of what a virile organization of the kind could do, strongly officered and rightly run. It deserves encouragement for its possibilities, rather than criticism of its weakness, for it is susceptible of something better than being made a mere excuse for "special" numbers of sundry mining periodicals with a view to increased advertising. The American Mining Congress can be just what American mining men choose to make it, and a pushing dignified organization, with some semblance of authoritative utterance, would be of substantial benefit to the mining industry.

DURING the next ninety days considerable annual assessment work will be done on thousands of unpatented mining claims west of the 100th meridian. In connection therewith, it is worthy of note that, unless the locator considers the claim worth working or patenting, it is of no use or need to spend any money on it. Of course, $100 worth of work or improvement must annually be put upon an unpatented mining claim in the United States if one wants to hold it; but if it isn't worth holding, there is little use of annual assessment work. Unless one thinks his claim of some value, it were useless to spend money "just to keep up the title," for he might keep on putting $100 per year for ten years on the claim in that way; and if he missed one year, he would have no better title than if he had put no work on it at all. In such a case, viz., where the locator has little or no belief in the value of his location, he need spend no money on it, but go on the proposition that others are of the same belief concerning it; and if they are, then he can let it lapse, and if any one else has no better opinion of it than himself and does not jump it, he can relocate it later on and save his money. A good many, however, have a better opinion of their claim than this, yet take the chances on relocation or trouble of some kind by neglect to do the necessary annual work. This is a grievous mistake. If the claim is worth consideration at all, it should be taken care of by sufficient annual work and improvement to prevent any possible trouble as to title. Meanwhile a United States patent should be secured at the earliest date. If a man wants to keep on owning the claim, it is vastly more comfortable to have a clear title to it; and if he wants to sell it, next to the value of the property, nothing will expedite the transfer so satisfactorily as to be able to show an original deed from Uncle Sam.

RECOGNIZING that cheapness is not regulated by what one pays, but by what he gets for what he pays, and that the value of an advertisement is determined by its results, the leaders in many branches of business connected with mining or metallurgy advertise in these columns. And in this regard it is to be said that our readers can be supplied by them with what they need at fair prices. It is still further to be said that those advertisers deserve the business they seek, for it is their trade announcements that enable the publisher to furnish this journal at such small cost to subscribers. It is manifest to every one that such a publication as the MINING AND SCIENTIFIC PRESS could not be placed in the hands of its readers at a cost to them of less than 6 cents per issue were it not for the advertising patronage, and it is equally manifest that in buying from those who so advertise herein the reader really benefits himself in more ways than one, for beside the consciousness that he is dealing with reputable firms, it is to be borne in mind that it is those firms who make it possible for him to get such a journal for $3 per year; for, as stated, without the income received from advertising, this journal could not be issued for any such amount and continue to maintain its high standard of technical excellence. This fact holds true of nearly every publication of large circulation, statistics from the business office showing that the cost of producing a journal exceeds the income from its subscriptions, with the effect that it is the advertisers who make possible its manifest value and continuous existence. Of course the advertiser doesn't place his advertisement in this paper for philanthropic reasons or just because he wants to have the reader regularly supplied with even so good a publication; he advertises for the profit its wide circulation brings him, for in no way could he get so great a hearing at so small a cost, he being assured profitable publicity, but it is manifest from the above that it is of mutual interest to buy from firms that advertise. If what they have wasn't good they wouldn't or couldn't advertise it in the MINING AND SCIENTIFIC PRESS.

CONCENTRATES.

A 16-CANDLE POWER incandescent electric light would take half an ampere current at 110 volts.

THERE is nothing impossible geologically in marine shales carrying gold in commercial quantities.

"CAPACITY," as applied to a gold dredge, is the actual amount the dredge can lift running full buckets, with the ladder lying at an angle of 45°.

A 3% SOLUTION of hydrogen peroxide injected beneath the skin with a hypodermic syringe furnishes an antidote for cyaniding poisoning by inhalation.

APPROXIMATELY, a pipe 3 feet long will hold as many pounds of water as the square of its diameter in inches. A 5-inch pipe will hold about 25 pounds of water in each yard of length.

TO ESTIMATE the horse power obtainable from 1 miner's inch of water, multiply the head of water in feet by the decimal 0 0024147: the product is the theoretical horse power so procurable.

QUARTZ is a crystallized mineral as originally deposited; quartzite is a rock of quartz, granular and secondary. Quartz occurs in veins; quartzite in strata. Quartzite is sometimes a metamorphosed sandstone.

REGARDING last week's illustrated description of an "inverted siphon," such a construction as that suggested, "a mile long, of wrought iron, and 18 inches diameter," could be made to work all right. With a 400-foot head, the approximate pressure would be 400 pounds per square inch.

THERE are many recipes and formulæ for welding steel and iron. The following is recommended: Carbonate of ammonia, one-half pound; borax, two pounds; muriate of ammonia, one-half pound; black oxide of manganese, one-quarter pound. Beat up in a mortar and mix well.

WHILE interesting as a laboratory experiment, liquid air has not nor is it likely to be put to successful commercial use in or around a mine. A 2 H. P. engine working continuously for one hour would produce only enough liquid air when converted into power to run a 2 H. P. engine one minute.

THE Slocan district, B. C., is the only British Columbia province, so far as "Concentrates" knows, that has shipped zinc ores to the United States for treatment. That section has sold zinc concentrates to the Lauzon Zinc Co., Iola, Kansas, the railways making a special rate of $11 per ton freight.

ITALY AND CANADA produce the best asbestos, the Italian quality being the superior, having longer, silky fiber. Italian asbestos contains 80% silicate of magnesium, and 30% oxide of iron. The South African asbestos carries 50% silica and about 40% oxide of iron, being too brittle and stony for use.

EASILY FUSIBLE ALLOYS must contain cadmium. Such an alloy is four of lead, seven to eight of bismuth, and one to two of cadmium, and which fuses between 66° and 72° C. Lipowitz's metal, which softens at 55° C. and becomes perfectly liquid at 66°, consists of four parts of tin, eight parts of lead, fifteen of bismuth and three of cadmium.

THERE are several formulæ for compounds to keep machinery from rusting. Take 1 ounce camphor, dissolve it in 1 pound melted lard; remove the scum, then mix with the camphor and lard as much fine black lead as will give it an iron color; clean the machinery well; smear with the mixture. After twenty-four hours rub off, then clean with soft cloth.

IN woodworking shops an exhaust system is often used by which all shavings and sawdust falling from the machines are carried away. A system of main piping is fed by the exhaust pipe attached to each machine, and furnished with a large fan, which draws all the waste products into the pipe and conveys the contents into a chute, which, in its turn, automatically carries them along to the boiler house, where they are consumed.

BESIDE the pneumatic portable hammer—an admirable device driven by compressed air—an electrical hammer is also becoming of general use in chipping, riveting and similar work, operated by a motor of ¾ H. P., cheaply installed and of economic value. The electrical hammer has the advantage of long-distance power transmission, and, like its pneumatic brother, has a range of service and a record for economy and effectiveness that makes its use worthy of consideration.

NEXT to skilled judgment, the best safeguard while following or intersecting veins is the judicious use of crosscut work. Whenever doubt exists this should be extended far enough to include other crevices and give decisive information. Generally speaking, one crosscut in the line of an ore shoot is worth a dozen elsewhere. Well-designed mine maps, with plenty of sections and kept up with the work, are always necessary for good work underground. This is particularly the case in irregular or complicated ore deposits. Nevertheless it is not uncommon to find large mines operating without maps or with a mere apology for one.

WHEN cement is dissolved in dilute hydrochloric acid, part of the calcium silicate is not decomposed, but merely dissolves, and is precipitated on neutralizing the acid with ammonia. To analyze the cement, dissolve one gram in dilute hydrochloric acid, add ammonia and filter off the precipitate of iron, alumina and silica. Redissolve this precipitate in concentrated hydrochloric acid and reprecipitate with ammonia. The two filtrates and washings are then collected for estimation of calcium therein. It is advisable to dissolve the ignited calcium after weighing in hydrochloric acid and estimate the SiO_2, Al_2O_3 and Fe_2O_3 it may contain.

ANTIMONIAL LEAD is a by-product of base silver-lead bullion refining. In Colorado such base bullion will contain between 3% and 4% antimony. Antimonial lead will run from 10% to 50% antimony. That carrying from 20% to 30% is considered best adapted to commercial use. There is an electrolytic process of extraction of antimony from ore in which the antimony sulphide of the ore is dissolved with sodium sulphide. This solution is electrolyzed in a vat divided by a diaphragm, the antimony solution being put in the cathode compartment filled with caustic soda solution to which has been added enough ammonium chloride to raise the specific gravity to that of the antimony solution.

THE only reason few hydraulic gold working patents are weekly recorded and so many smelting and process patents are is because that is the way they are furnished by the U. S. patent office, and the weekly illustrated page of new patents in each issue is an abstract of the official reports. "Concentrates" would be pleased to publish any gold hydraulic mining patent when so reported from the patent office. This does not mean that hydraulic mining is at a standstill, but many of the devices long ago invented are so admirably adapted to the work for which they were designed that they continue to be used from possible inability to improve on them. Meanwhile, if the questioner will note the weekly page of published patents he will observe dredger devices and other improvements which constitute the latest phase in large hydraulic mining propositions.

THE limit of electric heating is purely financial. To convert heat into other energy with a very small efficiency and to send it out by expensive cables, and then to degrade the energy down to heat again, is obviously much dearer than burning coal or gas direct. The electric arc and incandescent lamps are essentially cases of electric heating. By far the most important use of electric heating is the furnace. Here the temperature available is only limited by the volatilization of the electrodes, and this enables one to get temperatures otherwise unavailable, so that one can get chemical actions which are impossible at lower temperatures, either because they are endothermic or because the materials do not come into chemical contact at ordinary temperatures. It is impossible to say what the limits are in the electric furnace. Probably the temperature is limited by the volatilizing of carbon. The products are not limited to endothermic compounds. The furnace is useful for the reduction of metals and phosphorus and for melting glass and silica for optical and laboratory purposes, and perhaps for cooking utensils and evaporating pans and crucibles in chemical engineering and metallurgy.

THERE are great quantities of gold-bearing black sands scattered all over this west half of America, on the ocean beach and on the banks of big rivers, and considerable successful effort has been made at saving the gold, but as a general thing it has never been at any place a very big proposition, and rarely it doesn't more than pay wages. All sorts of schemes have been tried. The biggest trouble in working the sand by the sluicing process is that the gold is so extremely thin and light that the water carries it off even easier than it does the grains of sand, which have more body to them, and it is the sand, and not the gold, that settles down in between the riffles and packs there, hard. Should the head of water be increased or more slant be given the sluice box, it only makes the gold go through all the more. The cyanide process goes far toward solving the problem, the principal trouble in that case being the fact that without proper concentration the small amount of gold and the large amount of iron interferes seriously with the necessary chemical action of the zinc shavings on the cyanide solution, ofttimes preventing precipitation, largely by reason of the iron, which in the cyanide solution will prevent the zinc from going into the solution to replace the gold.

AT most Arizona copper works remelting furnaces have been dispensed with. At the Copper Queen the matte, made from a mixture of oxidized and sulphuretted ores in cupolas 120 inches by 42 inches at the tuyeres, is discharged into large wells which are mounted on rollers, and rotated like the converters by hydraulic machinery, one well standing in front of each furnace. From the wells the slag flows continuously, and the matte is poured directly into the converter, which is placed on a lower level. There is thus secured the minimum of handling. The capacity of each furnace is adjusted accurately to the capacity of its own converter, but the furnace has occasionally to wait for a converter and the converter for the furnace, as the matte should not be poured until the well is nearly full, lest the slag in any quantity accompany it to the converter. The tilting well was adopted after experiencing the difficulty of controlling the flow through a tap hole directly into the converter from a deep receptacle holding so many tons of matte. Each furnace is provided with two wells in tandem. An electric crane is used to move the matte from any furnace well to any converter, and to lift the converter slags and pour them into one of the wells nearest a furnace stack. At Nacosari, Sonora, Mexico, the well is placed to the side of the furnace instead of in front, and can be tilted to the rear as well as to the front, and so when it has to be emptied of matte the supernatant slag can be poured off to the rear.

IN the adjustment of water to a belt concentrator, it should be noticed that the proper quantity of water is something to be carefully regulated. There should be on each side of the belt a small streak of sand—that is, there should be less water there than in the balance of the pulp elsewhere on the belt. If the water feed be not regulated in this manner, the sides will be sloppy and a loss will result. When this condition is observed, too much water is being added. When too little water is fed, there will appear broad bands of sand at the sides of the belt and sand will pass over with the sulphides. Clean sulphurets are always desirable, and, if they can not be obtained on a single machine without too serious a loss, the pulp must be classified by passing through a pointed box and the coarse fed to one machine and the fine to another. In some mills all the concentrates are "run dirty"—that is, allowed to carry some sand, in order to secure all the sulphides in the concentrate. This concentrated material is then reconcentrated on a separate machine. The usual result is two products—a clean, high-grade sulphide and a low-grade "middlings," containing more or less sulphide of lower specific gravity than the high-grade material, and of lower value. This plan has been found to give satisfaction in the treatment of quartz containing much soft, slaty rock, in which there is a good percentage of sulphurets. Usually these sulphides are found to be low grade.

THE cost of timbering a shaft depends on the method of timbering employed, the size of the shaft, size of timbers, kind of timber used, cost of labor, and to a great extent on the ability of the workmen to do the work as speedily as possible while doing it properly. There is a small difference in first cost of timber between the overlap framing and the dovetail framing, but this is not material. As to the advantage which either method may possess over the other, it is not clear that there is any such advantage under ordinary conditions, though it is undoubtedly better to employ the overlap in a shaft where the ground shifts or shows a tendency to do so. The item of timbers broken or displaced by blasting in some shafts is an item of considerable amount, particularly where the timbers have to be carried close to the bottom of the shaft, owing to the dangerous nature of the ground. Some shafts are timbered with logs carefully hewn, but this is usually done where it is impossible to obtain sawed timbers. A double compartment shaft on the Mount Pleasant mine, near Grizzly Flat, El Dorado Co., Cal., is timbered to a depth of nearly 300 feet with timbers 12x14 inches, which have been hewn with such great care that one is likely to mistake them for sawed timber, without a careful inspection. The work done in hewing and graining such timbers would probably bring the cost to a figure far above the price a sawmill would charge; but in the absence of the sawmill, the miners had recourse to the ax and adz.

AT many shafts it is found economy to make prompt changes from ore to water bucket or from ore skip to water skip. Where large quantities of water are to be handled by bailing, and particularly where the ore-hoisting compartment is of necessity used for this purpose, it is advisable to provide large valve skips or buckets for this purpose, and it is always economy to have some convenient arrangement to quickly make the change. At the collars of vertical shafts this may be speedily accomplished by building a semi circular track at a proper height above the shaft and near it, on which a traveling block may move, and to which the several skips or buckets for ore or water, together with any extras, may be suspended. When a change of skips or buckets is necessary, that in use in the shaft, the movable guides are swung out of place, the skip hoisted to proper position and made fast to the traveler and the cable detached. The skip may then be run on the crescent-shaped track to the right or left, and another substituted for it, the guides replaced and in a few minutes the hoisting may be resumed. At inclines two methods are employed. Either a gate is opened in the main track and the skip is run on a horizontal track in the rear of the shaft, or a false track is thrown across the shaft from the hanging wall side, and the skip or bucket which had first been hoisted up into the head frame is allowed to descend, crossing the shaft on the false track and running out onto a horizontal track and another substituted for it. This is done by switches so arranged as to make the skips readily interchangeable. Economy in labor and time should be studied at every mine in order to reduce working costs to a minimum.

New Century Drop Motion Jig.

The jig as a machine for concentrating ores has maintained its position in well designed ore dressing plants where coarse concentration is possible, in spite of attempts to replace it with various other types of machines, none of which have wholly equaled it in capacity, quality of product, percentage of saving, or attention required to operate it. This statement, of course, refers to those classes of ore which are susceptible to the jigging process.

As a component part of a modern concentrator, it in no way conflicts with the legitimate field occupied by many of the excellent tables and vanners now in use. But while the machinery used in nearly every other department of concentrator work has during the past twenty years been undergoing constant evolution, always toward improvement (as will be readily called to mind by noting what vast strides have been made in the crushing department, in accurate sizing of materials, and especially in the treatment of fines), the jig until recently has remained practically what it was twenty years ago. Attempts have been made to improve the jig and overcome objections to the eccentric motion plunger actuating mechanism by substituting a device which would give it the required differential motion.

The New Century differential motion jig is one of the latest developments of the jigging machine, and is not in any way a radical departure from the ordinary jig, but is designed as an improvement of that machine, in that the plunger mechanism is so constructed as to more nearly realize present requirements, and in its method of removing middlings from the ore bed for regrinding by means of its New Century ore bed draw. This jig is now being introduced in several large concentrating plants. In some recent tests reported made on a three-compartment jig on the silver-lead ores at Park City, Utah, and on the copper-iron sulphide ores at Butte, Mont., it is stated that as compared with another make of jigs it showed greater capacity, used about one-half the water, and required less than one-half the amount of power, and making a higher grade concentrate.

The standard New Century jig has compartments 24 inches wide and 36 inches long, both the plunger and ore bed compartments being of the same size. The tanks are made of Oregon fir, 3½ inches thick, all corners and intersecting joints dovetailed and rodded down from the top through the sills at the bottom.

In place of the ordinary eccentric on the shaft, there is keyed a steel spiral cam, having an amount of drop somewhat in proportion to the length of stroke under which the jig is to operate. Extending down over the shaft and cam at each plunger compartment is an A-shaped casting, the two lower lags of which are bolted to the plunger proper, to become what is known on the Hartz jig as the plunger rod. Above the cam in this casting, with babbitted axles, is a 3-inch steel roller, the surface of which may come in contact with the revolving cam. From the top of the A-shaped casting extends a heavy stud bolt up through a 5-inch wrought steel I beam, which is supported by the iron brackets, the bases of which form the bearing boxes for the jig shaft. Around this short stud bolt, and abutting against the under side of the I beam, is a coiled steel spring with a nut on the stud at the lower end of the spring, designed to give the spring any desired compression. Above the I beam, and on the same stud bolt, is another nut, which can be adjusted up and down on the thread of the bolt.

As the shaft revolves and the cam comes in contact with the roller, it raises the entire plunger, with its mechanism attached, and compresses the spring against the under side of the I beam. When the highest point of the cam is reached by the roller the spring, acting with gravity, forces the entire plunger mechanism rapidly downward until the nut on the upper end of the stud bolt reaches a buffer on the top of the I beam, when the movement of the plunger is instantly stopped.

The aim of the builders is that by regulating the nut on top of the I beam any desired amount of stroke can be obtained, and that by regulating the nut underneath the spring any desired force of stroke can be obtained, and that both of these adjustments may be made while the machine is in operation.

The construction of the plunger used in the jig is novel, and performs an important part in the working of the jig. Instead of fitting the compartment closely, the sides of the plunger are cut free and slope away from the walls of the jig. On the sloping sides of the plunger is secured a flap valve material, the lower edge of which extends flush with the compartment walls; around the compartment at this point is placed a strip of enameled sheet steel, against which these valves operate.

During the instant of quick descension of the plunger these flap valves are forced outward to thoroughly pack the space on all four sides of the plunger, and to force all the water represented by the stroke displacement of the plunger up through the ore bed; and during the comparatively slow upward motion of the plunger, as the roller moves up the incline plane of the cam, the valves are to relax and permit an easy flow of water to the under side, this being designed to prevent any tendency to produce undesirable suction effect.

It is argued by the manufacturers that by reason



Old Tract at Carterville, Mo., with Caved Ground and Abandoned Shafthouse.



A Prospecting Outfit.



Venus Mill, Prosperity, Mo., Showing Elevator and Launder for Tailings.



Mohawk Mill, Mine Buildings and Dumps.



Beasley Mine and Mill, Webb City, Mo., Showing Old Caved Ground in the Foreground.

of the peculiar quality of the stroke obtained by the mechanism above described—that is, a comparatively slow up motion and a comparatively quick down stroke, with a short period of rest between each—the required conditions are realized for producing the maximum stratifying effect on the materials forming the mixture of ore and gangue in the ore bed, on the ground that the effect on this motion is to raise it in suspension during the down stroke of the plunger, and permit it to settle and arrange itself under the laws of gravity only, without the intervention of any outside disturbing forces, such as suction, etc.

It might appear that so short a stroke would not sufficiently actuate the bed and give it the necessary lightness to enable the various materials to seek their proper level, but the makers assert that with ½-inch stroke a three-compartment New Century jig will satisfactorily handle forty tons per day of material through a four and over a six-mesh screen, and do it with less than twenty gallons of water per minute furnished to the three plungers combined.

On any jig when in operation middlings, especially if they be of the lighter kind, with gravity approaching that of the gangues with which they are associated, will not readily find a side draw through which they can be discharged for regrinding, but tend to go out along with the tailings and compel the mine owner to regrind the whole tailings product or suffer a loss in values. It is argued that the only successful device for removing middlings must be one which draws them at every point at the tail end of the jig alike, as much from the back corner as from the front or in the middle. The New Century ore bed draw is designed to do this. An inside independent cast iron hutch is placed in the ore bed compartment of the jig at the tail end of the last compartment. Between the sides of this casting and at the top where the tailings overflow from the jig is a rotating valve made of a piece of shafting, usually 1 1/16 inch in diameter.

Transverse to the axis of this valve, and extending to its center, are cut a series of grooves, usually about ¾ inch wide. The number of grooves depends somewhat on the amount of material to be withdrawn as middlings, but usually not more than five are necessary.

Over the casting and the valve is placed a shield, over which the tailings flow out of the jig, with a lip extending downward and coming within close proximity to the ore bed sieve. Underneath this lip the middlings when settled on the ore bed can pass without going out of their due course, and the motion of the plunger throws them over through the grooves in the valve above mentioned, into the cast iron hutch, from which they pass out of the jig through an opening provided.

This ore bed draw can be placed on any other compartment for removing coarse concentrates when the amount of concentrates being so removed is more than can be successfully handled by an ordinary side draw.

This jig is manufactured by the American Concentrator Co. of Joplin, Mo., where probably more machines of the jigging type are used than in any other part of the United States, there being over 500 completely equipped jigging plants within 20 miles of that city. Several scenes surrounding Joplin are presented herewith, illustrating the character of the country and of the mining plants of which jigs form so important a part.

Some Structural Features of the California Gold Belt.

NUMBER III.

Written for the MINING AND SCIENTIFIC PRESS by W. H. STORMS.

The impression that the mother lode is a simple fissure is erroneous, excepting in as far as has already been indicated; but at Sutter Creek and vicinity just the reverse is the case. From the Argonaut on the south to the Keystone on the north, a distance of about 4 miles, a study of the lode is both interesting and important, in view of the large production made by that section. The mines within these limits have produced upwards of $50,000,000 in gold.

In and about Sutter Creek the surface exposures everywhere indicate great disturbance of the slates and schists. Folds and faults are numerous, and the underground workings have also developed a similar condition.

The east branch from the split in the Mahoney passes northward through the Mahoney and Belmont, as previously explained, and it is probable that the veins opened in the workings of the Mutual mine, half a mile to the northward, are on a portion of this system. The ore in the Mutual mine is of a different character from that usually found on the lode, containing a large proportion of arsenical sulphide and comparatively little pyrite. What becomes of the Mutual fissure northward has never been determined. It is not recognized in any of the workings of mines in that direction.

The west branch of the Mahoney strikes directly into the Lincoln mine. This is a mine worked at large profit in the early days of mining on the lode and is said to have produced about $1,500,000 to a depth of 350 feet. The vein was of good size—10 feet more or less—and is said to have carried $40 per ton. After years of idleness, the property was reopened and a shaft sunk to a depth of 2000 feet, but without finding a body of payable ore below the 350-foot level. An investigation disclosed the fact that the vein extending from the surface to a depth of 350 feet was faulted at that level. The fault strikes approximately with the vein and dips at a slightly greater angle than the vein. On the hanging wall, or eastern side of the fault plane, the formation dips normally to the eastward, conforming essentially to the general dip of the country, throughout the lode. All the country to the west of the fault dips westward, in proximity to the fault plane, but gradually assumes a position nearer the vertical at some distance from it. A more perfect example of a normal fault could not be imagined.

The accompanying sketch (Fig. 2) illustrates the condition as observed by the writer in the Lincoln

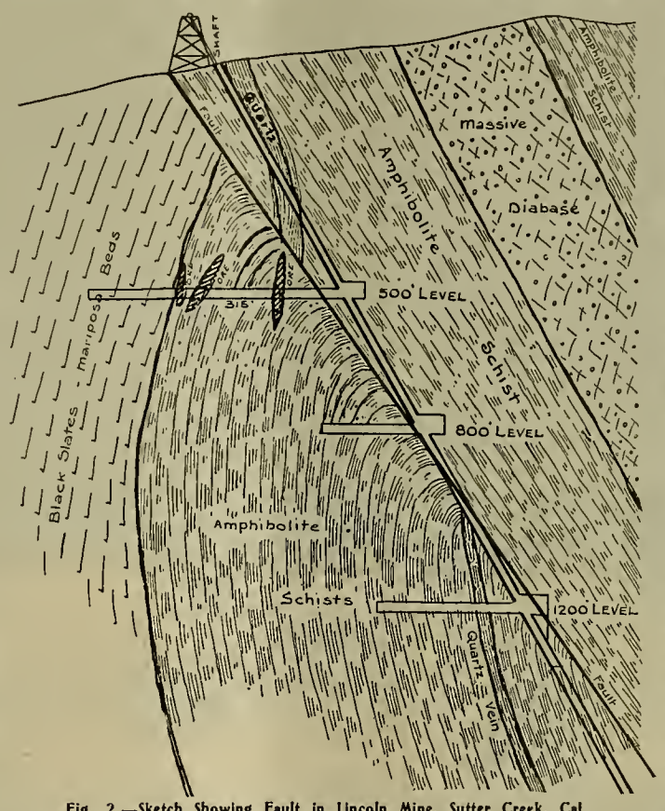


Fig. 2.—Sketch Showing Fault in Lincoln Mine, Sutter Creek, Cal.

mine in 1900, when the deepest workings were 1200 feet from the surface. Since then the shaft has been continued to 2000 feet and a large amount of exploratory work done, with no material change, and confirming generally the condition as indicated in the sketch. Several veins and small shoots of ore were encountered, as shown, but none of them proved of payable value. This fault evidently represents a large displacement, but how much no one can say. The natural inference would be that the vein should be found to the westward; but as far as development now occupied by the several veins, was not sufficiently strong to disrupt the tough, massive diabase and died out, as it were. The county road from Sutter Creek to Amador City passes across the formation and goes well to the east of any known veins, and then swings back to the westward, recrossing the upturned strata, and at the contact of greenstone schist and slate, where the experience to the southward would suggest looking for it, there is no vein nor fissure of any description. This contact has been explored, however, and several pockets discovered in the North Star, Wabash and Talisman mines.

The Keystone fissure system consists of several veins, in black slate, and one large, massive vein of gray ore, the latter nearly 150 feet in width on the 800 level. This system of fissures has proven very valuable and has been extensively worked to a depth of 1575 feet, though the greater amount of development has been above the 1000-foot level.

These fissures pass southward and are found in the South Spring Hill mine and in the South Keystone, or MacIntyre mines. They strike southerly, toward the town of Sutter Creek, and a gulch indicates their general course in the usual manner. If the course of these fissures, as indicated in the South Keystone property, is continued southward, the fissures will pass several hundred feet west of the Lincoln workings. The general system of veins of the Sutter Creek and Amador City groups of mines is indicated in the accompanying rough sketch. (Fig. 3.) North is to the left. The diabase mass near the center is apparently the disturbing element in the continuity of these two systems. The heavy black lines indicate the veins, the split to the right of the diabase area being in the Mahoney mine. The Lincoln lies between the diabase and the forks of the vein. The parallel system of veins to the left is in the Keystone, South Spring Hill and South Keystone mines. Southward from the South Keystone these veins are not developed; but all indications which may be observed on the surface and in shallow development indicate that the above is approximately the correct solution of the structural geology of this district and the disposition of the veins. Northward from the Keystone the vein system continues, but has not been so extensively developed as to the southward; but conditions are somewhat similar to those in the Keystone proper. The Bunker Hill mine, about 5000 feet north of the Keystone, is developed to a depth of 1400 feet and has handed and massive veins, occurring under conditions similar to those previously described.

(TO BE CONTINUED.)

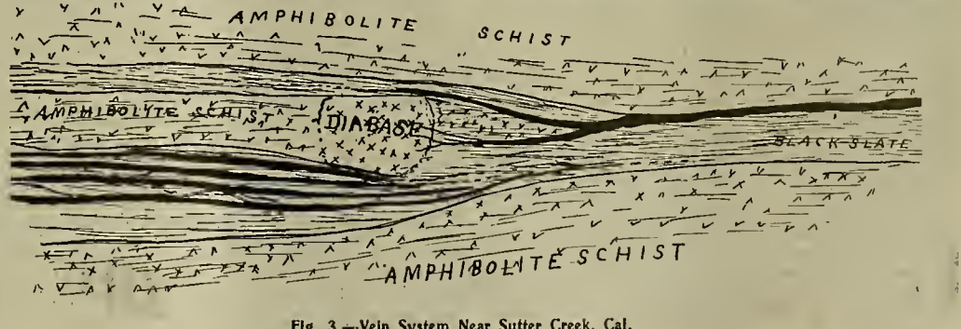


Fig. 3.—Vein System Near Sutter Creek, Cal.

GEOLOGIC FIGURES from the United States Survey show that the total production in the United States of crude petroleum in 1902 was 80,894,590 barrels; progressed, a vein similar to that mined above the 350-foot level was not discovered.

The next mine of prominence north of the Lincoln is the South Spring Hill, and beyond that the Keystone, the latter with a record only second to that of the Eureka, in Amador county. The vein system of the Wildman-Mahoney and Lincoln mines does not extend northward beyond the Lincoln, the west branch running up into a hill of diabase, between the Lincoln and Mutual, and scattering evidently terminates.

All of the mines previously described north of Jackson lie at or near the contact of amphibolite schist and black clay slate; but these conditions change at the north end of the Lincoln. It looks as though the stress which caused the formation of the fissures,

69,389,194 barrels in 1901—an increase of 11,505,396 barrels, or 16.5% over that of 1901 and of 27% over that of 1900. The greatest portion of the increase in 1902 came from Texas and California, the gain being 5,830,994 barrels, or 132.7%, for Texas and 5,187,518 barrels, or 59%, for California, as compared with their respective productions in 1901. The value of the crude petroleum produced in 1902 was $69,610,384, or 86 cents per barrel, that for 1901 having been $66,417,335, or 95.7 cents per barrel—a decrease of 9.7 cents per barrel, or 10% in 1902. The gross amount received for the total product in 1902 was only $3,193,013 greater than that in 1901, although the increase in output was about 16.5% greater. The average price paid for what is known as Pennsylvania petroleum, which comprises nearly

95% of the production of the Appalachian field, was $1.2375 per barrel in 1902, that for 1901 having been $1.21—a gain of nearly 3 cents per barrel. There was also a gain of nearly 4 cents per barrel in the price of the Lima-Indiana petroleum in 1902 over 1901. California petroleum decreased 21.8 cents per barrel in 1902 as compared with 1901, and Texas petroleum decreased 4 55 cents per barrel.

A New Reduction Process.

Written for the MINING AND SCIENTIFIC PRESS by O. B. DAWSON.

There will shortly he placed upon the market a new furnace, to he operated under an economy of lahor, time and fuel, for the purpose of reducing minerals in the gangue to a metallic, spongy condition, and hy the elevation of the temperature, concentrate the metal into approximately glohular, shot-like masses.

This differs radically from the process which involves the three operations of roasting, smelting and hessemerizing, and is designed to he accomplished by the agency of hydrogen reduction. Through slow roasting, hy present processes, sulphides are converted into oxides, from which matte is made by smelting. The further treatment of the matte hy hessemerizing is essential to reduce it to a metallic state. This operation is intended to hring ahout a complete reduction of the metal under a temperature slightly above the heginning of incandescence. Patents are issued covering this process and the furnace, hoth in America and foreign countries.

The intent is to exclude the air and introduce a practically pure hydrogen gas for taking off all oxygen not so required, so as to prevent the formation of metallic salts, such as oxides, carhonates, chlorides, sulphides, etc., and hydrogenize the elements naturally combined with and extracted from the metals. The ore in its natural state and without any flux is passed through a reducing chamher where it is suhjected to a degree of heat ahout equal to that of the beginning of incandescence, that is, about 1000° F., the heat heing applied externally. While the ore is thus heing heated in the reducing chamher in the presence of the products of comhustion arising from the externally applied heat, which products intermingle with the ore, suhstantially pure hydrogen gas is introduced for the purpose of comhining with the sulphur the oxygen and other metalloids present in the minerals. The amount of hydrogen must he slightly in excess of the amount necessary to comhine with these metalloids, so that if oxygen should enter with the products of comhustion it will combine with the hydrogen gas, preventing the formation of oxides. The hydrogen has a stronger affinity for oxygen than has the metals, and it will also take from carhon dioxide part of its oxygen, thereby forming a reducing gas and at the same time prevent the formation of metallic carhonates, etc. The gases thus heing driven off hy combining with the hydrogen, the gangue hecomes cellular, permitting the hydrogen gases to readily and effectively commingle with the minerals and therehy reduce them to a metallic, spongy condition. Because of the excess in the supply of hydrogen gas, there is always sufficient present to maintain the metals in this metallic condition.

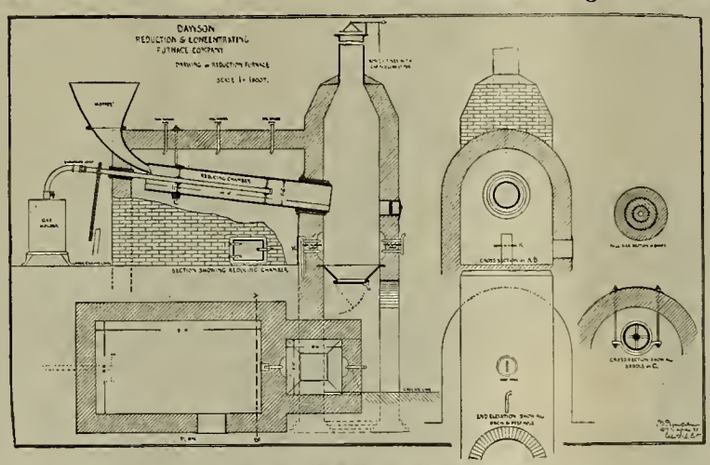
While still heated and in the condition mentioned the metals pass into a practically air-tight concentrating chamher still in the presence of hydrogen, where they are suhjected to a higher degree of heat than that required in the reducing chamher. The metals, heing thus fused, collect in approximately glohular masses within the gangue, after the form of shot or nuggets, and may suhsequently be readily removed from the fragile gangue hy crushing.

Of course, owing to the necessity of the presence of oxygen for the promotion of the comhustion necessary to effect the heating of the ores in the reducing chamher, a certain amount of CO and CO^2 will have a tendency to intermingle with the ores, but hy reason of the excessive supply of hydrogen gas no oxides can be produced. All of the mineral is reduced to a metallic state, the hydrogen gas combining with all the sulphur, oxygen and other gases or metalloids given off hy the minerals. It will he understood, therefore, that oxides and carbonates will not he formed. The amount of hydrogen gas present being in excess of that required for combining with and carrying off the gases mentioned, enters into the cellular gangue and thereby freely acts upon the minerals, reducing them and keeping them in a metallic, spongy condition. The gangue is thus made cellular hy reason of the withdrawal and consumption of the gases naturally and previously comhined with the minerals.

In the Bullion mountains, San Bernardino county, Cal., the process will shortly be given a thorough and complete field test, which is expected to demonstrate the practicahility of this furnace under usual conditions of mining reduction, and the treating of sulphides and carhonate ores. This plant, which was erected by Lewellyn Bros. and the Lacy Mfg. Co. of Los Angeles, Cal., is approximately a 50-ton plant, and will he in operation in Septemher. It is near the center of the Lava Bed mining district.

An experimental plant of approximately five tons a day has heen in operation in New York City for ahout eight months in reduction works first estahlished at Caldwell, N. J., and has heen re-erected in New York City on a somewhat larger scale, where ores are being successfully treated from several mining sections of this country. Sulphides, carhonates and chlorides have heen most generally treated.

The inception of this process came ahout hy the request of a prominent manufacturer of gold foil to produce a spongy condition of pure gold, of such form and consistency that it would he malleahle and weld easily hy reason of its absolute purity. This was first undertaken a number of years ago, and after the process was formulated, a furnace was devised to carry it out on a commercial scale. The reduction and concentrating furnace herein described is the outcome of years of experimental work.



The Dawson Reduction Furnace.

By experiment, silver chloride has heen found to he the easiest of all minerals reducihle to a metallic state. Next, perhaps, comes iron oxide, and following this are the carhonates and oxides of copper. The sulphides of copper require a somewhat longer time and slightly higher temperature.

The secret of the process is the practical exclusion of air, the maintenance of an approximate temperature of 1000°, and the presence of an excessive amount of hydrogen throughout the entire act of reduction and concentration. The hydrogen prevents the formation of metallic salts and permits the metal to remain in a metallic state after its reduction. After the reduction the metal passes into a supplementary chamher still under the action of hydrogen, the temperature is increased several hundred degrees, the metal melts and collects into glohular masses within the coke-like gangue. At no time is liquid slag formed. The gangue is then automatically dumped from the receptacle at the hase of the secondary furnace and when cold passed hetween rollers. This resultant is a very fragile, coke-like matter containing the little particles of metal. This can he readily separated hy any of the standard mechanical separators in general use. It is helieved that the process is one which saves time and lahor cost, and one that can he operated at a great reduction in fuel expense, and that by its use much lower grade ores can he successfully worked. Some of the tailings now considered of little value can pass through the reduction chamher of this furnace at a considerable margin of profit.

As will he noticed by reference to the engraving herewith, the furnace is hopper-fed, and can he dumped at intervals without in any way interrupting the feed or the continuous process of reduction.

If desirahle several reduction chambers can he installed within the same comhustion chamher. This will in no way change the process or render it less effective, resulting only in an increase of capacity.

In cost the installation of the process is comparatively slight. The installation of a 50-ton plant would cost approximately $10,000, and larger plants could he installed at a cost smaller proportionately.

One of the strongest features, from the miner's standpoint, is that all that is essential to the successful operation of this furnace in the way of fuel is charcoal, which can readily he produced at almost any camp, or crude oil, if the latter is more easily obtainahle. No matter how inaccessible the mining plant may be to coal delivery, the question of transportation or inaccessihility of freight will thus he largely eliminated. By the use of wood the gas may be produced, hoth for fuel and reduction purposes, at a cost which makes it attractive to the furnace operator. Of course, if coal or coke are readily ohtainahle at a reasonahle cost, they may he used with equal facility.

Gold Mines of San Diego County, Cal.*

Any one who has not traversed the west half of America finds it difficult to form a just idea of its vastness of extent and variety of mineral wealth. Any one of the mining States of the American Union, of the Provinces of British America, or of the States of the Mexican Repuhlic, has tremendous area of mineral ground that justifies most extended notice. Nearly every part of this great region has received illustrated notice herein through the 43 years of this journal's existence, but necessarily in a desultory way. Last week's issue contained notices of some "Southern California" mines, viz., on the desert, in Kern county. On the front page of this issue appear some illustrations of typical gold mines still farther south, yet in California; for, like several of its sister States, California is a commonwealth of enormous extent. For instance, the California gold mines illustrated in this week's issue are in one county—San Diego—(there are 57 counties in California) and, though in the same county, these mines are some of them nearly 200 miles apart.

To Mr. R. S. Baverstock of Los Angeles, Cal., we are indehted for the photos and notes concerning the mines in the extreme eastern part of San Diego county, and close to the Colorado river. Figs. 1, 2 and 3 represent these mines. Fig. 1 shows what comprised till recently the largest number of stamps under one roof in California, it heing a view of the 100-stamp mill looking north, with the hoist and track on the left of the Queen mine. Just hack of the writer is the famous "Glory Hole," from which hundreds of thousands of tons of low-grade ore have been milled.

Fig. 2 represents a view looking south, and showing in the distance the 100-stamp mill of the Golden Cross, and on the left of it the hig mass of tailings which are heing worked by cyanide. This bank fills up a valley about half a mile in width, and in many places 30 to 40 feet deep. On the right of the picture is the precipitation plant, and in the foreground are seen the cars filled with tailings, waiting to he hauled up the incline and discharged into the 500-ton vats, of which there are five. The old 40-stamp mill does not show in the picture, hut is just on the left of it. The cyanide plant is heing successfully operated hy Manager Barker, who is making sufficient profit out of $1 tailings to put the property in good shape, and this with water pumped 14 miles. No effort is heing made at present to operate the stamp mill.

Fig. 3 represents the American Girl mine looking west, showing the mill, cyanide plant and hoist, and, heyond, the shaft house of the Randolph mine. This plant is not at present heing operated. The mine is developed to a depth of about 700 feet on the incline, and large hodies of ore have heen hlocked out; hut, owing to change of character, the owners are considering the equipment of a plant suited to the ore and installing a water supply sufficient for handling 250 tons daily. There are up to date over 2 miles of underground workings in the mine, and, heside this property, another one on the same ledge east has a large amount of ore hlocked.

Fig. 4 shows the old Stonewall mine, on the Cuyamaca grant, east of the city of San Diego ahout 60 miles. This mine was famous under the administration of Governor Waterman of California. The shaft is ahout 600 feet deep. The mine has a 20-stamp mill and is heing reopened hy S. W. Lucas and Boston men, who have not only acquired the mine, hut the grant, which is one of the finest cattle ranges in southern California. It consists of about 20,000 acres and embraces Cuyamaca Peak, the highest point in that section, and thousands of acres of pine, cedar, oak and other timher. The mill is heing started up on the old dump, which consists of thousands of tons of low-grade ore, which with modern milling methods will show a profit. In the meantime the work of unwatering the deep shaft has begun.

There is much activity in the Julian mines; nearly all the old properties are being reopened and put in good working order. Julian and Banner are the oldest gold camps in southern California, mines there having been in constant operation almost 35 years.

Fig. 5 shows the hoist and mill of the Helvetia mine, near Julian, which is in active operation, and now producing ore that is reported to carry high values in telluride. Fig. 6 represents the old Gold King mine and mill at Banner, where it, the Golden Chariot and others have shared the fluctuating fortunes characteristic of so many California camps.

*See illustrations front page.

Bituminous Rock in California.

Bituminous sandstone in California is usually in Tertiary form, the stratified ledges being overlaid by chalk rock, or compressed silt, which, being removed, holes from 8 to 12 feet deep are bored, and after being sprung with dynamite are blasted with black powder. The rock is made up of finely divided sand, each grain of which is surrounded by a miniature encasement of bitumen. That containing about 16% of bitumen free from oil is in greatest commercial demand, though the residual asphalt from the Kern, Cal., oil refineries is a present competitor of the mining of bitumen in California. The oil measures of California are but another form of the same thing. In the case of bituminous rock the oil passed upward from the horizon in which it was generated, impregnating the soft, loose sandstone. In places the oil issues from the shales, forming a surface accumulation; where overlain by sandstone it percolates therethrough, and in the course of ages has formed extensive masses of bituminous rock. This naturally mixed compound was in extensive use when manufactured for street paving purposes, but the residual asphalt from southern California has of late years proved an active competitor for popular favor. The engravings herewith are of two bitumen mines about 9 miles west of the Pacific ocean, 3 miles from the city of Santa Cruz, Cal., at an altitude of 800 feet.



Santa Cruz, Cal., Bitumen Mine No. 1; Medium Rock.

The term "bituminous rock" is usually applied to a stratified sandstone thoroughly impregnated, as is the rock depicted herewith by heavy oil. When fresh it is a black plastic tough mass; when dried it assumes a brownish color and disintegrates. The term asphaltum is ordinarily applied to the solid or vi cous residue left upon the evaporation of the volatile constituents of a heavy oil. The group of rocks in the California Coast range, wherein these oil shales are mostly found, is characterized by considerable thickness of siliceous or flinty shales, with some of calcareous origin, which in their unaltered condition in many places appear to be made up of the remains of microscopic sea animals. The oil distilled from these shales is of different density; in some places the conditions have favored its preservation as a light volatile oil with no solid base; in others, as in the vicinity of Santa Cruz, the product remaining as a thick dark oil with a large percentage of asphaltum. Chemical action is going on in some portions of these deeply buried shales all along the California Coast range, as is evidenced by the cold and warm sulphur springs so numerous, and the fact that oil is often associated with such formation leads to the conclusion that it is still being generated, and that the gas and flowing water forces it upward. In many places the process of impregnation of bituminous rock is still going on. Great quarries of this deposit have been worked in several sections for the last twenty years.



Santa Cruz, Cal., Bitumen Mine No. 2; Soft Rock.

Notes on the Metallurgy of Copper of Montana.*

NUMBER VI.

Written by H. O. HOFMAN.

SMELTING ORES IN THE REVERBERATORY MATTING FURNACE.—The leading facts of the reverheratory furnace practice are brought together in the following table:

EXAMPLES OF MONTANA REVERBERATORY FURNACE SMELTING.

	A.	B.	C.	D	E.	F.
Length of hearth	50 feet.	50 feet.	49 feet 6 in.	50 feet.	42 feet 6 in.	37 feet.
Length, a, of bridge section*	6 feet.	6 feet.	4 feet 6 in.	6 feet.	42 feet 6 in †	.....
Length, b, of middle section	28 feet.	32 feet.	32 feet.	32 feet.	42 feet 6 in †	16 feet.
Length, c, of flue section*	16 feet.	12 feet.	13 feet 0 in	12 feet.	42 feet 6 in.†	.....
Width, d, of hearth at bridge*	10 feet.	10 feet.	10 feet 9 in	10 feet 9 in	15 feet 9 in.	8 feet 0 in.
Width, e, of hearth at middle*	20 feet.	20 feet.	20 feet 2 in	20 feet.	15 feet 9 in.	14 feet 6 in.
Width, f, of hearth at flue*	4 feet.	6 feet.	4 feet.	4 feet.	15 feet 9 in.	5 feet 0 in.
Hearth area, square feet	842	886	878	878	688	.....
Hearth, thickness	22 inches.	24 inches.	19 inches.	20 inches.	28 inches.	22 inches.
Length of grate	10 feet.	10 feet	7 feet.	10 feet 9 in.	Producer Gas, Regenerative Chambers.	8 feet.
Width of grate	5 feet 5½ in	5 feet 4 in.	5 feet 6 in.	5 feet.		6 feet.
Depth of grate below top of bridge at bridge	1 foot 10 in.	2 feet 9½ in	2 feet 4 in.	2 feet 8 in.		3 feet 0 in.
Depth of grate at opposite end	1 foot 2 in.	2 feet 6½ in.	1 feet 4 in.	2 feet 2 in.		.....
Grate area, square feet	53.9	53.3	53.0	53.75		48.0
Ratio, hearth : grate area	15.6	16.6	16.5	16.3		.....
Height of roof above bridge	2 feet 7 in.	2 feet 6½ in.	2 feet 10 in.	2 feet 8¾ in.	24 inches.	2 feet 0 in.
Height of roof above hearth at bridge	4 feet 8 in.	4 feet 4 in.	4 feet 4 in.	4 feet 8 in.	7 feet 0 in.	4 feet 10 in.
Height of roof above hearth at flue	2 feet 1½ in	2 feet 10 in.	3 feet 0 in.	2 feet 2 in.	.....	2 ft. 4 in. to 2 ft. 8 in.
Width of bridge	3 feet 0 in.	3 feet 5½ in	3 feet 0 in.	3 feet 0 in.	4 feet 1½ in.	.....
Size of flue at vulcatory	6 ft. x 30 in.	6 ft. x 30 in.	5 ft. x 30 in.	6 ft. x 30 in.	.....	36 in. x 6 ft. 6 in. to 7 in.
Size of flue leading to chimney	30 in. x 48 in	30 in. x 30 in.	28 in. x 30 in.	30 in. x 30 in	42 in. diam. at each end.	30 in. x 36 in.
Chimney, inside diameter	5 feet 6 in.	6 feet 3 in.	6 feet 0 in.	6 feet 1 inch.	.....	4 ft. 6 in x 4 ft. 6 in.
Chimney, height	70 feet.	.....	70 feet.	75 feet 3½ in.	.....	80 feet.
Charge, weight, tons	25	15	24	18	35	13
Charge, time of melting, hours	5	3½	6½	4¾	6	5½
Charge, tons in 24 hours	112 5	105	90	907	150	70
Charge, tons per square foot hearth in 24 hours	0.129	0.118	.102	0.102	0.218	.....
Rate of concentration	5.7 : 1	4.7 : 1	7.56 : 1	5 : 1	3½ : 1	5 : 1
Fuel, bituminous coal, manner of firing	Direct.	Direct.	Direct.	Direct.	Prod. gas.	Direct.
Per cent ash	8.9	15.0	14.85	5.0	17.0-30.0	7-10
Per cent fixed carbon	51.9	44.5	44.5	55.0	45.0	50-52
Tons charge : 1 ton coal	3.05	3 : 1	4 : 1	2.81 : 1	2 : 1	2.5 : 1
Labor in 8-hour shift ⁂	2+2	2+2	2+2½	2⅔+1½‡	‡	2½+1⅔
Matte, Cu	53.8	48.3	50	50	50	55
Ag. ozs. per ton	45	35	100	66	20	.....
Au. $ per ton	.....	.....	.....	2 (?)	.....	.....
Spec. gr	.....	4.8	.....	.....	4.77	.....
Slag, SiO_2	36.8	42.8	34.5	38.6	41.9	49
Fe(Mn)O	51.9	47.31	43.0	51.4	42.7	32-36
Al_2O_3	8.4	7.5-8.0	8.5	1.5	10.9	.....
ZnO	.....	.....	14.0	.....	.....	.....
CaO	1.1	1.2	.....	3.3	1.1	.....
Cu	0.75	0.40	0.60	0.40	0.58	0.65
Ag	0.45	0.30	1.0	0.40	.....	.....
Spec. gr	.....	3.58	.....	.....	3.54	.....

* See Fig. 2.
† The hearth has the form of a rectangle.
‡ Not comparable in this manner on account of gas producers.
⁂ The first figure represents the regular crew, the second the auxiliary labor.

The characteristics of the Montana reverheratory matting furnaces are the form of hearth and the greatness of its area. While as late as 1891 the hearth had the usual pear-shaped form of the original Welsh furnace (Fig. 1), a radical change was inaugurated hy making the hearth ohlong, tapering very quickly toward the bridge, hut less so toward the flue (Fig. 2). The result was an enlarged hearth area served by the same grate area which, on account of the free development of the flame, could heat more effectively and smelt a larger amount of charge per unit of fuel consumption than with the old form. While at Argo, Colo., the reverheratory matting furnace of 1878 had a hearth area of 105 square feet with a ratio of hearth to grate area as 4.66 : 1, in 1894 the hearth area had been increased to 481 square feet and the ratio to grate area decreased to 15.03 : 1. At present the Montana furnaces reach in round figures a hearth area of 880 square feet, with hearths 50 feet long and 20 feet wide (in the middle section, Fig. 2); the ratio of heart to grate area differs, however, only slightly from the Argo standard of 1894. Such a furnace treats 105 tons of charge in twenty-four hours, producing 50% matte with a concentration of 3 to 4 into 1. These large furnaces have many advantages over the smaller ones besides the greater capacity. The sides are less readily corroded hy the slag (claying every twelve days versus every three days), as for a given amount of matte less surface is exposed to the slag; there is less variation in temperature on account of the greater reservoir of heat, which lengthens the life of the hrick; the layer of slag is thinner, which allows quicker heating and causes less foaming when the charge is dropped from the hoppers; and the level of the matte remains more constant.

FIG. 1.

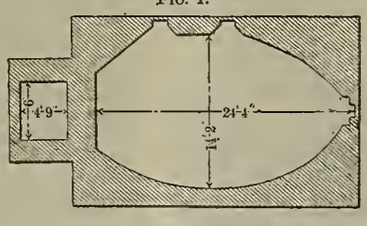
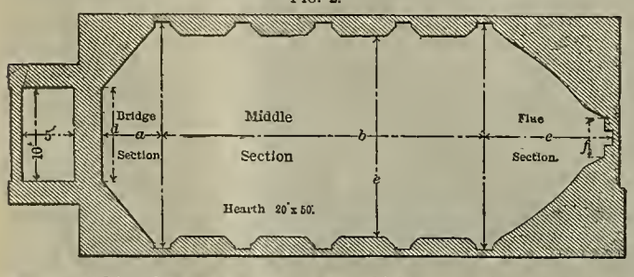


FIG. 2.



FUEL.—The fuel used is hituminous coal of various grades from Montana, Wyoming and Utah.

Most furnaces are direct fired. Some furnaces are worked with natural draft, hut the majority have under-grate hlast. In one instance the original firebox has been changed to receive a gas producer, with satisfactory results as to saving of fuel and to shortening of the time required for melting. This latter is due to the fact that the ordinary grate has to he cleaned every four hours, while the grate of the producer requires attention only once in twenty-four hours. On account of structural difficulties the producer had to he given up. In many furnaces air is admitted through the roof ahove the fire hridge in order to secure a better comhustion and thereby save fuel. The air travels through the vault underneath the furnace, rises some distance in two corners of the stack (square on the outside, circular on the inside), descends in the others, returns underneath the hearth through three or four horizontal channels on either side of the vault, rises in corresponding vertical hoxes near the hridge, enters both sides of an air chamher on the roof ahove the bridge and descends through slots into the fire-bridge flue. There is some douht prevalent as to the efficiency of this superheating. With most furnaces the heat of the flame passing out of the furnace goes to waste. The main difficulty lies in the fact that, in order to roast successfully in a reverheratory furnace, it is essential to have a steady even temperature at the fire bridge, and with a reverheratory matting furnace, charged and discharged at intervals, this is not easily obtained, if it can he managed at all. In order to utilize the waste heat, one Montana plant has attached a 300 H. P. hoiler, to one of its 50 by 20 foot furnaces. While an attempt of this kind in an Eastern refinery had proved a failure, owing to the diminished melting power caused hy the reduced force of the draught, here it proved a success, the furnace with boiler doing hetter work than the neighhoring furnace, the gases of which went directly into the main flue connected with the stack. The cause of this, at first, paradoxical result was found to lie in the fact that the furnaces were hlessed with a strong draught which drew the flames from the fireplace (worked with under-grate hlast) too quickly through the furnaces. By introducing the necessary dampers to check the draught, the work of the furnaces without appended hoilers was hrought up to that having a boiler.

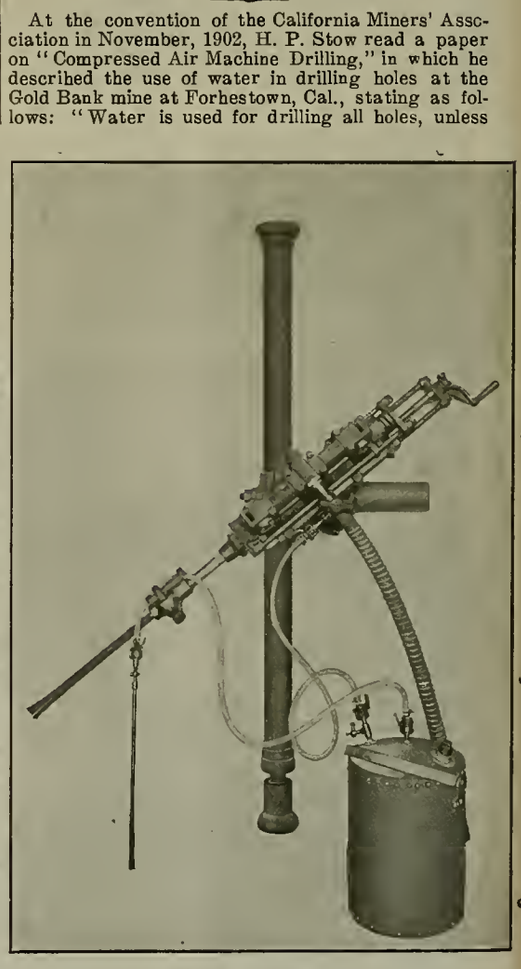
One plant only has reverheratory matting furnaces with regenerative chamhers, similar to the open hearth steel furnaces with stationary hearths. Tilting furnaces (hearths 13 by 16 feet with 176 square feet area), similar to the Camphell open hearth steel furnace, which were built in 1890 and 1892, were ahandoned on account of their small capacity and hecause of the fact that it was impossihle, in pouring off the slag, to control the flow in such a manner as to prevent matte from passing over. Small amounts of matte in a large mass of slag cannot be distinguished hy the eye. These furnaces were run, however, for several years as stationary furnaces, heing gradually replaced hy furnaces of larger size. The gas producer used is 15 feet high, has a 7-foot hosh and a throat 7 feet 4 inches in diameter. The producer gasifies from 10 to 12.5 tons coal in twenty-four hours, the top making one revolution in three minutes.

(TO BE CONTINUED.)

*Trans. Am. Inst. Min. Engs. (Condensed).

Application of Water in Rock Drilling.

At the convention of the California Miners' Association in November, 1902, H. P. Stow read a paper on "Compressed Air Machine Drilling," in which he described the use of water in drilling holes at the Gold Bank mine at Forhestown, Cal., stating as follows: "Water is used for drilling all holes, unless



Portable Drilling Outfit.

possihly the very steep 'uppers,' and increases the efficiency of the drill as high as 50%. Water was used under pressure even when pumping water from the mine, tapping the pump column, and in the upper

levels, where the pressure was not sufficient, it was brought from the surface. The following test was made:

"Three rounds were drilled by the same miner, using a 2¼-inch drill, drilling the same number of hours, size, and as near as possible the holes were of the same kind. Two of the rounds were drilled without taking down the bar, and the third was put in alongside of the other two. He drilled one round without water, one with water, bailing from a bucket, the usual method; and the third with water under pressure in a hose. Without water he drilled 32 feet, using thirty-eight drills; with water by bailing, 41¾ feet, using thirty-three drills; and with water from the hose, 52 feet, using thirty-seven drills—that is, a gain of 30% depth of holes, and 50% gain of feet per drill, with bailing over drilling dry; a gain of 62½% of depth of holes and 66⅔% gain of feet per drill, using the hose over drilling dry; and a gain of 24½% depth of holes, and 11% of feet per drill by using hose over bailing water from a bucket. All of which shows that there is not only a gain of ground drilled, but a saving of drill bits used by using water under pressure, instead of bailing it from a bucket or not using it at all. Besides the actual gain in drilling, the 'pressure-water' is a saving in getting rid of the gases in the pile of dirt and the dust formed in drilling, resulting materially in the better health of the men, freedom from powder headache and miners' consumption, and increased rapidity of getting into the face to remove the dirt."

The accompanying illustration shows a portable outfit arranged by the Rix Compressed Air and Drill Co., San Francisco, Cal. It consists of a galvanized pot with a hail, holding eight gallons of water, and which, the manufacturer says, has been tested to 150 pounds per square inch pressure. This pot has openings for admitting air pressure on the water, for attaching the water hose, for filling and for releasing the air when filling is required. There are two small pieces of hose, one for admitting the air and one for the squirter. The air hose is attached to the side of the drill cock and lightning couplings are used.

The superintendent of the North Star mine at Grass Valley, Cal., writes the manufacturers: "For clear water, we put up small barrels on each level, or in the most convenient place where there is a drip, and run the clear water into this barrel, which is also protected from dust or dirt. A faucet is placed at the bottom. A boy with a heavy galvanized watering pot, fitted with a small nozzle, distributes the water to the tanks. A tank of water lasts for some time. It depends on how steadily the machine is running and how careful the man is about shutting off the water when not using it. It will last at least an hour or two anyway, and one boy can keep forty tanks supplied under reasonable conditions of water supply." If these appliances save an appreciable percentage of the cost of drilling, and save blacksmith labor, any reasonable time and care devoted to keeping up the water supply and making connections would be economical.

How to Make Blue Prints, Etc.

The simplest of all the photo-printing processes is the cyanotype, or blueprint, the paper for which may be prepared as follows: In a dark-colored or opaque bottle dissolve two ounces of citrate of iron and ammonia in eight ounces of water, and in a similar bottle dissolve one and one-quarter ounces of ferricyanide of potash in eight ounces of water. Immediately before use, mix equal portions of these solutions, and, by means of a soft sponge, a wad of cotton, or a camel's-hair brush, spread the mixed solutions evenly over the entire surface of a heavily sized white paper. Thus must be done in a room lighted with gas or other artificial light whose color tends toward yellow, and the paper should be dried quickly in a dark room or closet. The tracing is laid on a sheet of heavy glass, or, preferably, in a printing frame, with the drawing next the glass; the prepared paper is then laid over the tracing with its prepared side against the tracing cloth. A piece of heavy blotting paper, or felt, is then laid on the back of the paper, to distribute the pressure and keep the tracing and printing paper in close contact; a board is then placed over the felt, and the whole is submitted, glass side up, to the rays of the direct sunlight. In from three to ten minutes the print is removed and washed in clear water, when the entire surface becomes a deep blue color, except at the points protected by the lines of the tracing, where the paper will remain white.

After washing, the print is hung up and allowed to dry, when it is ready for use as a working drawing. Any desired alterations in the print may be made with an ordinary writing pen and a solution of caustic soda. This solution, applied to the blue portions of the print, will immediately bleach it white, while any existing lines may be obliterated by means of a little Prussian blue water color, or even an ordinary blue pencil.

The printing frame for use in the making of sun prints consists of a rectangular frame, or box, as shown in Fig. 1, on one side of which is fixed a pane of clear plate glass, a. The tracing is then laid in the frame against the glass, as shown at h, and the printing paper next, as shown at c. A felt pad, d, is then spread over the back of the paper, and the wooden backing, e, is put in, to hold the paper and tracing against the glass. The arms, f, are then turned down, and the springs, g, pressing against the cleat, h, keep everything tight in place, while the

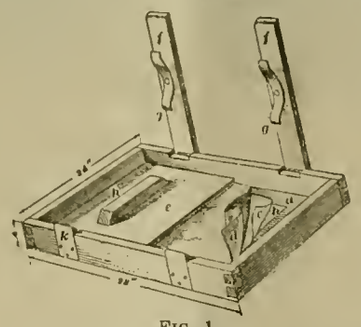


FIG. 1.

catches, k, hold the arms down. The frame is then turned over, and so placed that the sun may shine through the glass and tracing onto the printing paper.

The backing is usually made in two or more pieces, as shown, in order that the frame may be partially opened and the progress of the printing examined, while one of the arms is still clamped down and secures the end of the tracing and paper from slipping. If the print is then found to be insufficiently printed, the back may be replaced and the exposure continued.

When the printing frames are large and not easily handled, it is customary to build a track out through a window, as shown in Fig. 2. The frame is then

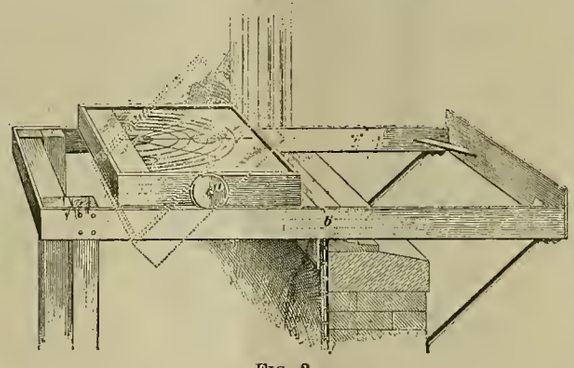


FIG. 2.

provided on each side with a flangewheel, a, for running on the track, h. When the frame is taken in to remove the print, or to put in a new tracing, it is simply turned over on the wheels, as shown by the dotted lines. The back is removed, the tracing and paper adjusted, and the back replaced. The frame is then turned glass side up, pushed on the track, and left in the sun till the printing is completed.

Next in simplicity to the ordinary blueprint process is the blueline process, whereby the reproduction shows in clear blue lines on a perfectly white ground.

The paper is coated with the following solution:

Gum arabic, grains	385
Perchloride of iron, grains	123
Tartaric acid, grains	62
Sodium chloride, grains	46
Water, ounces	3½

When dry, the paper is exposed under a tracing, as in the previously described process, and, when sufficiently printed, is immersed in a saturated solution of ferrocyanide of potassium until the lines are fully developed. It is then rinsed in a dilute solution of hydrochloric acid to remove any yellow stains due to the ferrocyanide, and is finally washed in water.

Alterations in the finished print may be made with an ordinary pen and a rather thickly ground solution of Prussian blue water color. Existing lines may be removed with the soda solution previously described.

The processes for printing black lines on a white ground are numerous, but somewhat complicated. One of the earliest forms consisted of a process of double printing, and, though more complex and expensive than later methods, it gives results that leave nothing to be desired.

A sheet of thin but close-grained paper is immersed for half a minute in a solution of common table salt and then dried; it is then brushed over with a solution of ten grains of nitrate of silver in one ounce of water, and again dried. The paper is then exposed under the tracing and printed until the lines just commence to change color, while the ground becomes a deep bronze color. The print is then soaked for ten minutes in a solution of one ounce of hyposulphite of soda to ten ounces of water, and afterwards well washed in water and dried. When dry, the print is rubbed over with sweet oil, to render it transparent, and is then put in the printing frame in the place formerly occupied by the tracing. A new print is now made under the oiled copy, and this second print is soaked in the soda solution and washed in water, the same as the first one. The result is a clear white ground, on which the lines of the drawing are duplicated in a deep bronze black, equal in every respect to an inked drawing. Any number of prints can be made through the oiled copy; but the process is so troublesome, and takes so much time, that it never found much favor except for special work and small sizes of drawings.

A paper for direct printing of black lines on a white ground may be prepared as follows: In nine ounces of water dissolve

	Drams.
Gelatine	3
Perchloride of iron solution	.6
Tartaric acid	3
Ferric sulphate of iron	3

Apply two coats of this solution to the surface of a heavy sized paper, allowing each coat to dry thoroughly. Print as usual, under a tracing having somewhat heavy and well defined lines, and develop the print in a solution consisting of six drams of gallic acid dissolved in thirty-two ounces of water and six and one-half ounces of alcohol. The lines will appear strong and of a deep purple-black color, and the ground will assume a cream tint, afterwards changing to pale gray. The print should then be washed in several changes of water and hung up to dry. Additional lines on this form of print can be made with ordinary drawing ink; existing lines can be removed only by carefully rubbing with an ink eraser.

The quality of any print produced by the agency of sunlight is dependent very largely upon the tracing from which it is made. The lines of the original should be strong and of an even density, and the ink used should be absolutely opaque.

The best results are obtained when the ink with which the tracing is made is mixed with a small quantity of thickly ground chrome-yellow water color. If the color refuses to mix freely with the ink medium, a drop of ox-gall will clear it and cause it to flow more freely—though too much gall will give it a tendency to blot.

Regardless of the numerous disadvantages, nearly all mechanical drawings of the present day are reproduced by some one or other of the sun-printing processes. There is, however, an increasing tendency among users—architects particularly—to adopt the more recent method of printing by means of mechanical transfer. This consists of making duplicate copies of an inked drawing or tracing by placing it in contact with some prepared surface that will absorb a portion of the inked lines and afterward transfer them to other sheets.

The disadvantage lies in the fact that the ink necessary for the purpose must be colored with an aniline dye, thus becoming very difficult to handle and dirty to use. It has a corresponding advantage, however, inasmuch as different parts of a drawing can be made with different colored inks, and the copy will show these color relations.

The materials necessary for the transfer process may be prepared as follows: Soak four ounces of white glue in five ounces of water and three ounces of strong aqua ammonia. When the glue is soft, warm the solution, by setting the vessel containing it in a pan or pail containing boiling water. When the glue is dissolved, add three ounces of granulated sugar and eight ounces of gelatine; then let it come to the boiling point until the whole becomes liquid. While still hot, paint the solution on sheets of heavy white blotting paper until the latter is thoroughly saturated; then lay them away to dry for two or three days.

When ready for use, slightly moisten the surface of a sheet with a sponge dipped in cold water, and lay the drawing or tracing (which has been executed with the prepared inks already described) over the pad so that every part of the inked lines comes in contact with the sheet. Rub the drawing on the back into close contact with the prepared blotter, and after two or three minutes carefully remove it. Sheets of plain white paper laid over the pad and gently rubbed into contact will receive a complete impression nearly as clear as the original; from six to ten copies may be thus obtained from a single impression. After use, the pad should be laid aside for twenty-four hours.

The inks required for these pads may be mixed as follows:

Black ink: Aniline black, 1 ounce; water, 14 ounces; glycerine, 4 ounces.

Blue ink: Aniline blue, 1 ounce; hot water, 7 ounces.

Add when cool: Spirits of wine, 1 ounce; glycerine, one-fourth ounce; ether, 10 minims.; carbolic acid, 1 minim.

Red, violet or green ink may be prepared by substituting the desired color of aniline for the one mentioned above.

Modern Methods in Ore Treatment by Cyanidation.*

NUMBER III.—CONCLUDED.

Written by EDWIN O. WATT.

Experiments made with unroasted sulpho-telluride ore and potassium cyanide solutions did not give an extraction equal in any case to 60% of the gold contents. The results, however, proved so satisfactory that it was decided to continue to work the process.

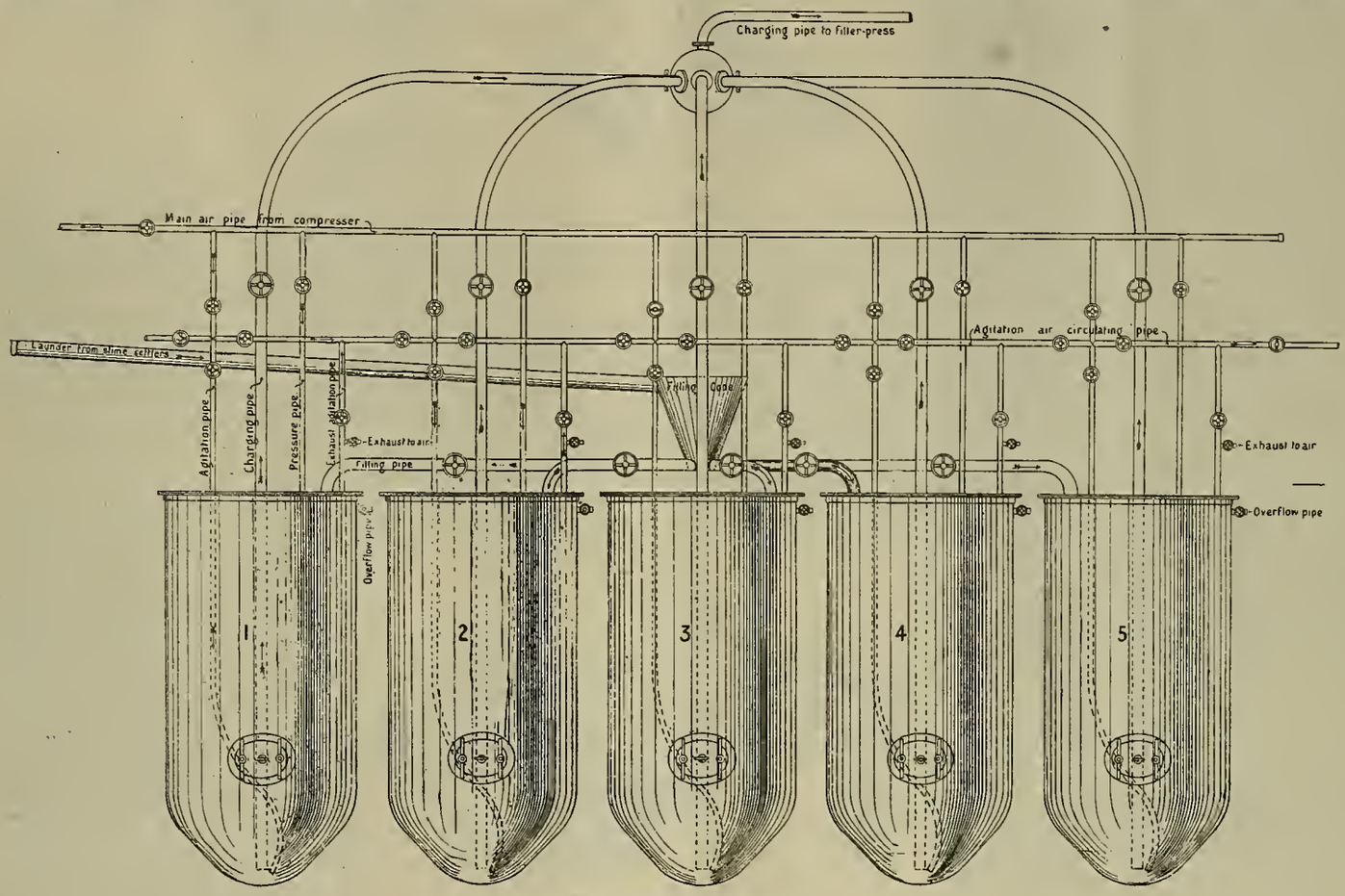


Fig. 8 —Pneumatic Agitators.

The exhausting air smelt so strongly of cyanogen that it was realized that a still greater saving of cyanide might be effected hy passing the air through a series of pressure tanks, instead of allowing it to exhaust direct through the atmosphere. On the treatment works there were only two pressure tanks and it was decided to install a set of five, using the same stream of air for the series. Some alterations were made in the design of the pressure tanks, and the necessary pipes were attached to convey the air in a continuous stream through the pulp in each tank. The accompanying diagram (Fig. 8) shows the arrangement by which the combined pneumatic agitators and filter press pressure tanks are heing worked at present on the Kalgurli mine. For the sake of clearness of illustration the set is shown in a straight line, hut they are really heing worked in a circular pit, as shown in the smaller diagram (Fig. 9). The plan of the top of the tank is shown in Fig. 10. Each agitator is 6 feet 6 inches in diameter and 13 feet 6 inches deep, and is usually charged with about 6 tons of slime in a cyanide solution of 0.10% of available potassium cyanide. After agitating for three hours the circulating air is shut off and the high pressure air is turned onto the top of the pulp. This drives the slime up the filter press charging pipe into filter presses, where, as previously explained, the auriferous cyanide solutions are recovered from the pulp. After discharging the slime from the agitators the tank remains full of compressed air at a pressure of about 30 pounds per square inch. Instead of being allowed to hlow into the atmosphere, as is usual under these circumstances, the air is used for discharging another agitator, or is allowed to circulate for agitation until it falls helow the pressure required for that purpose. The air pressure required to agitate one agitator is ahout 3½ pounds per square inch, and for five agitators about 22 pounds, hut this pressure varies slightly, according to the consistency of the pulp. For charging filter presses it is not convenient to work with an air pressure much under 30 pounds per square inch, for, although it was found that a pressure of 10 pounds would charge a 5-ton filter press full, it took nearly an hour to do it, whereas a pressure of 30 pounds per square inch will charge a 5-ton press in ten minutes. An experiment made with the present set of five pneumatic agitators may prove of interest to metallurgists. The agitators were charged with, approximately, 6 tons of ordinary slime in a solution of 0.10% of availahle potassium cyanide and the usual stream of air was passed through for three hours. A sample of the solution was then taken from each agitator. No. 1 agitator, which first received the air, indicated .060%, No. 2 .100%, No. 3 .115%, No. 4 .115%, and No. 5, from which the air exhausted into the atmosphere, .060% of availahle potassium cyanide.

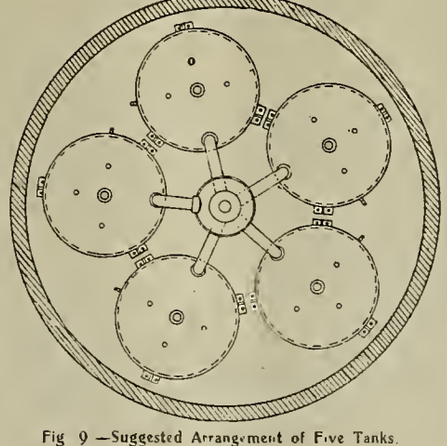


Fig 9 —Suggested Arrangement of Five Tanks.

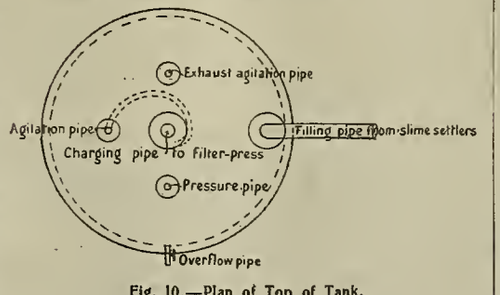


Fig. 10.—Plan of Top of Tank.

This experiment showed that in two of the series there was an actual increase in the amount of cyanogen in the solution, due to the volatile cyanogen passing over from the preceding agitators. The results of this experiment have been confirmed by other tests made on the Kalgurli mine and hy lahoratory tests made on other mines on the fields. When the Kalgurli mine agitated the slimes by mechanical stirrers for twenty-four hours it cost about 2½ pounds of potassium cyanide per ton to ohtain a good extraction. With the present pneumatic agitators the consumption of potassium cyanide has fallen to about 1 pound per ton, and the extractions are hetter.

The composition of the ore is practically the same and the consumption of potassium cyanide on the separated sands has not varied. While I am of the opinion that the introduction of compressed air to the pulp in this way is heneficial in consequence of the fact that it oxygenates the cyanide solutions, I think that the beneficial action is more largely due to mechanical than to chemical causes, as instanced hy the great attrition that takes place hy the ore particles ruhhing against each other, especially when these particles are not already in a very fine state of division. By reference to the diagram it will be seen that the agitation pipe is peculiarly hent, so as to give a violent rotary movement to the pulp.

This, combined with the action caused hy the surging of the air through the material, causes the particles to rub heavily against each other. The larger particles are thus worn away and the gold is cleaned and burnished, and thus rendered readily amenahle to dissolution in cyanide solutions. This process of agitation has now heen at work on the Kalgurli mine for ten months and has heen subjected to severe tests and has not failed. Its originality consists only in the method hy which the air is admitted and used. The numher of pipes and valves over the agitators appear at first glance somewhat complicated, hut in actual practice it has not heen found to he so, and the management have not experienced any difficulty in getting the attendants to understand the arrangements after a few minutes' explanation. No time has heen lost by any fault of the arrangement, and no part of the plant has shown any perceptihle wear.

Coal Miners' Wages in Bohemia.

The wages paid in the coal districts of Bohemia, per nine-hour shift, are as follows:

Class.	Wages—Crowns.	Wages—Value.
Pick men	5.00	$1 02
Carpenters	3.60	73
Engine men	3.40	69
Other men working in pits	4.00	81
Overseers	4.50	91
Workmen at pit's mouth	3.50	71
Boys	2.00	41
Women	1.55	31

The pick men are paid by the joh; all others are paid hy the day. The labor day of all miners is nine hours, including the going in and out. The men at the pit's mouth work twelve hours, with two hours' rest at midday.

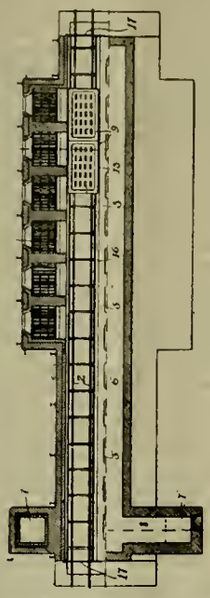
* Trans. Australian Inst. Min. Engrs. (Condensed.)

Mining and Metallurgical Patents.

PATENTS ISSUED AUGUST 25, 1903.

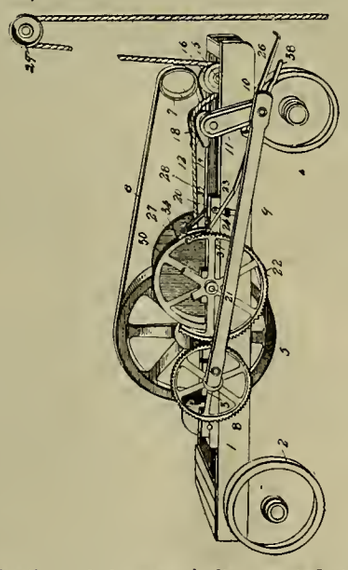
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

ROASTING FURNACE.—No. 736,929; E. C. Brice, Colwyn, Pa.



Roasting furnace comprising tunnel, trackway therein, fireboxes communicating with upper part of tunnel, and passageways communicating between latter and smokestack, in combination with series of cars on trackway having receptacle of refractory material, sides of receptacles having openings therethrough, bottom portion thereof having lateral passageways, vertical passageways communicating therewith, sides of receptacles adjacent to fireboxes extending close to roof of tunnel.

OIL DRILLING MACHINE.—No. 736,993; D. A. Messner, Akron, O.

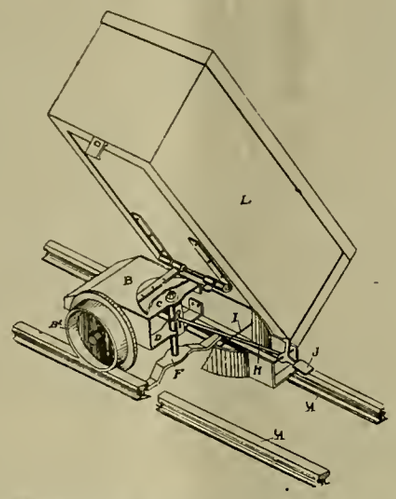


Combination of frame, shaft mounted therein, means for driving shaft, gearwheel on one end of shaft, pitman having one end connected with gearwheel, shaft parallel with driving shaft, crank arm secured thereto connected to other end of pitman, arm secured to last-mentioned shaft, guide pulley carried by free end of arm, angle lever, link pivotally connected with short arm of lever, lever pivotally connected with opposite end of link, movably mounted bearing box, shaft mounted therein, drum carried by shaft, rigid rope guide secured to frame, in alinement with guide pulley, rope or cable passing round guide pulley supported upon guide adapted to be raised and lowered by rocking of pulley.

TREATING REFRACTORY ORES.—No. 737,059; A. M. Beam, Denver, Colo.

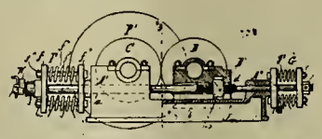
Pulverizing the ore, subjecting it, in connection with suitable oxidizing flux or reagent mixed therewith, in closed oven or muffle, to action of low degree of indirect heat while air is excluded for short time, until sulphides of base metals are partially converted into sulphates, so that air may be afterward admitted without burning sulphur or causing cementation or coating of ore particles with sulphur or other residuum; admitting air to ore in muffle, completing conversion of sulphides of base metals into sulphates and releasing gold or precious metals to free or amalgamating condition by subjecting ore for further short time to low degree of indirect heat.

DEVICE FOR LOCKING ORE CARS TO TRACKS.—No. 737,006; G. G. Newcomb, Denver, Colo.



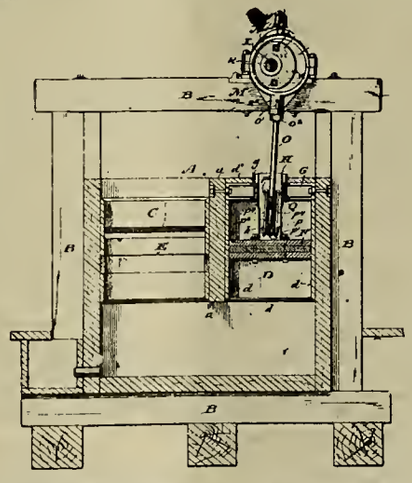
In device for locking cars to rails or track, combination, comprising supporting bars C and D secured to truck B; inserted through circular aperture C′, swinging in elongated aperture D′ in hollow cylindrical mandrel E which is provided with spiral slot E^2, secured to lower end crossbar F, mandrel G inserted into mandrel E, secured to it pin E^3 extended outward through spiral slot E^2 into adjusting rod H pivoted upon rod I, adjusting rod extending outward under trip finger J being held in desired position by means of coiled spring.

CRUSHING ROLLS.—No. 737,130; C. W. McArthur & F. Cazin, Denver, Colo.



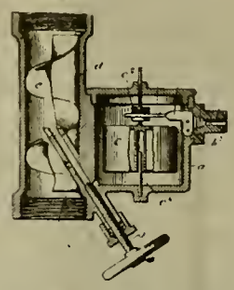
Combination with bed or frame and fixed movable bearings, rolls journaled therein, adjusting rods extending longitudinally through portions of bed or frame in threaded engagement between ends with movable bearings to adjust them with relation to stationary bearings, spring mechanisms at one end of rods to permit movable bearing and its roll to yield and return same to normal position, cushioning mechanism between frame and opposite ends of rods to cushion their return movement.

ORE JIGGER.—No. 737,264; E. J. Muller, Butte, Mont.



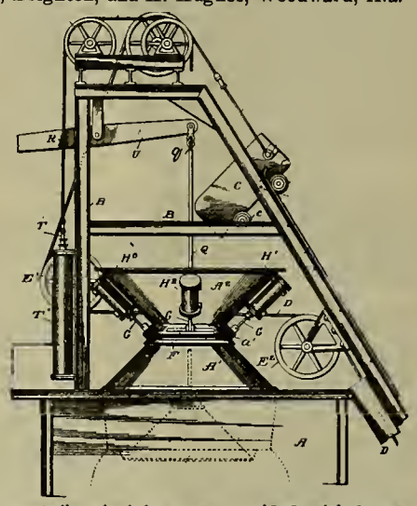
In ore jigger combination with tank separated by partition into compartments which communicate with each other below partition, and horizontally disposed screen vertically movable plunger arranged in compartments on opposite sides of partition, guide arranged in upper part of compartment containing plunger, hollow trunk attached to and extending upwardly from plunger into opening in guide in which it is adapted to reciprocate, driving shaft extending horizontally over tank and provided above plunger trunk with eccentric and strap, rod attached at upper end to strap provided at lower end with box pivoted on cross pin in lower part of trunk, box composed of two parts, one formed with socket in which lower end of rod is secured, the other connected by bolts with cross head loosely mounted on rod, and spring interposed between upper box member and cross head.

VAPORIZER FOR EXPLOSIVE ENGINES.—No. 737,463; C. F. Pearson, Chicago, Ill.



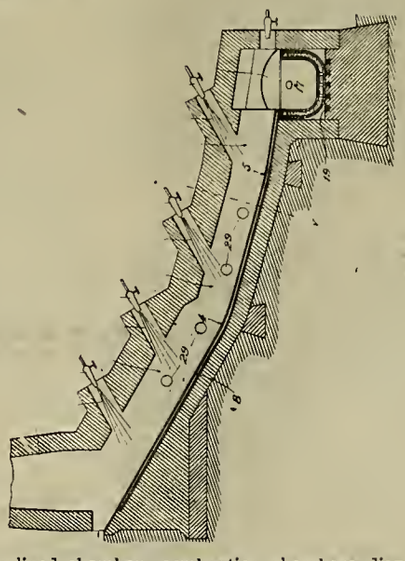
Vaporizer comprising walls forming air passage, spiral partition placed in passage to give air spiral movement, oil supply nozzle projected diagonally into air passage discharging into spiral partition, oil receptacle communicating with nozzle, valve controlling oil flow through nozzle, valve controlling admission of oil into oil receptacle, float actuating latter valve.

METALLURGICAL FURNACE.—No. 737,519; S. Stewart, Brighton, and H. Hughes, Woodward, Ala.



A metallurgical furnace provided with hopper at upper end, combination with frame mounted above furnace, inclined track having curved end carried by frame, car provided with four wheels traveling on track, hoisting rope or chain secured to rear end of car adapted to allow front end of car to swing down when it passes over curved end of track, bell normally closing top of furnace, sliding gates constituting gas seal mounted above bell, cylinder for each gate, piston rods and pistons for operating gates, valve and pipes for simultaneously admitting fluid pressure to all cylinders.

SMELTING FURNACE.—No. 737,487; E. Riveroll, Los Angeles, Cal.



Inclined chamber, combustion chambers disposed along inclined chambers communicating therewith, a floor of varying pitch, liquid fuel burners discharging through combustion chambers, toward floor of inclined chamber.

Mining Summary.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

J. MacDonald, superintendent of the Treadwell mines, says the Alaska-Treadwell G. M. Co. has bought all the Berners bay mines heretofore owned by the Nowells, including the Johnson, Eureka and Kensington lodes. They will be developed and machinery put in.

The shortage of workmen continues, so that the large mines of southeastern Alaska are unable to secure sufficient labor, though they pay high wages. The Treadwell mines can't get 500 men for Douglas island and in opening up the Berners Bay mines, which the company has bought. The closing of many Klondike mines last month because of a water shortage has led Superintendent McDonald, of the Treadwell mines, to announce that his company will employ outcoming miners to the number of 500, guaranteeing them steady work.

ARIZONA.

COCHISE COUNTY.

The Solomon Springs C. Co.'s mine has been bought by Eastern men for $500,000. The property is 5 miles southeast of Bisbee and consists of sixteen claims. The Houghton Dev. Co. has been organized to work and develop the property, and its directors are G. Pope, R. R. Goodell, J. H. Rice, F. G. Coggin, G. C. Lawton, of Houghton, Mich.; S. Kaufman of Marquette, Mich., and G. G. Barnum of Duluth, Minn. G. C. Lawton is superintendent and has started development work.

The Junction Dev. Co. of Bisbee report putting in an additional steam pump.

GRAHAM COUNTY.

The Shannon Co., near Clifton, is reducing 450 tons of copper ore per day. A tunnel has been run on the property and a new body of ore uncovered in the Carter, the deepest mine of their group.

MARICOPA COUNTY.

(Special Correspondence).—It is reported that La Gloria M. Co. will erect a smelter on their property in the White Tank mountains this fall.

J. M. Swetnam of Phœnix is interested in a number of claims near the Horton mine, 30 miles northwest of Phœnix, on which he says work will begin.

Phœnix, Aug. 28.

The Angel mine, west of Wickenburg, has resumed operations, says S. C. Bird of Bridgeport, Conn., manager. There is considerable ore on the dump which will be treated at the Wickenburg smelter.

Owing to the miner's union attempting to dictate to the owners of the Socorro mines, near Wickenburg, these mines are reported closed down, throwing eighty men out of work.

MOHAVE COUNTY.

M. P. Gilbert, manager of the Leland group of mines, near Kingman, says their 40-stamp mill is expected to be ready for operation by Oct. 1st. The ore runs $8 per ton in gold, and a cyanide plant will handle the tailings.

PIMA COUNTY.

The Twin Buttes copper mines, in San Xavier mining district, have been sold to the Twin Buttes M. & S. Co., with D. S. Rose of Minneapolis, Minn., president.

PINAL COUNTY.

(Special Correspondence) — The Pinal Paraffine Oil Co. will be ready next week to put the casing in their well; then drilling will be resumed. The well is down to a depth of 1217 feet.

Florence, Aug. 28.

YAVAPAI COUNTY.

The Model M. Co. at McCabe report construction work on the mill nearing completion. In addition, a shaft house is being built. A tramway will connect them.

Superintendent J. K. Truman of the Climax mine, near Prescott, says they have seven shafts on this property, with favorable prospects. The 10-stamp mill has been remodeled and two more concentrators and several cyaniding tanks added. A tramway is also being built.

The work of overhauling the 10-stamp mill and the cyanide plant at the mines of the Climax G. M. Co., at Quartz mountain, near Prescott, is progressing; additional concentrating tables are being put in.——The Mark Twain mine is reported showing 12 feet of ore. They are shipping to the smelter.

A strike is reported in the mines of the Eureka G. & C. M Co., near Jerome. The main tunnel cut a body of ore which assayed $20 per ton, principally in gold. The vein is of quartz.

YUMA COUNTY.

S. W. Pease, who has been drilling for artesian water, reports having struck oil last week at depth of 400 feet in a well he was sinking at the Choyas, a placer camp 6 miles from Quartzsite. The capacity of the rig is 1200 feet and the well will be put down to the limit to further test the ground.

ARKANSAS.

MARION COUNTY.

(Special Correspondence).—The Morning Star, Beulah and White Eagle mines are hauling their ore 10 miles to Buffalo City and shipping to the smelter at Ioia, Kansas.——Hickman Bros., who have been prospecting their land on Jimmies creek with a diamond drill, have gone through a 45-foot run of zinc.

This week Manager R. Harding, of the Missouri Pacific-Iron Mountain system, inspected the work through Boone and Marion counties and was much pleased with its progress.

The Olympia expects to resume operations at their shaft Oct. 1.——Last week, by a $6 blast at the Morning Star mine, enough ore-bearing rock was broken down from the hillside to keep the mill running for two weeks.

The Iron Mountain railway is now operating to Cotter, on the east border of Marion county. Thousands of men are employed on the line from Cotter to the Missouri State line. Some heavy work is encountered near the crossing of the State line, the cost of construction of 9 miles there being at the rate of $125,000 per mile. Jack is being found all along the line where the heavy work is being done.——The new core drill ordered by Dr. Wells and R. J. Williams has arrived. This drill was built under special plans furnished by Wells.

Yellville, Aug. 26.

The White River Zinc M. Co. has been incorporated, with G. L. Mallory of Little Rock as president, to operate near Yellville.

Work has been resumed on the shaft of the Appleton mine, near Yellville, owned by Winfield men.—— Work will be resumed on the Bald Hill mine by Estes Bros.

Superintendent Richards of the McIntosh mine, near Yellville, says he has completed shipment of ore for the present. The mine will be started up this month and operation be made regular now that the ore can be sent to the market.——The Zinc Belt Mineral Co. has been incorporated by A. L. Tuttle, D. J. Hyden, J. W. Buckingham, W. R. Lorton, B. T. Buffington, E. C. Waidren and I. L. Reaves.——Drift No. 1, at the Ioia Con. mine, near Yellville, has extended 40 feet into the ore body. A concentrating plant is to be built.

CALIFORNIA.

AMADOR COUNTY.

After working a few days on the Butte basin gravel claim, near Jackson, operations were suspended on account of the flow of water being too heavy for the pumps to handle.

At the Argonaut mine, at Jackson, supplies are being received and preparations made to resume operations, says the Amador Ledger. Whether it will commence operations when it gets in condition to do so will depend entirely on the labor outlook at that time.

CALAVERAS COUNTY.

D. Palmer has taken over the Lava Bed mine, at Railroad Flat, and will begin development work next week.

At the Forty-nine mine, at Douglas Flat, work is progressing and the gravel bed is expected to be reached this month.

At the Rose Rock mine, north of Murphys, a heavier engine has replaced the one formerly in use.

Williams Bros. report work progressing at their Napoleon mine, at Telegraph, near San Andreas. They have the shaft retimbered and in working order, and they are running crosscuts and sinking winzes.——Raymond & White of San Francisco have a lease on the Colver mine. They have the shaft retimbered and are hoisting out the water.——The directors of the Rosella mine have decided to build a mill this fall.

The Golden Leaf mine, worked by Mobley Bros., at Telegraph, is progressing. They have 1000 feet of underground work done and are making a raise for an air shaft. They will start their mill next week.

EL DORADO COUNTY.

(Special Correspondence).—J. A. Parker of Oakland has bonded Mrs. F. Silvia's property in Georgetown; also B. Wooley's ranch. This ranch covers the greater part of the once famous drift mines, Mamaluke hill, that has produced thousands in placer gold, said to be for a stock company for quartz mining. A 30-foot shaft is about all the development on this property. There a good many rumors of buying, bonding, etc., but no work toward development yet.

Georgetown, Sept. 1.

The Ancient Channel M. Co. of Latrobe is putting in machinery for the mine and will increase development work.

It is reported operations on the Greek mine, near El Dorado, were resumed last week and that development work will be increased.

KERN COUNTY.

The Kopje Oil Co. of Waterman Bros. et al is reported preparing to resume operations on its land at Kern river, near Bakersfield, which has been leased for several years to the Naught Five Co. The property adjoins the lands of the Faicom, Kern Oil & Dev. and Provident.

The Yellow Aster mine, at Randsburg, resumed Aug. 31st with thirty men, and more will be put on this week. The sheriff and his deputies are protecting the employes by armed guards, who accompany the men to and from work. A few of the former men have returned to work.

The Flamioflume M. Co. put on fifteen more men at its mine in Jaw Bone canyon, near Mojave, last week.——The Echo and Karma mills at Mojave are having considerable trouble at present on account of lack of water, says the Randsburg Miner.

The Pyramid M. Co., near Randsburg, continues opening up its ground. The drift being run on the 120-foot level is in 50 feet and in ore.

M. P. Gilbert of Kingman, Ariz., reports taking an option on a group of goid-bearing claims near Mojave.

NEVADA COUNTY.

On San Juan Ridge, near Nevada City, R. I. Thomas, manager, a company of San Francisco men reports operations begun on the Shady Creek placer mine. The plant to be put in will consist of a 10-inch dredging pump, capable of handling 2400 cubic yards daily; 100 H. P. will be used, and obtained from water under a 300-foot head. During the winter season the tailings that cover the older creek gravels to a depth of 15 feet will be stripped and the bottom gravels worked during the summer months.

The 10-stamp mill at the Posey mine, near Grass Valley, began crushing ore last week, says W. H. Bray, manager of the Posey and Huron mines.

Manager C. A. Pusheck of the Mountain Maid mine, near Grass Valley, says operations will be resumed at the mine and developments increased.

At the Sixteen to One mine, near the Spanish, above Washington, good results are reported being obtained with the Huntington mill in use, such as to lead the Sacramento men owning the property to consider building a 20-stamp mill.

The Grass Valley Morning Union reports the Gold Blossom mine near Grass Valley sold to C. A. Mau of San Francisco, F. C. Eldred of Toledo, Ohio, and J. E. Poignd estre of Grass Valley, who will incorporate the California-Ohio Mines Dev. Co. to operate it. The mine is on Union hill, ½ mile southeast from the Idaho-Maryland mine. Two tunnels have been run, the upper one being in 250 feet. The second one was started 90 feet lower and struck a new ledge, which has been uncovered for 300 feet. The ledges are about 20 inches in width. Machinery will be put in and a shaft sunk.

PLACER COUNTY.

Superintendent F. P. Jackson of the gold dredging plant operating on the North Fork of the American river, near Iowa Hill, reports work going ahead satisfactorily.

SAN MATEO COUNTY.

J. E. Kerr of San Francisco has drilled a number of wells at Half Moon Bay and is building another derrick. He intends drilling several shallow wells.

The Paxton Oil Co., at Half Moon Bay, will resume work this month, having been closed down for six weeks waiting for pipe. There is 200 feet of oil in their well.

SANTA BARBARA COUNTY.

The Pinal Oil Co., near Santa Maria, reports its pipe line in working order, and shipping of oil to San Francisco via the Pacific Coast railroad will begin. A number of tanks have been put up at Graciosa station.

SHASTA COUNTY.

At Keswick, furnace No. 3 of the Mountain C. Co. was blown in last week. This enlarges the working force at the smelter by sixty men to the shift. The number of men at the smelter will be increased from time to time as the tonnage is increased, and it is expected all the furnaces will be running this fall and the converters turning out double the amount of metal at present obtained.

C. S. Osborne, superintendent of the Shasta May Blossom mine, north of De Lamar, says preparations are being made to put in additional machinery, including an engine and compressor and a diamond drill for development work.

SIERRA COUNTY.

Near Alleghany, at Kanaka creek, D. Burger, manager of an Eastern company, says he is preparing to work the bed of Kanaka creek and has put fifteen men to work.

SISKIYOU COUNTY.

C. H. Bennett, for an English company, has taken an option on the Blue Ledge copper claims, in Applegate district, near the Oregon line and south of Ashland, Or.

Cameron & Son are developing a prospect in Quartz valley, near Yreka, near the Shores mine ——Work has been resumed at the McKean mine, near Callahans, with further development in extending No. 1 tunnel, and also making a station for hoisting machinery.——The Carlock & Morrison quartz mine, in Quartz valley, is being worked.

Manager Brokaw has men at work sinking a shaft on the Golden Eagle quartz mine at Indian creek, near Yreka.

TRINITY COUNTY.

Five more stamps are being added to the Dorleska mill at Dorleska. The main ore chute of the Dorleska is 17 feet wide and carries values in gold. The five stamps of the mill and a Huntington crusher are in full operation.

A number of Trinity county mines are shipping ore to Keswick, Shasta county, taking advantage of the custom smelting being done by the Mountain C. Co.'s smelter. These quartzose gold ores are desired as a flux at the smelter.

M. Rose reports opening a ledge of galena on his mine on Deakin gulch, in Coffee creek section, near Trinity Center. The ledge is 8 feet in width at the surface and was uncovered by sluicing the sidehill with water under pressure. Rose will develop the prospect.

J. C. Hyle and O. J. Hepburn of Philadelphia, Pa., of the Last Chance M. Co. have made arrangements to resume control of the Paulsen mines on Trinity river, near Weaverville. The Grass Valley water will be carried across the Trinity to Union hill and that placer property worked. The company will be reorganized.

TUOLUMNE COUNTY.

Superintendent G. Stayton reports a strike of gold ore at the Willietta quartz mine, 4 miles from Chinese, on the Tuolumne river. In driving a crosscut from an old tunnel, they struck a body of ore showing free gold.

The Big Creek G. M. Co., composed of Maine men, is operating 5 miles east of Groveland. Superintendent Watson says he has men at work on the Justice and also on the Katahdin.

At the Rawhide mine, near Jamestown, forty stamps are dropping in the mill.

At the Bell mine, near Tuttletown, a station has been cut at the 500-foot level, and sinking to the 600-foot point is progressing.

At the Mount Jefferson mine, at Groveland, the mill is running steadily on ore from the stopes and drifts on the 300, 400 and 500-foot levels.

Superintendent H. Argall has overhauled the pump and other machinery at the Cosmopollte mine, near Groveland, and expects to resume this month.

COLORADO.

(Special Correspondence).—With silver at 60 cents, a large number of mines which have been idle for a number of years would doubtless start up. With the advance it has already made, it will mean much to mines already producing silver.——The feeling all over the State seems to be to strike. In places they do not seem to have any special grievance—simply want to strike. In places it will be a question as to who can stand it the longest without work before the strike is settled—employe or employer. In other places it is a question as to who shall be the dictator—the man who puts in his time, money and brains (the man who risks everything), or the walking delegate or agitator, who has nothing to lose and everything to gain. At Idaho Springs the union seems ready to settle; but the operators, before taking them back, want them to agree not to go out on strike at the demands of the union.

Denver, Sept. 1.

BOULDER COUNTY.

A deposit of high-grade mica, of sufficient quantity and quality to pay for shipping, is reported found by J. Bruner and W. J. Korf, of Eldora. It is one of the spurs of the Snowy Range, known as Beach mountain, 9 miles southwest of Eldora. It averages squares of 3½x6 inches.

CLEAR CREEK COUNTY.

At Lawson work is progressing on the Commodore mine, and at the Princess of India tunnel, on the opposite side of the creek, which will take on more men this month. The Joe Reynolds tunnel is nearing the main shaft and continues a steady shipper. J. F. Standish is sinking on the

Last Chance and has discontinued tunnel driving for the present. R. C. Vidler of Georgetown continues the work for the East Red Elephant Co., which will operate on the same mountain as the Commodore.

A 40 H. P. steam hoist has been placed on the Gomer mine, near Georgetown, in place of a 12 H. P. gasoline plant. The Gomer M. Co. is operating up Spring gulch.

CHAFFEE COUNTY.

A strike of silver ore is reported in the 800-foot tunnel on the Eureka mine near Cottonwood lake, 12 miles west of Buena Vista, by Superintendent A. Closs.

CUSTER COUNTY.

The lessees of the Louella mine, near Silver Cliff, report opening a body of ore that runs 15% copper, 75 ounces of silver and some gold. The ore was opened at 150 feet depth. It is intended to sink the shaft to 250 feet, when regular shipments will begin. A lead carrying chloride of silver, which also shows gold and copper, has been opened near the King of the Carbonates mine by J. W. Preston and Prof. Ray.

EL PASO COUNTY.

The Telluride R. Co. has sold to the General Metals Co. of New York the Telluride mill at Colorado City, and the latter company will acquire the right to use the bromine process at all of its plants to be erected, paying royalty for such use to the Telluride R. Co, says the Mining Record. C. E. Finney, of New York, is manager of the General Metals Co., which has been organized to engage in the business of extracting gold from ores by the bromine process, and will build for the purpose a number of reduction mills throughout the North and South American countries. C. D. Grove will continue as superintendent of the Telluride mill.

The union men are out on a strike at the Telluride mill, in Colorado City, and Manager Fullerton states that no attempt will be made to resume operations until the Cripple Creek strike is ended. Fullerton refused to accede to the demands of the union that W. Keene be permanently discharged.

FREMONT COUNTY.

Work is progressing at the coal mine being opened near Williamsburg by S. Smith. A trestle has been built. A long slope is being driven to cut the coal measure, and will be completed by October 1.

A considerable tonnage of lime rock is going to the steel works at Pueblo from the Colorado Fuel & Iron Co.'s new lime rock quarries at Howard. It is said the company expects to be shipping from 100 to 150 carloads of lime rock from the quarry daily by October 1.

The ore at the Union mill at Florence having been run through, the mill has closed down till such time as the striking miners return to work. In the meantime the machinery will be overhauled and be put in repair. It is reported that the mill trust will dismantle the Metallic mill and remove it to the De Lamar-Wall group of mines in Utah. Some of the machinery was taken to Canyon City, to be used in reconstruction of the Canyon City smelter. It is also reported that the company will also remove its National mill south of Florence. The Dorcas mill is still running.

GUNNISON COUNTY.

The Eureka M. Co., near Crested Butte, has begun producing zinc-lead ore from the Garfield, one of its group of claims, and a jack train will deliver the ore from the mine to the concentrator.

HINSDALE COUNTY.

W. F. Butler has a bond and lease on the M. G. group in Horseshoe basin, near Lake City, and has put men to work there.

Machinery for the Hanna M. Co.'s mill at Capitol is on the ground and is being set up.

LAKE COUNTY.

The tonnage of Leadville district is holding up and shipments are averaging 2500 to 2750 tons a day from all classes of ores, says the Times. Cars are not plentiful. The production is well scattered over both the silver-lead and gold belts. Diamond drill operations in the "downtown" section continue with satisfactory results. The work with the diamond drill on the gold belt has also been successful, and the deepening of shafts of the Ibex, the Monarch and others, and the sinking of new deep shafts will be done, some of which is already under way. The zinc tonnage, which ten years ago was nil, now ranges to 8000 tons a month. The closing down of the smelters in Denver has been felt to some extent, but the plants at Leadville and at Salida are running full blast. If the Denver plants were going, it is expected the output of the district would run up to 3000 tons a day.

Operations continue at the Sharp placer mines, near Leadville, and development is being increased. The ditch water brought in to wash out the gravel in sluice boxes is turned into a large tank, from which it is pumped out and piped up to the embankment to be played on the gravel and wash it down. The plan of hauling the gravel out in cars and dumping it in a sluice was found too expensive and slow.——Owers & Co. of Idaho Springs have made arrangements to put down a drill hole near the Sharp placer operations and prospect the formations. One-half mile east of them, at the Homer mine ground, the work of prospecting has been renewed. Manager H. I. Higgins proposes to sink his shaft deeper.

Arrangements have been made to start up the Buckeye mine on Fryer hill, Leadville, this week. This is an iron proposition.——R. B. Estey and T. D. Kyle, who have the lease on the Fitzhugh group, expect to be shipping ore this month from the sulphide bodies which have been idle for several years. At present they are driving a drift at the 452-foot level to the stope.

The Resurrection mill at Leadville, after undergoing repairs, is running full force again, and 125 tons a day are being handled. It is expected the company will increase its shipments. —— The Crown Point mine, near the Bartlett mine, on Sugar Loaf mountain, has resumed after a shut down of twenty years, says the Carbonate Chronicle. The lease is in charge of W. B. Ridgley. The shaft has been opened.

LA PLATA COUNTY.

The work of developing the Mancos contact on the La Plata side of the divide between La Plata and East Mancos has been started by H. C. Deming of Harrisburg, Pa., who has a lease and bond on C. C. Carnell's group of claims at the head of Boren gulch, says the La Plata Miner. Shipments to the smelter began this week.

The Chief M. Co., near La Plata, is sinking a winze in the upper tunnel and it is expected work will be resumed on the lower tunnel next week.——Two shifts are working on the Little La Plata-Red Cloud mine and sacking shipping ore.

PARK COUNTY.

Superintendent A. E. Whiting of the Wolverine M. Co. at Tarryall says operations will be resumed on the company's property this week.

PITKIN COUNTY.

Smoke and gas are growing worse in the Smuggler mine, near Aspen, and those connected with it by tunnel; the underground workings have been temporarily abandoned and a few watchmen are all that are left on the property. The Mollie Gibson mill was compelled to close on account of not getting sufficient ore from the other mines. All of the Smuggler ore was treated at this mill.

RIO GRANDE COUNTY.

The T. M. Bowen mines at Summitville, comprising 174 acres of patented grounds, were sold last week to P. Schuch for $20,000. Schuch has the cyanide plant on the Reynolds mine at Summitville.

SAN JUAN COUNTY.

Work is progressing on the aerial tram at the Henrietta mine in Cement creek basin, near Silverton, and it is expected the tram will be in operation next week. The Henrietta is owned by the San Juan S. & R. Co. The cost of tramming the ore from the mine to the Gladstone Railroad will, it is said, be 15 cents a ton, whereas the former cost of transporting it by wagon from the mine to the basin, when the weather permitted, was $2 50 a ton. The daily capacity of the tram will be 500 tons.

SAN MIGUEL COUNTY.

On Sept. 1st all union mill men in the Telluride district went out on a strike. The Smuggler-Union Co.'s Pandora mill was forced to suspend operations, but at the company's new mill Manager Wells says he has enough non-union men to keep it in operation. The Liberty Bell, the Nellie and the Columbia Menono mills are closed down, and only one man is working at the Alta. The strikers demand an eight-hour day.

SUMMIT COUNTY.

H. L. Monroe of St. Louis, Mo., president of the Wire Patch G. Co. (reorganization of the Wire Patch G. M. & M. Co.), says preparations are being made to operate the Wire Patch group, near Breckenridge.

TELLER COUNTY.

Killian & Geer, operating in the seventh level of the Doctor-Jack Pot mine, near Cripple Creek, report getting out ore which yields 27 ounces in silver per ton, in addition to the gold values, which run 2 ounces.

J. Campbell & Co., who have a contract for sinking the shaft on the LeClair claim of the LeClair G. M. Co., near Cripple Creek, have put in an air compressor and will operate one drill. The shaft is down 325 feet. Sinking will continue to the 400-foot level when lateral work will be started. Crosscuts will be run out south and east to cut the Mary McKinney basalt from which values have been taken on that property.

The Acacia Gold M. Co. has given a two years' lease to Wyatt & Sharp on the Wrockioff shaft of the Burns claim at Cripple Creek. The lessees will sink the main shaft, now down 800 feet, to 1000 feet and pay from 15% to 30% royalty on all ore shipped. The purpose of sinking the shaft is to further open the Burns vein. The Wrockioff shaft is equipped with a steam plant.

The Hull City placer, near Cripple Creek, under lease to A. E. Carlton & Co., will be started as soon as the labor difficulty is settled, and meanwhile the machinery is being overhauled. Improvements have been made in the engines and compressor. A 250 H. P. boiler will be added.

The Ingham cyanide mill at Cripple Creek will increase its capacity to fifty tons per day. Larger elevators are to be put in also.

The Milwaukee M. & L. Co., sinking the shaft on the LeClair claim at Anaconda, has put in a one drill air compressor. The shaft is down 315 feet and it is intended to sink until the 400-foot level is reached, when lateral work will be started. A crosscut will be driven south and east with expectation of cutting the Mary McKinney flat basalt vein.

The Colorado M. & L. Co., operating on the Dexter claim on Bull hill, Cripple Creek, have a shaft down 500 feet and will sink to 1000 feet. Regular ore shipments are being maintained. The ore is giving returns of $30 in gold to the ton. Stoping is being done on the first, second and fourth levels. Another station will be cut at 570 feet. The management propose putting in an air compressor to supply air for three drills.

The heading of the Cripple Creek drainage tunnel, south of the El Paso shaft, broke through into the north lateral from the Ocean Wave shaft on the 24th ult., thus opening the tunnel for 3000 feet south from the main El Paso workings, says the Gazette. There then remained 73 feet of country rock between the port 1 heading and the south heading of the Ocean Wave shaft, which was expected to be broken out in five days. The contractors pumped out the Ocean Wave shaft and put men to work south toward the portal. When this is cut through the tunnel will be open from the portal to 1000 feet north of the El Paso shaft. August 25 was the original time limit for the completion of the tunnel, but as the contract carried a strike clause no penalty will be inflicted on the El Paso Co., which has been driving the bore. The tunnel was started seven months ago and was rushed through, gaining about ten days on the contract during the last thirty days prior to the strike, and would have been completed on August 15 had there been no strike interference, says Superintendent W. Bainbridge.

Cripple Creek advices of September 2nd say there seems to be a likelihood of the State troops being ordered to Cripple Creek. The sheriff of Teller county has not asked for troops, but it is understood that an appeal for protection has been made to the Governor by business men of the district. The C. K. & N. and the Old Gold mines, which adjoin the El Paso properties on Beacon hill, have resumed. Manager N. Franklin has fifteen men at work at the Eagle sampler, handling El Paso ore. Manager J. Burns has reopened the Portland mine and has 500 men at work. Arrangements were made by Burns with the union officials, whereby both union and non-union men would be taken on and soliciting membership allowed during the noon hour. The Vindicator mine, on Bull hill, pulled its pumps on the 28th ult. and the mine will be allowed to fill up with water. This action is said to be due to the Hull City and Findley properties having failed to pay their share of the cost of pumping which serves to unwater all the properties concerned. The Golden Cycle, as well as the other properties named, will probably be flooded.

IDAHO.

BOISE COUNTY.

The 10-stamp mill for the Magnolia mine, near Idaho City, is on the ground, and the company is putting up a saw mill. The shoot on the Magnolia has been opened for 200 feet. The ledge is 20 feet wide, averaging $10 a ton.

M. M. Gibson says work was resumed this week on the Grant and Globe quartz claims in Rocky Guich, near Idaho City. The tunnels will be driven ahead.

A development plant is proposed for the Osborne mine at Pearl, Idaho, owned by C. J. Bassett et al.

CUSTER COUNTY.

The Bachelor mountain mines are reported bonded to R. Macbeth et al. of Custer and of Salt Lake City, Utah, for $7500. The group is said to show a 21-foot ledge at a depth of 160 feet, with values in gold. Men have been put to work.

IDAHO COUNTY.

T. Hye of Spokane, Wash., manager of the Eureka mines at Newsome, says he has men at work running a tunnel 500 feet long, which is in 95 feet. They are following the ledge, which is 12 inches wide. The company plans to put on a 5 stamp mill in the spring.

Manager Perkins of a Pittsburg, Pa., company has bought the Fuller-Lawrence group of ten claims and three fractions for $100,000. The property adjoins the Dewey mines near Roosevelt, in Thunder Mountain district.

Machinery is being put in by the Pittsburg Tunnel M. Co. at their mines near Roosevelt, in Thunder Mountain district. The machinery consists of a shingle mill, planer and joiner, water wheel and engine and boiler. A sawmill is being set up and a 10-stamp mill will be built, says C. R. Dixon, a director. In the spring an electric dynamo will be put in to furnish lights for the mines and to operate the electric drills.

C. J. Perkins et al, of New York, have bought the H. Y. group of claims near Roosevelt and a cash first payment of $10,000 made.

KOOTENAI COUNTY.

W. T. Bailey of the Continental mine, near Port Hill, states the company will not put in the proposed concentrator till next year. At that time they expect to build a 100-ton plant. Work is progressing on the mine and ore is being taken out at rate of thirty tons per day. The road from Port Hill to the mine, 24 miles, has been repaired.

LEMHI COUNTY.

President St. V. Le Sieur of the Le Sieur Opal M. Co. says they have begun to operate the opal mines near Forney. S. L. Le Sieur is manager. The company expects to have its plant at the mine ready for turning out polished opals by Oct. 15.

G. W. Thompson and N. Hibbs of Lewiston have bought the Richardson Bros. & Pope group of claims in the Salmon river country for $200,000. It is intended to begin work this month and add such machinery as is needed.

W. L. Cook of Nephi, Utah, reports having men at work opening up the Royal Harlequin group of opal claims, adjoining the North American Opal Co., near Salmon City. The same section, says Mr. Cook, is rich in lode and placer gold. Ramey Bros. are working a flat on Silver creek with hydraulic power with good returns.

OWYHEE COUNTY.

At the Florida Mountain mill of the Trade Dollar M. Co., at Dewey, the battery of boilers and the Corliss engine have been displaced, and all the machinery will be run by electric motors. There will be three motors: A 75 H. P. motor on the upper floor and connected to a shaft which will run the batteries, rock breaker and vanners; a 100 H. P. motor to drive the pans and settlers, and a 10 H. P. motor in the machine shop on the ground floor. The power is brought from the Swan Falls plant, 27 miles distant on Snake river. Aside from the change from steam to electric power at Dewey, other improvements have been made. The machine shop, formerly at the Blaine mill, is in the Florida Mountain mill. A new ore house with bins of larger capacity has been built at the end of the tunnel track above the mill, and connected by covered tramway with the top of the mill. Heavier rails have been laid and the track in the tunnel made a broader gauge, with a view of substituting an electric motor for mule power.

SHOSHONE COUNTY.

Since the strike made on the O. K. mine last week it is the intention of the company to build a mill. When the ore shoot was struck on the 400-foot level drifting was started and has gone in 70 feet. The ledge is 4 feet wide. Of this there are 2 feet of milling ore. The O. K. mine adjoins the Silver King mine, near Wardner. B. F. O'Neill, A. Burch, O. H. Linn and J. W. Flink are interested.

A company is being organized at Orofino to exploit the coal prospects on Orofino creek. Considerable work has been done and the quality of coal is said to be improving.

MICHIGAN.

CANYON COUNTY.

The Magnolia group, on Miller mountain, near Nampa, will be equipped with a 20-stamp mill by the Nampa M. Co., which owns it. Ore bodies have been developed averaging $15 per ton in gold. Miller mountain is on the State wagon

road near the crossing of the Payette river.

KEWEENAW COUNTY.

Sinking is progressing in the Allouez shaft of the Allouez C. M. Co., at Allouez, on the Kearsarge amygdaloid, the overburden of 50 feet having been successfully gone through, and is in the ledge.

HOUGHTON COUNTY.

The jigs are in place at the Franklin mill at Hancock for the fourth head, and the other work incidental to installing the head is progressing, says the News.

The Elm River Co., since resuming work on the Winona lode, near Winona, last June, has sunk its No. 2 shaft to the 300-foot mark. Two drills are running and it is intended to carry this shaft to a depth of 1000 feet and then drift, to thoroughly test the lode at depth. The lowest drifts were at a depth of 250 feet from the surface.

The burning of A shafthouse of the Atlantic mine, near Houghton, has delayed development work. The erection of a temporary shaftbouse is under way. Eight drills have been used in the drifts tributary to A shaft, but these have been divided between B and D shafts. As A shaft produced not over 25% of the Atlantic rock, the management, by crowding B and D shafts, can maintain nearly the former output until A shaft is again in commission. The copper contents of the lode, which for the first six months of 1903 averaged in excess of seventeen pounds per ton of rock, have recently shown a falling off, present results being sixteen pounds per ton, says the News.

MONTANA.

DEER LODGE COUNTY.

Official announcement has been made that operations will be resumed at the concentrator at the Washoe smelter at Anaconda on Sept. 10th.

FERGUS COUNTY.

Superintendent T. Riser has men on development work on the Wright mine, between the Kendall and Barnes-King mines near Kendall. The main tunnel is being extended along the hanging wall of the ore body. It is intended to drive this tunnel 700 feet. It is said the ore can be worked by cyaniding.

GRANITE COUNTY.

The Willow Creek M. Co. has been organized at Philipsburg by J. H. Grant and D. Olson of Philipsburg, and W. H. Wahl and T. J. Haugeberg of Washburn, N. D. The company owns a group of seven claims on Willow creek, 16 miles west of Philipsburg, and has in addition a millsite, water rights, etc. The ore is a free-milling gold proposition.

JEFFERSON COUNTY.

Canol & Martin of Helena, who are working the Sure Thing mine, in the Ontario district, near Basin, will sink another 100 feet from the 200-foot level. They have started their mill on the Argo and Eclipse mines in Hellgate canyon and are producing 10 tons of concentrating ore per day, which averages 15% copper. They propose to double the capacity of the mill.

LEWIS AND CLARKE COUNTY.

The Piegan M. Co., near Marysville, has bonded three adjoining claims from the Kelly Bros. of Empire, on which is a vein 40 feet wide, and development work is under way.

Development work is progressing in the Liverpool mines in Lump gulch, 9 miles from Helena, and ore is being taken out. Shipments will begin next week. At the 500-foot level a drift is being driven east on the vein. While work is being done on the 500, 600 and 750-foot levels, no stoping has been done. Stoping will begin next week at the 600-foot and 750-foot levels. The ore has to be hauled 1½ mile down hill and the cost of taking to the smelter is expected not to be over $1 a ton. The ore runs well in silver.

SILVER BOW COUNTY.

Judge Clancy, in the District Court at Butte, on the 29th ult., in the so-called "Nipper case," rendered the decision for the United C. Co. (the plaintiff) as against the Washoe M. Co. and the Anaconda C. Co. The United C. Co. claimed the ore bodies on the theory that they were extralateral portions of the Nipper vein, which they alleged had an existence in the Nipper claim and crossed it east and west and dipped to the south through the south side line. This was denied by the defendants, who claimed the so-called Nipper apex and vein did not exist, and that the only vein in the Nipper claim was the Blue X fault or fissure. An appeal will be taken to the Supreme Court.

NEVADA.

ELKO COUNTY.

The slimes plant, with which the mills of the mines at Tuscarora of the Dexter M. Co are being equipped, will be ready for operation this week. It is designed to recover the auriferous contents from 30,000 tons of material that fill the slimes pond, averaging $5 per ton value.

ESMERALDA COUNTY.

At Gold Mountain, 4½ miles southwest of Tonopah (Nye county), the Gormy & Bjornerud group of seven claims, adjoining the Battleship group on the south, were sold last week to the Gold Mountain-Eagle M. Co. of California. H. J. Gormy is manager and has begun development work.

NYE COUNTY.

At Cloverdale, C. Sweeney of Spokane, Wash., is reported to have bought the King-Baldwin group of seven claims, 1 mile from the original Workman discovery, for $5000.

STOREY COUNTY.

The Butters Co. has bought the Imperial mine dump at Gold Hill, and will crush the material at the Best & Belcher mill and flume the tailings to their plant in Six-Mile canyon.

WASHOE COUNTY.

A. J. Pritchett, S. Porteous et al of Reno report finding a ledge of quartz carrying free gold, ¼ mile from the Southern Pacific railroad track, 27 miles east of Reno and about 8 miles west of Wadsworth.

WHITE PINE COUNTY.

Manager P. H. Cannon of the Old Imperial M. Co., near Cherry Creek, reports development work progressing on the drifts at the 250 foot level of the New Century mine. They are taking out good grade gold-silver ore the full width of both drifts. A blast and fan are now supplying fresh air in the drifts and eighteen men are at work. An assaying laboratory has been built.

Work on the Rising Sun group, near Ely, has opened up a vein of copper ore 4 feet in width, and assaying 20% copper, with some values in gold, says the White Pine Miner. M. McDonald of Tonopah has an option on the group.

NEW MEXICO.

GRANT COUNTY.

The Santa Rita M. Co.'s concentrating mill at Santa Rita has been enlarged and remodeled and four slime tables added to the equipment. The mill has capacity of 180 tons per day. Operations were resumed this week.

W. McAllister of Silver City reports making arrangements for a 60-ton concentrator to handle the low-grade ores of the Aztec group of mines at Pinos Altos. The Aztec mill, 1 mile north of the town, will be moved and set up with the new plant at the mines.——The Mogollon G. & C. Co. have added a boiler and engine to their plant.

LINCOLN COUNTY.

The Mescalero M. & M. Co. has been incorporated, with principal place of business at Roswell, by J. A. Ryan, C. R Young, A. L. Norfleet and J. E. Hurd, the last named being the general manager. The company owns ten claims on Rio Bonito.

SAN MIGUEL COUNTY.

S. Binns of Baxter Springs, Kan., manager, says he is arranging for a copper reduction plant at the Archibald & Pettis mines, near Mineral Hill.

OREGON.

BAKER COUNTY.

Machinery for the Alpine 20-stamp mill, near Sumpter, is on the ground, says J. Temple Grayson, manager of the Alpine M. Co. The sawmill will begin cutting lumber this week for the mill.

D. Grant and B. Rusk of Bourne last week bought, for $30,000, three claims in the Platts group, on the Rock creek side of the Elkhorn divide, and adjoining the Oregon Clipper of the South Pole group, near Sumpter, says the Miner. Development work will be started.

J. W. Larkin of the Cougar mine, near Sumpter, says work is progressing. The crosscut is being driven and arrangements are being made to resume work at the mill.

The Don Juan mine, near Sumpter, has been sold to J W. Davidson for Michigan men. Davidson is making arrangements for pumping out the shaft and opening up the lower workings.

DOUGLAS COUNTY.

Men have been put to work at the Riverside mine, near Bohemia. Work will hereafter be done by the day, instead of by contract. Another tunnel has been started on the vein, which will be used as a working tunnel for the entire group.

GRANT COUNTY.

E. S. Topping and W. E. Sanders have a bond on the Monitor claim, adjoining the Oriole mine, near Susanville. The Monitor is one full claim and a fraction, and will be worked in connection with the Oriole. Operations will be started next week, and it is expected plans for a mill will be considered.

The Stockton M. Co. at Galena is preparing to resume development. It is intended to sink a new shaft in the vertical and to build a mill.

Manager A H. Willett reports development work will begin next week on the Copperopolis mine, in Quartzburg district, near Granite.

SOUTH DAKOTA.

LAWRENCE COUNTY.

Operations on the Hercules mine and the Branch Mint M. Co. mine in the Bear Butte district near Deadwood are progressing; also at the Golden Crest, Gilt Edge-Maid, Ruby and Oro Fino properties. Work of change in the milling plants of the Branch Mint is under way. The water has been pumped out of the workings of the Hercules, and drifting on the body of porphyrite ore which exists at the 230-foot level of the mine has been started.

The Rex M. Co., operating a mile south of Lead, report the double-compartment shaft in ore, being a white quartz carrying values of about $7 a ton, and showing galena. Sinking continues and crosscutting will be started. It is expected a treatment plant will be built.

Alterations at the Hidden Fortune mill, below Deadwood, are progressing and the company expects to be ready for work by Sept. 1. A plate house is being built and amalgamating plates will be put in over which the ore will be run after it has been treated in the cyanide vats. This mill has a capacity of 300 tons daily. As soon as the first section is on a permanent working basis the company proposes to double its size.——The Capital G. M. & M. Co. has been incorporated by local Lincoln, Neb, men to operate a group of claims at Texana, along the Northwestern road, in Deadwood gulch, 3 miles above Central City. This group consists of sixty acres and the company also has under bond a number of other claims adjoining. J. Harrop of Lincoln, Neb., with C. H. Nelson and C. P. Ames of Deadwood are officers.

UTAH.

BEAVER COUNTY.

The Horn Silver mine at Frisco is maintaining daily shipments of fifty tons to the smelters. The ore averages 30% in lead. An increase in output is expected this fall.

F. O. Meakin of Salt Lake City of the Wasatch King M. Co. reports having men at work upon their group in the northern part of Beaver Lake district, near Milford. In the copper vein, which is 4 feet wide, there are 20 inches of ore that runs high grade. The gold vein opened on another claim is also showing values.

J. E. Meyer of Salt Lake City of the Federal G. & C. M. Co, operating near Milford, says two shafts are being sunk. The Federal group adjoins the Majestic on one side.

IRON COUNTY.

The Colorado Fuel & Iron Co. made an addition to its Utah holdings last week by buying for $90,000 of the Taylor estate six iron claims near Kanarraville, says the Tribune. The six claims are the Blowout, Excelsior, Black Magnetic, Chesapeake, Duncan and Desert Mound. The Duncan is said to contain a large body of soft hematite. The Desert Mound is also a hematite proposition and is favorably situated for working, being accessible to a railroad. The Blowout has the largest amount of iron in sight of the group. A few men are at work on experimental development. There is thought to be no intention of a local treatment plant, as the company already has a large plant at Pueblo, Colo. Another objection to a local iron smelter is the insufficiency of water and coal in the vicinity.

JUAB COUNTY.

Superintendent Legg says arrangements are being made for the 50-ton concentrator for the Uncle Sam mine, near Eureka, and he expects the mill to be in operation by Nov. 10. Water will be procured from the Bullion-Beck pipe line.

W. D. Sheppard has men at work on the Pioneer mine, south of Diamond, and is putting up a gasoline hoist. A mill will be in operation by Nov. 1.

The Centennial-Eureka mine shaft at Eureka has been completed to the sixteenth level—a depth of 1800 feet—and a station is being cut at that point.

At Mammoth, the management of the Victor Con. mine report taking out high-grade ore from the 500 foot level at a point under the winze where ore was struck at depth of 60 feet below the 400-foot level.

The Black Jack mine shaft, near Eureka, says Manager D. Evans, is down 1180 feet, being put down at rate of 4 feet per day. It will continue to the 1400-foot point.

Manager Joseph of the Carisa mine at Eureka says a number of lessees on their ground are shipping ore—both copper and silver-lead—and the company is taking out copper ore from the tunnel, the 100-foot level and the 700-foot level. The new ore body opened up by the company on the 1000-foot level is showing good values.

PIUTE COUNTY.

At the Sevier Con. M. Co.'s group, near Richfield, the mill is nearing completion, Acting Manager C. W. Foster says.—— Six miners are at work in the tunnel on the Annie Laurie Extension, and another shift will be added next week. The Annie Laurie vein is expected to be tapped by Sept. 10th.

L. Neilsen is driving a tunnel on the Outzen group, in Mount Baldy district, near Marysvale.

Needed repairs are being made at the Trapper's Pride mine, near Marysvale, says Superintendent A. D. McLain, after which more men will be put on and further development work done.

P. A. H. Franklin of Salt Lake City is reported to have bought the Deer Trail mine, near Richfield.——Shipments of ore have begun from the Aldebaran mine, says Superintendent B. T. Ashby. In the winze being sunk on the shoot values are showing.

SALT LAKE COUNTY.

The Michaelson M. & M. Co. has been incorporated at Salt Lake City by C. O. Michaelson, P. I. Dockendorf, D. Burlough and J. H. Hiller.

The equipment at the lime quarry of the American S & R. Co., north of Salt Lake City, which was destroyed by fire last week, is being replaced. The new crushers and other machinery are on the ground. The fire caused no cooling of furnaces at the smelters, as they have a reserve supply constantly on hand.

The Little Eddie G. & C. M. Co. has been incorporated at Salt Lake City by E. McCarrick, A. H Page and J. McCarrick, to operate in Bingham.

There are twenty-two teams and forty men employed on the Utah Copper Co. concentrator site at Bingham, doing grading work. Concrete work began this week.

The Continental Alta M. Co. is working 300 men on the Grizzly and Lavinia claims at Alta, says the Tribune. No ore is being shipped as yet, but is being blocked out.——Down at the Albion tunnel machine drills are being used.

At the Silver Shield mine, at Bingham, Manager H. S. Joseph says it seems that the Niagara tunnel at 5300 feet has broken into the vein that has been worked in the upper levels. The mineralized portion of the vein is 3 feet in thickness, and 1 foot carries 32% lead, seven ounces in silver and 6% copper.

SUMMIT COUNTY.

At the Keith-Dearns mine, near Park City, work is progressing on the mill which is expected to be ready for operation by October 1.

The management of the Daly-Judge M. Co., operating at Park City, has decided to use a gasoline locomotive for movement of ore cars in the tunnel between the mine and mill, in which new tracks are being laid It is expected the track laying will be finished next week. The mine is shut down, pending these improvements, says Manager O. J. Salisbury.

WASHINGTON.

FERRY COUNTY.

Near Danville, the Lucile Dreyfus mine has six men at work, and is sending out fifteen tons of ore per day to the smelter. ——The Mineral Hill Con. M. Co. has started work on a tunnel on the Copper Bullion claim, which will be driven 1100 feet. This is expected to open the extension of the Lucile Dreyfus vein, says Manager Humphreys of Spokane.

Superintendent H. Brooks has put men to work on the St. Crispen mine, on Sheep creek, near Northport. The mine carries gold and copper values.

At Republic, at a depth of 600 feet in the Quilp mine, a 20-inch streak of ore has been opened up, says E. L. Tate. The values average $200 in gold per ton. The ore was first struck in the 400-foot level, which is 525 feet deep, and drifted on for 90 feet. It proved 5 feet wide, with a high-grade streak of 20 inches. It carries seventy-five ounces silver per ton in addition to the gold. Development work continues, and fourteen cars of ore per week are shipped to the smelter.

Manager W. D. Church of the Tom Thumb mine, near Republic, says as soon as arrangements are made with the smelters to take sufficient ore to pay for pumping the water out of the mine it will be reopened.

W. Hoffstedter, J. O'Donnell and J. Meyer have taken a lease on the Copper

King mine, on Belcher mountain, near Republic, and will start work this week.

LINCOLN COUNTY.

Iowa men have bought the Evergreen mining claim, in Cedar canyon, near Davenport, of Davis Bros. for $3000, says the Spokesman-Review. The claim is a copper prospect and adjoins the Turk group of claims. The new owners have put four men to work, continuing the shaft.

OKANOGAN COUNTY.

J. Drumheller, of Spokane, and J. Wentworth, of Loomis, with New York men have incorporated the Copper World G. M. & S. Co., to operate the Copper World group of fifteen claims. Shafts and tunnels will be started and later it is expected to build a smelter.

W. G. Madison of Spokane, manager of the mines of the Bodie M Co., near Curlew, says he is putting in machinery for the milling plant, which consists of a 10-stamp amalgamation-cyanide mill, a sawmill and a power plant for both. The sawmill will have a capacity of 15,000 feet of lumber per day, and the power plant will furnish 60 H. P.

SNOHOMISH COUNTY.

It is reported the Amalgamated Copper Co. has bought the Monte Cristo mine and smelter at Monte Cristo.

WYOMING.

ALBANY COUNTY.

A body of covellite is reported struck in the Albany mine, 3 miles east of the Rambler mine at Holmes, in the Douglas district. It is owned by the American Copper Co.

UINTA COUNTY.

Superintendent Deming says the well of the Idaho-Wyoming Oil Co. at Spring valley is 1350 feet deep and the drill is in slate. The Spring valley field is an extension of the Fossil field and has several producing wells. It is expected that the Idaho-Wyoming well will have to penetrate 150 feet more of shale to reach the oil-bearing sandstone. The wells in Spring valley are from 1200 to 1700 feet deep. In the latter the oil has risen 1200 feet and a pump is being put in to raise it.

FOREIGN.

AFRICA.

NATAL.

It is reported an important find of cassiterite has been made near Ichanga Station, says the South African Mines.

TRANSVAAL.

The following table gives the gold yield of the Transvaal for the years indicated:

Year.	Value	
1884.....	£10,000	$48,665 00
1885.....	6,000	29 199 00
1886.....	35 000	170 327 50
1887	169 000	822,438 50
1888	967,000	4,705,905 50
1889	1,491.000	7.255,951 50
1890	1,870,000	9,100,355 00
1891.....	2,938,000	14 297,777.00
1892	4 698,000	22 862 817.00
1893.....	5,649,000	27,490,858 50
1894	7 809,000	38,002,498 50
1895	8,578,000	41,744 837 00
1896	8,598,000	41 842.167 00
1897.....	11,476,000	55,847.954 00
1898.....	16.044,135	78,078,683 17
1899.....	15,782,640	76 806,217 56
1900	1,457.684	7.093.819 00
1901.....	1,014 687	4,937 974 28
1902	7,269,888	35,378,909 95
1903 (June 30).....	5,579,730	27,153,756 04
Total	£101,442,764	$493,671,211 00

WEST AFRICA.

At the Himan concessions sinking is suspended pending installation of sinking and pumping machinery, which has arrived on the ground. The shaft is down 100 feet.

AUSTRALIA.

QUEENSLAND.

At the Lancelot Freehold Tin & Copper Co., at Newellton, during July the 5-stamp battery crushed 213 tons Lancelot tin ore for thirty tons of dressed, 65% tinhismuth ore.

The Mungana, at Chillagoe, report for July 1549 tons of ore handled containing 95¾ tons of copper, 7912 ounces of silver and 165 tons of lead.

WESTERN AUSTRALIA.

At Kalgoorlie, the need of thoroughly prospecting in depth the large area of abandoned ground lying south of the productive section of the Kalgoorlie Golden Mile is shown by the extraction of gold-bearing ore from a small lease, known as the Merriwee, in that part of the district, says the West Australian Journal. The rock is of hard quartz intermixed with ironstone, and the results obtained from two crushings show it to carry 8 dwt. gold over a width of 18 inches. With a view to further testing the reef the shaft will be deepened from 30 feet to 50 feet.

The Coamopolitan Proprietary at Kookynie, in North Coolgardie field, has sunk the main shaft 100 feet on the underlay.

The report issued by the government assistant geologist shows that the Princess Royal reef at Cue has yielded 6534 ounces for 6720 tons. Of this quantity 449 tons came from the Royal Secret, the yield from it being 364 ounces. The amount of cyaniding that was done on the Princess, and which was the means of helping to hold the ground so long, was 2370 tons, which yielded 399 ounces. Besides the addition of plant, which increased development necessitated at the new shaft, several buildings have been erected on the lease.

Hereafter the monthly yields from most of the Western Australia mines controlled by Bewick, Moreing & Co are to be given in fine gold, says the West Australian Journal. The Lake View Consols and Ivanhoe already declare their outputs in fine ounces, and the supplementary list of companies now to follow suit includes the Sons of Gwalia, the Great Fingall, the Golden Age Consolidated, the East Murchison, Waroonga South and the Vivian. ——A diamond drill borehole is being put down from the surface of the Kalgoorlie Amalgamated, south of the Golden Link's Eclipse mill at Kalgoorlie. This is to pick up the run of ore being worked in the Eclipse lease ——The Hannan's Reward Co, Mt Charlotte, is still negotiating with the Government for assistance in carrying out some development in deep ground with the diamond drill.

The Altona North mine at North Kalgoorlie is being worked by tributers, who are to sink a minimum depth of 100 feet in twelve months. There are nine men working.——Manager W. Bright of the Eagle-Hawk-Heather Co. has completed the purchase of the Missing Link, a 10-acre lease at Niagara, for £2500. The Link adjoins the leases operated by the Eagle-Hawk-Heather Co.

At Coolgardie 231 tons of ore drawn from the 900 and 1000-foot levels of Bayley's were cleaned up for 86 ozs. 16 dwts. of gold. Concentrates yielded an additional 70 ozs 7 dwts. The management, per instructions from London, has closed down the mine pending reconstruction. ——The last seam of ore intersected by the crosscut at the 400-foot level of Bayley's Consols shows a width of 5½ feet, but average assay value is low.

BRITISH COLUMBIA.

BOUNDARY DISTRICT.

Development has been started on the Gold Bug claim in Providence Camp —— Work has been resumed on the Ah There mine in Deadwood camp, and ore is being taken out——The Gold Finch claim in Skylark camp has been bonded to D W. McVicar and W. T Hunter, manager of the Hunter-Kendrick Co., Greenwood. The claim will be worked in connection with the E. P. U. claim adjoining it.

Foreman Holman of the Mother Lode mine, at Deadwood, with a force of fifty-five men, for ten days or more supplied sufficient ore to keep two furnaces at the smelter in operation—600 or 700 tons daily, says the Miner.

Work and shipments will be resumed at the Winnipeg mine, in Wellington camp, near Hartford Junction, 2 miles east of Phœnix, says R. Plewman, president and managing director of the company.

The British Columbia mine, at Eholt, has closed down again. During the past eighteen months considerable high-grade copper has been shipped.

The Goldfinch mine, in Skylark Camp, near Greenwood, has been bonded by D. W. McVicar, manager of the E Pluribus Unum, and W. T. Hunter of the Hunter-Kendrick Co. The Goldfinch adjoins the E Pluribus Unum and will be worked in connection with it.

EAST KOOTENAY DISTRICT.

The Alice mine, near Creston, will resume operations next week. This mine is owned by a Manchester, Eng., company. Development work will be increased and a concentrator will be built.

On Perry creek, near Fort Steele, work is progressing at the Badger and Red Mountain group of mines. A ditch 4000 feet in length is being built. Water power is obtained sufficient to run a battery of five stamps. A contract has been let to run a working tunnel ——The Kootenay Perry Creek Co. have sunk a shaft 20 feet, striking the rimrock, and are sinking another shaft in the old tunnel which is expected to reach bedrock.——The Perry Creek M. & H. Co. have completed the grade for a ditch and are putting in a flume 1½ mile in length. They have forty men at work.

The Morrissey coal mines are averaging over 1100 tons daily.

A group of nineteen coal licenses for claims up Elk creek, above Michel, were issued to as many Fernie citizens last week.

LILLOOET DISTRICT.

The judgments against the Toronto-Lillooet Gold Reefs Co. having been satisfied it is expected work on this company's properties, near Lillooet, will be resumed this month.

NANAIMO DISTRICT.

The Tacoma owners of the Marble Bay copper-gold mines, on Texada island, have resented the demand of the local branch of the Western Federation of Miners for an eight-hour shift for miners and a nine-hour shift for carpenters, teamsters and surface laborers at present wages by closing down the mines altogether.

ROSSLAND DISTRICT.

The Iron Horse mine has been added to the list of those operating in the Rossland camp, says the Rossland Miner. The mine has been opened up, and smelter test shipments are being extracted from the ore bodies blocked out. The Iron Horse adjoins the Kootenay on the east. The principal holders in the proprietary company are the Reddin-Jackson Co. of Rossland and A. E. Humphries of Denver, Colo.

SLOCAN DISTRICT.

A 1000 foot tunnel will be started this week on the Howard fraction, near Slocan City, to tap four ledges at vertical depth of 700 feet. The property is owned by Virginia men, with J. M M. Bennedum as superintendent. Ten men are at work and more will be taken on. The company also intends to build a wagon road and erect a mill to treat the second-class ore on the dump- —— Work at the American Boy is confined principally to driving an intermediate tunnel between Nos. 4 and 5 and raising on the vein connecting all three.

VANCOUVER ISLAND.

The Texada Miners' Union having withdrawn its demands for a nine-hour day for carpenters and blacksmiths, the Marble Bay mines will reopen this week, says the Rossland Miner. The company has for some time past recognized the union, in so far as the payment of the regular scale of wages for miners is concerned, but has reserved the right to employ non-union men. At the Van Anda mines the miners are still on strike, as Manager Vaughan-Rhys refuses to recognize the union in any form.

WEST KOOTENAY DISTRICT.

The Eva stamp mill, 2 miles from Camborne, in Lardeau district, is nearing completion, the crushers being in place and stamps ready to drop. The other machinery is being set up. It will run by water power. At the mine three shifts are at work. —— At the Ophir-Lade stamp mill and compressor plant work is progressing. The air pipe is being laid up the mountain side. At the mill the crusher and stamps are in place and the cable is being put in. Grading for the reservoir is finished and timbers are being framed.

KLONDIKE.

Low water in Klondike creeks nearly stopped mining operations previous to the rain of last week. Many claims shut down for the season, throwing 500 men out of work during ten days previous to August 25th. The North American T. & T. Co. entirely closed down operations on Bonanza and reduced its number of men on other creeks. Continued low water on the Upper Yukon is starting outward men from Dawson who intend coming out before navigation ends. Steamers are having difficulty in getting up and down the Yukon. The water is lower than ever known at this season and an early freeze is expected. Frost appeared last week along the Yukon.

MEXICO.

CHIHUAHUA.

A 12 H. P. gasoline hoist has been set up at the San Salvador mine at Terrazas camp and work is progressing well with forty men on the payroll, says the Enterprise.

D. W. Shanks of Los Angeles, Cal., is developing a mine in the Cerro Almaloya section near the Cigarrero, near Parral.

F. Collinson of Clarendon, Tex., has taken over the interests of A. D. Gatherings in the Kansas Boy mine at Santa Eulalia and is making arrangements to start development work.

The Columbia and Sierra Madre mines in Sierra Madre district have been sold for $50,000 to J. Arnold et al of London, England.

DURANGO.

At Bacis, the Gold & Silver M. & S. Co. has a 100-ton concentrating plant running steadily, water power being obtained from the river. W. Pearless, manager, says it is intended to put in a cyanide plant to treat the tailings from the mill. They have 3 miles of gravity tramway, by which the ores are brought from the mines to the mill. The proposed electric line from Durango to San Dimas would pass this camp.

OAXACA.

J. Felton of Ejutla reports high-grade gold-bearing ore found near Ejutla in a ledge showing 15 feet across on the surface.

SINALOA.

At Culiacan, the Palmerito mine, Wilkins & Flores owners, is said to be turning out 5000 ounces of silver per month with a 5-stamp mill. The ore is principally a chloride.

SONORA.

It is reported that the Greene Con. Co., operating at Cananea, proposes to double the capacity of its reduction works, now capable of handling 1500 tons of ore daily. The new equipment will consist of three furnaces.

The Promontorio mine, 20 miles west of Nogales, is making regular shipments. Last week 7000 ounces of silver bullion was sent out and another of 14,000 ounces this week.

At the Verde Grande C. Co.'s camp, 40 miles northwest from Hermosillo, the machinery is ready to start and the smelter will be blown in next week. The smelter is of 100 tons capacity daily. There are 120 men employed.

J. F. Bueslem, manager for the Boston & Mexican Placer M. Co. at Cumuripa, says they are making preparations for putting in a plant for operating the ground of the company.

The Moctezuma G. & S. M. Co. has been formed at Douglas, Ariz., to operate in Moctezuma district in the east extension of the San Jose mountains; A. R. Wormell, W. F. Hall, H. E. Sone and F. C Gilland.

Seventy miles south of Nogales, in the Magdalena district, a Chicago, Ill., company is working the Sierra del Oro mines. They are working a vein of ore 70 feet wide of $5 value and have a 200-stamp mill in operation, says the Cananea Herald.

PERU.

Berropasco advices report a gold-bearing vein 15 feet wide has been struck at Chuquitambo. An English company is working mines near this vein which are producing high-grade ore

Commercial Paragraphs.

G. W. MYERS, Pacific coast representative of the Masurite Explosive Co, reports the home office under date of Aug. 28th informed him they would ship to San Francisco, Cal, a carload of masurite from the factory at Sharon, Pa, on Sept. 1st.

J. A. YEATMAN & Co, hydraulic engineers, San Francisco, Cal, report shipping this week to Woloott, Eagle county, Colo., a complete hydraulic equipment, including a two-step series pressure centrifugal pump and an Adams hydraulic lift.

FAIRBANKS, MORSE & Co, Denver, Colo., state they have recently secured orders for three mills—one for Naco, Ariz, and the other two for Colorado. In each of the mills they are installing the Elspass mills, which they are agents for. They also have an order for a 40 H. P. gasoline hoist from the Josephine mine, Idaho Springs, Colo.

C. M. FUELLER, 1752 California street, Denver, Colo., has opened an ore testing plant He has installed an Overstrom concentrating table, but will make tests on all others. He writes that he is independent of machinery houses, not being tied down to any particular machine. During the past year he has designed some very large mills in the United States.

R. J. CORY, in charge of the Denver office of the Allis-Chalmers Co., says: "Three of the specialties of the Allis-Chalmers Co. in mining machinery are the Gates crusher, the Gates ball mill and Gates tube mill. Within recent years the company have sold over 90,000 tons of the three machines named. The one item of Corliss engines made by this company amounts in weight to over 500,000 tons of iron and steel."

THE Mine & Smelter Supply Co., Denver, Colo., has received orders for two 20-stamp mills, one for Hanna M. & M. Co., Lake City, Colo., and one for the Barstow mine, Ouray, Colo.; one 18-inch De Remer water wheel for Deadwood, S. D., and one each 18, 24 and 48-inch wheels for Idaho. They state their orders for De Remer water wheels are rapidly increasing and that their trade on the Wilfley table has been the best this season it has ever been. The Durkee electric drill is another one of their specialties which has had increasing sales.

PERSONAL.

E. A. WILTSEE has returned from the East to San Francisco, Cal.

J. H. MEALE of Sonora, Cal., is in San Francisco, Cal., on mining business.

W. D. CHURCH is manager of the Tom Thumb mine, near Republic, Wash.

W. R. BERMINGHAM of Fresno, Cal., is in San Francisco, Cal., on mining business.

G. ROSS, interested in Arizona mines, is in San Francisco, Cal., from Jerome, Ariz.

D. J. MCFALL, interested in mines near Nevada City, Cal., is in San Francisco, Cal.

E. C. LIMBACH, of Denver, Colo., is in Sonora, Mexico, examining mining property.

J. C. BAILER is instructor in chemistry at the Colorado School of Mines at Golden, Colo.

A. H. TARBET of Salt Lake City, Utah, interested in Utah mines, is in San Francisco, Cal.

T. COALE has resigned as superintendent of the Butler-Liberal mine at Bingham, Utah.

H. HUNSAKER, interested in Colorado mines, is in San Francisco, Cal., from Denver, Colo.

T. W. HAND succeeds A. Conard as general manager of the Hays Con. M. Co., Nogales, Ariz.

C. B. CULBERSON of Boulder, Colo., interested in Boulder county mines, is in San Francisco, Cal.

R. S. SANDOW of Grass Valley, Cal., is on a mining business trip through eastern Oregon and Idaho.

W. OCHS returned to Salt Lake City, Utah, last week from a trip to New York on mining business.

M. P. GILBERT, manager of the Leland group of mines near Kingman, Ariz., is in the East on business.

H. J. GORMY is manager of the Gold Mountain-Eagle M. Co., at Gold Mountain, near Tonopah, Nev.

H. E. ZERBE returned last week to Salt Lake City, Utah, from an examination of mines in Montana.

JEROME DRUMHELLER of Spokane, Wash., returned last week from a trip to New York on mining business.

J. E HURD of Capitan, N. M., is manager of the Mescalero M & M. Co., operating in Lincoln county, N. M.

G. M. BUTLER has been appointed instructor in mineralogy at the Colorado School of Mines at Golden, Colo.

J. EKMAN of Calumet, Mich., is superintendent of the H. M. H. group, near Telluride, San Miguel county, Colo.

C. D. ROOKLIDGE returned last week to Salt Lake City, Utah, from a trip to northern Montana, examining mines.

K. C. BABCOCK of the University of California, has been appointed president of the University of Arizona at Tucson.

J. E. MEYER of Salt Lake City, Utah, of the Federal G. & C. M. Co., Beaver county, Utah, is in the East on business.

J. W. CUNNINGHAM of Boise, Idaho, has resigned as assayer in charge of the United States Assay Office at that place.

J. H. BURKHART has resigned as superintendent of the Rawhide Extension mine, near Jamestown, Tuolumne county, Cal.

A. C. NAHL, superintendent of the San Francisco mines near Llano, Sonora, Mexico, is in San Francisco, Cal., on business.

J. E. SNELUS of London, England, is superintendent of operations in Egypt of the Mysore Reefs & General Exp. Co., Ltd.

C. A. BURCHAM, part owner of the Yellow Aster M. Co., is at their mines at Randsburg, Cal., from Los Angeles, Cal.

FRANK T. LELAND, of the Risdon Iron Works, San Francisco, Cal., has returned from a business visit to Magdalena, Mexico.

E. H. BARTON, superintendent of the Yellow Aster M. Co. at Randsburg, Cal., returned from San Francisco, Cal., last week.

C. J. NORTH, a director in the Blackbird M. Co., operating in Lemhi Co., Idaho, is in Salt Lake City, Utah, from Buffalo, N. Y.

H. S. WOOLLEY of Pocatello, Idaho, has been appointed as assayer in charge of the United States Assay Office at Boise, Idaho.

M. CLERE has succeeded M. Cololot as superintendent of the San Jose mine, southwest of Douglas, in Arizpe district, Sonora, Mex.

SUPERINTENDENT I. MCKAY of the Halifax mine, at Tonopah, Nev., has returned there from a business trip to San Francisco, Cal.

P. A. JOHNS of Prescott, Ariz., has resigned as manager of the Braganza G. M. Co., near Prescott, to devote his time to other interests.

W. I. SNYDER, of the California mine at Park City, Utah, has returned to Salt Lake City, Utah, from a visit to California and Nevada.

A. D. PARKER, owner of the Little Gem mine at Anchor, Taos county, N. M., returned last week to Florence, Colo., after visiting the property.

F. BARKER, manager of the London Venture Co., is in San Francisco, Cal., in connection with the purchase of the Esperanza, Mexico, mine.

W. S LEWIS, vice-president of the Jayhawk G. M. Co., returned to New York City last week after several weeks at Red River, Taos county, N. M.

A. R. MINNER, of the Utah Copper Co., is at Bingham, Utah, from Canon City, Colo., to superintend construction of the concentrator for the company.

J. A. FARWELL, for many years with the Crane Co., Chicago, has assumed an equally responsible position with the J. Geo. Leyner Co., Denver, Colo.

G. W. MYERS, Pacific coast representative of the Chrome Steel Works, Brooklyn, N. Y., returned this week to San Francisco, Cal., from a business trip to New York.

A. S. BIGELOW, superintendent of the Pelger and Capsilvar mines of the Franco-Russian Co. des Almaks in Mongolia, has returned to North Columbia, Nevada county, Cal.

SUPERINTENDENT WILLIAMS of the Belmont mine at Park City, Utah, has accepted a similar position at the Butler-Liberal mine at Bingham, Utah, vice T. Coale, resigned.

W. B. MUCKLOW of Hartford, Conn., of the Majestic Copper Co., operating in Beaver county, Utah, is in Salt Lake City, and expects to remain in Utah until the smelter is in full operation.

A. E. WHEELER, for two years assistant superintendent of the Boston & Montana C. & S. Co. smelters at Great Falls, Mont., has been appointed superintendent, vice J. C. Morrow, resigned.

W. J. WILLIAMS, manager of sales of the Mexico Mine & Smelter Supply Co., Mexico, D. F., was in Denver the past week on his way to Chicago on business connected with his company.

E. H. TEATS of Denver, Colo., consulting engineer for the Marowyne G. M. Co., in Dutch Guiana, is in Denver, Colo., from an examination of mines in Nevada, and will return this month to Guiana.

J. C. MORROW, having resigned as superintendent of the Great Falls smelters of the Boston & Montana C. & S. Co., Montana, is manager of the Green River C. Co. of Cananea, Sonora, Mexico.

MANAGER JACKLING of the Utah Copper Co., at Bingham, Utah, has resigned, to take effect Oct. 1st, and will be succeeded by J. McDonald, superintendent of the Commercial mine, at Bingham, Utah.

F. COLLINSON, of Clarendon, Texas, returned there last week from Santa Eulalia, Chihuahua, Mex., on mining business, after arranging for the commencement of work on the Kansas Boy mine at Santa Eulalia, Chih., about the first of the month.

PROF. R. D. SALISBURY, head of the Geological Department of Chicago University, is in charge of a party of fifteen making a survey of the Big Horn mountains in Wyoming for the U. S. Government, and has returned to Wyoming from a trip to Denver, Colo.

"JIM" WARDNER is reported dying in a Milwaukee, Wis., hospital. It is stated that in the early part of 1903, while traversing eastern Nevada, he drank from a roadside stream into which close above ran discharge from a cyanide plant, and that the poison therefrom has occasioned his fatal illness. "Jim" Wardner is known to thousands of mining men throughout this west half of America, who will read with regret of his sad condition.

SINCE the appearance of a little notice in this column some weeks ago concerning the connection of Senator E. W. Voorhels, ex-president of the California State Miners' Association, with a South American gold mining company, his mail has been filled with inquiries as to when he starts for the equator. It is to be said that he has no intention of moving from California and will act as resident agent for the Darien G. M. Co., with headquarters at San Francisco, Cal.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING AUGUST 25, 1903.

736,919.—WINDOW SCREEN—J. W. Adams, Santa Ana, Cal.
737,053.—RAILWAY SIGNAL—Ammann & Cambell, Spokane, Wash.
737,054.—PRESSING FRUIT INTO BOXES—Anderson & Fleming, San Jose, Cal.
737,216.—CAN HEADER—C. E. Forry, S. F.
736,951.—MARINE PROPULSIGN—H. H. Fowler Oakland, Cal.
737,384.—SNAP HOOK—J. A. Gavitt, Pendleton, Or.
737,223.—SNATCH BLOCK—E. S. Grammer, Kanaskat, Wash.
737,100.—LAWN MOWER—C. F. Hamlin, Pasadena, Cal.
737,239.—STEAM ENGINE—S. B. House, Saticoy, Cal.
737,420.—SINGLETREE—P. Krall, S. F.
737,127.—ROTARY ENGINE—J. F. Muncey, Everett, Wash.
737,269.—LOADING MACHINE—T. M. Park, Darrington, Wash.
737,140.—NUT WRENCH—P. F. Rice, Tustin, Cal.
737,274.—PUMP—G. C. Richards, Berkeley, Cal.
737,387.—SMELTING FURNACE—E. Riveroll, Los Angeles, Cal.
737,499.—PUMP—C. F. Scott, Winthrop, Cal.
737,291.—CAN BODY MACHINE—W. H. Smyth, Berkeley, Cal.
737,513.—CAR CONTROLLER—W. H. Snyder, Seattle, Wash.
737,533.—EXTRACTING GOLD—E. L. Van der Naillen, S. F.
737,546.—STOVE—J. N. Young, Alameda, Cal.
36,514.—DESIGN BANGE—J. C. Irvine, S F.
36,527.—DESIGN—Daisy M. Wunschow, Santa Cruz, Cal.
36,528.—DESIGN—Daisy M. Wunsohow, Santa Cruz, Cal.

Notice of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

PUMPS.—No. 737,274. Aug. 25, 1903. G. C. Richards, Berkeley, Cal. The object of this invention is to provide a pump of simple construction adapted for use particularly in oil wells, where great difficulty is experienced in lifting heavy oils and those containing considerable quantities of sand and like gritty foreign substances. It consists in the combination in a pump of a main discharge pipe, a plurality of pump barrels on the end thereof, cylinders reciprocal on the outside of said barrels, valves in said barrels and cylinders, means for giving said cylinders an alternating reciprocating movement, and guides supported from above and extending beneath the lower end of the cylinders and serving to suspend the latter should they become detached.

DEVICE FOR PRESSING FRUIT INTO BOXES.—No. 737,054. Aug. 25, 1903. W. C. Anderson and C. F. Fleming, San Jose, Cal. Assigned to Anderson Barngrover Mfg. Co., a corporation of San Jose, Cal. The object of this invention is to provide a machine capable of pressing several thousand boxes of fruit in a day, that is uniform in its results, that does not mar the fruit, and that is adjustable for variation in filling and for different sizes of boxes or packages. It consists of a horizontal endless carrier upon which the boxes or other receptacles containing the fruit are conveyed, a superposed adjustable pressure surface arranged and operating in relation to said carrier, and means for compressing the contents of the boxes as the latter are passed between sa'd carrier and surface.

CAN HEADER.—No. 737,216. Aug. 25, 1903. C. E. Forry, San Francisco, Cal. The object of this invention is to provide an automatic machine of simple construction capable of being operated rapidly and in which any danger of injury to the can bodies or tops is obviated. It consists of a can body carrier movable about horizontally disposed sprockets, said carrier comprising pivoted cylindrical jaw segments, means for delivering the bodies in upright position into said jaws, means for insuring the closing of said jaws upon the cans, a can head carrier rotatable intermittently, a yielding guide mechanism by which injury to the heads as they are fed from the conveyor trough into the rotatable carrier is obviated, means for effecting the movement of said last named carrier by and relative to the can body carrier, and means for delivering the can bodies from the machine.

Catalogues Received.

"Jessop's Steel and How They Make It," is an interesting story, finely illustrated and worth reading. I. Willard Beam, 29 Main St., San Francisco, Cal., is the Pacific coast agent for this well-known manufacture.

"Digging Machinery" is a handsome brochure issued by the Hayward Co., 97 Cedar St., New York, descriptive of several styles of dredges, derricks and excavating machinery.

Dividend Notice.

Bunker Hill & Sullivan Mining & Concentrating Co., Wardner, Idaho, $18,000, payable Sept. 4.

Obituary.

W. C. GIVEN, a pioneer miner of Trinity and El Dorado counties, Cal., died at Junction City, Aug. 25th, the result of an apoplectic stroke. Deceased was born at Brunswick, Maine, seventy-three years ago, and came to Placerville, Cal., in 1850, making the trip around Cape Horn. He is survived by a widow and two sons.

Latest Market Reports.

SAN FRANCISCO, September 4, 1903.

METALS.

SILVER.—Per oz., Troy: London, 26⅝d (standard ounce, 925 fine); New York, bar silver. 57¾c, refined (1000 fine); San Francisco, 57¾c; Mexican dollars, 46c San Francisco, 45½c New York.

The San Francisco shipments of silver during August, 1903, were as follows:

Standard silver dollars	$204,000
Fractional silver coin	270,955
Total	$474,955

COPPER.—New York: Standard; $13.75; Lake, 1 to 3 casks, $13.75@13 87½ Electrolytic, 1 to 3 casks, $13.62½@13 75; Casting, 1 to 3 casks, $13.37½; San Francisco: $15 00. Mill copper plates, $17.00; bars, 18@24c. London: £59 10s spot per ton.

LEAD.—New York, $4 25; Salt Lake City, $3.50; St. Louis, $4.00; San Francisco $4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5½c; plg, $4.75. London: £11 2s 6d per long ton.

SPELTER.—New York, $6.00; St. Louis, $5.00; London, £20 17s 4d per ton; San Francisco, ton lots, 6¼c; 100-lb lots, 7c.

ANTIMONY.—New York, Cookson's, 7½c; Hallett's, 6⅝c; San Francisco, 1000-lb. lots, 8c; 300 to 500 lbs., 8½c; 100-lb. lots, 10½c.

TIN.—New York, pig, $27.00@27.50; San Francisco, ton lots, 28½c; 500 lbs., 29c; 200 lbs., 29½c; less, 30c; bar tin, ℔ lb, 30c @32c. London, £122 15s spot.

PLATINUM.—San Francisco, crude, $18.00 ℔ oz.; New York, ingot, $19.00 per Troy oz Platinum ware, 75@80c per gram.

QUICKSILVER.—New York, $47 00@47.50; large lots; London, £8 12s; San Francisco, local, $44 50 ℔ flask of 76½ lbs.; Denver, $49.50. Export, $43.00.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 34c.

SOLDER.—Half-and-half, 100-lb. lots, 18 75c; San Francisco, Plumbers', 100-lb. lots, 15 50c.

NICKEL.—New York, 50@60c ℔ lb.; ton lots, 45@48c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer plg, $18 50@18.75; gray forge, $17.10; San Francisco, bar, 3c ℔ lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $27 00@29.00; open hearth billets, $28.00@30 00; San Francisco, bar, 7c to 12c per lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer	$18.00@19.00
Foundry Northern 1	17.50@18.00
Northern 2	17.00@17.50
Northern 3	16.50@17.00
Southern 1	16.35@ ——
Southern 2	15.85@ ——
Southern 3	15.35@ ——
Forge	14 85@ ——
Charcoal	20.50@21.00
Billets, Bessemer	28.00@29.00
Bars, Iron	1.60@ ——
Bars, steel	1.75@ 1.80
Rails, standard	28.00@30.00
Rails, light	34.00@40.00
Plates, boiler	1.90@ 2.00
Tank	1.75@ 1.80
Sheets, 26 store	2.90@ 3.00
No. 27	2.90@ 3.00
No. 28	3.00@ 3.10
Angles	1.75@ ——
Beams	1.75@ ——
Tees	1.80@ ——
Zees	1.75@ ——
Channels	1.75@ ——
Steel melting scrap	14.50@15.50
Relaying rails	29.00@30 00
Dealers forge	13.00@13.50
No. 1 railroad wrought	14.50@15.00
No. 1 cast, net ton	14.00@14.50
Iron rails	19.00@20.00
Car wheels	19.00@20.00
Cast borings	5.50@ 6.00
Turnings	11.00@11.50

LUMBER.—(Retail): Pine, ordinary sizes, $24.00@25.00; extra sizes higher; redwood, $28.00@30.00; lath, 4 feet, $4.50@5.00; pickets, $21.00; shingles, $2.50 for No. 1 and $2.25 for No. 2; shakes, $13.50

for split and $15.00 for sawed; rustic, $28.00 @35.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, $3.35; Cut, $3.55; 10d to 16d, Wire, $3.45; Cut, $3.35; 8d, Wire, $3.50; Cut, $3.50; 6d and 7d, Wire, $3.60; Cut, $3.60; 4d and 5d, Wire, $3.70; Cut, $3.70; 3d, Wire, $3.85; Cut, $3.85; 2d, Wire, $4.10; Cut, $4.10. Special rates for carload lots.

LIME.—Santa Cruz, $2.35; Roche Harbor, $2.35 per bbl.

CEMENT.—Imported, $2 50@2.75 ℔ bbl; California carload lots, $2 25 f. o. b. at works; small lots, $2.50 ℔ bbl. in saoks, 4 sacks to bbl.

GENERAL SUPPLIES.

POWDER.—F. o. b. San Francisco: No 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s. 11c ℔ set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 23@24c ℔ lb.: carloads, 23@23½c; in tins, 30c; soda ash, $1.95 ℔ 100 lbs.; hyposulphite of soda, 2½@2½c ℔ lb.; caustic soda, in drums, 3@3½c ℔ lb; Cal. s. soda, bbls., $1.20@1.40 ℔ 100 lbs.; sks., $1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb tins; roll sulphur, 4@5c; powdered sulphur, 2@3c; flour sulphur, French, 2@3c; alum, $2.00@2.25; California refined, 2 @ 2½c; sulphide of iron, 8c ℔ lb.; copper sulphate, 5@6c; chloride of lime, spot, $2.50@2.75; sulphuric acid, in carboys, 66% B, 2½c ℔ lb.; nitric acid, in carboys, 8c ℔ lb.

OILS.—Linseed, boiled, bbl., 44c; cs., 49c; raw, bbl., 42c; cs., 47c; Lucol oil, boiled, bbl., 41c; cs, 46c; raw, bbl., 39c; cs, 44c. Kerosene—Pearl, per gal., 20½c; Astral, 20½c; Star, 20½c; Extra Star, 24½c; Eocene, 23½c; Elaine, 26½c; Water White, in bulk, 14½c; Mineral Seal, iron bbls., 18½c; wooden bbls., 21c; cs, 24c; Mineral Sperm, cs, 26½c; Deodorized Stove Gasoline, bulk, 17c; do., cs., 23½c; 86° Gasoline, bulk, 21c; do., cs., 27½c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 16c; do., in cs., 22½ c; Lard Oil, E. W. S., bbl., $1.00; cs., $1.05; Neats-foot Oil, pure, bbl., 75c; cs., 80c; Sperm, crude, 70@60c; Natural White, 65c; Bleached do, 50c; Whale Oil, cs, 50@55o.

COAL. — San Francisco, coast, yard prices: Wellington, $8.00; Seattle, $6.50; Coos Bay, $5.50; Southfield, $8.00. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $13; Cannel, $8.50; Welsh Anthracite, $13.00; Rock Springs, $8.50, long ton; Colorado Anthracite, $14.00. Coke, $10.50 per ton in bulk, $13 in sacks; Sunnyside, $8.50, long ton.

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6c; less than 500 lbs., per lb., 6½c; in 25-lb. tin pails, ½c per lb. above keg price; in 1 and 5 lb. tin cans, 100 lbs. per case, ½c per lb. above keg price. Dry Lead—In bbls., 1 ton and over, 6c; do. in kegs, 6½c.

BONE ASH.—Extra No. 1, 5@6c per lb. No. 1, 4@5c.

RED LEAD.—500 lbs. and over at one purchase, per lb., 6c; less than 500 lbs., 6½c.

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BORAX.—Crystal, 7c; calcined, 25c.

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BISMUTH.—Subnitrate, per lb., $1.75.

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PHOSPHORUS. — (American) ℔ lb., 75c.

SILVER.—Chloride, ℔ oz., 90c@$1.00; nitrate, 55c.

ALUMINUM.—No. 1, 99%, small lots, 37c ℔ lb.; 100 lbs., 35c; 1000 lbs., 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

URANIUM.—Oxide, ℔ lb., $3.50.

ZINC.—Metallic, chemically pure, ℔ lb., 50c; dust, ℔ lb., 10c; sulphate, ℔ lb., .04c.

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ASSESSMENT NOTICE.

INYO MARBLE COMPANY OF CALIFORNIA.—Location of principal place of business, San Francisco, California; location of works, Inyo, Inyo County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 18th day of August, 1903, an assessment (No. 37) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 30, fifth floor, Mills Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of October, 1903, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 18th day of November, 1903, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES E. ANDERSON, Secretary.

Office—Room 30, fifth floor, Mills Building, San Francisco, California.

ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the Golden West Consolidated Mining Company will be held at the office of the company, at Iowa Hill, Placer County, California, on Saturday, the 26th day of September, 1903, at the hour of 9 o'clock A. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the meeting. E. M. ARMSTRONG, Secretary.

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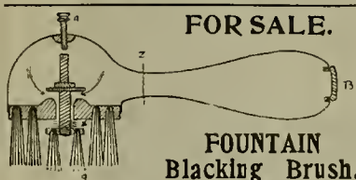
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NOTICE

of Receiver's Sale of the Electric Plant, Apparatus, and Other Property of the Cochiti Gold Mining Company.

Notice is hereby given that the Receiver, by appointment of the District Court of the Second Judicial District of the Territory of New Mexico, for the County of Bernalillo, in that certain cause pending therein wherein Raymond P. Ripley and others are defendants, will, under and by virtue of an order of said court made August 20, 1903, receive bids for the purchase and sale of all the property of the said Cochiti Gold Mining Company, now in his possession as such receiver. Said property consists of a complete cyanide mill of two hundred and fifty tons capacity, built of structural iron, various other buildings such as stores, boarding house, store house, hunk houses, etc., etc. The machinery consists of dry crushing apparatus, Davis and Allis finishing rolls, twenty steel leaching tanks of two hundred and one hundred and thirty tons capacity; also sixteen thousand dollars worth of mining and mill supplies; office furniture, etc. And also, situated at Madrid, N. M., an electric power plant and structural steel building, one eight hundred horse power engine, one 600 K. W. generator, complete switches, etc., etc., for a twenty-thousand-volt transmission, and other property such as is generally used in connection with such a mill run by electricity, including one hundred miles of copper transmission wire.

Also the Albemarle, Pamlico, Huron, Ontario patented mining properties, and the U. M. C. and three-fourths interest in the Red Cloud, containing in all almost one hundred acres and having five thousand feet on the strike of the vein. These mines and the mills are situated at Albemarle, Sandoval County, New Mexico, twenty-four miles from Thornton on the A. T. & S. F. Ry.—the other property at Madrid on said railway.

Bids will be received by the undersigned for the sale of said property, or any part thereof, for sixty days from the date of this notice. For the Madrid power plant property, and the electrical machinery, bids must be itemized, fixing the price to be paid upon each separate article; and, also, separate bids must be submitted for the wire, on account of conflicting interests in the property. The buildings and other property may be removed by purchasers from the premises on which they are located.

A reasonable deposit, certified check or cash, must accompany each bid as a guaranty of good faith and responsibility.

Lists of the property and all other information requested will be furnished upon application to the Receiver. WILLIAM SPENCER, Receiver.

P. O. Address: Alhuquerqus, New Mexico.

August 21, 1903.

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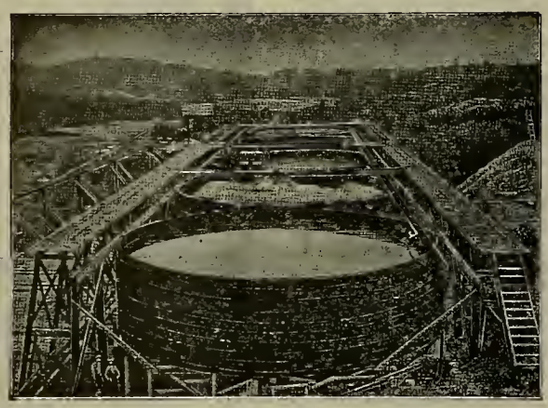
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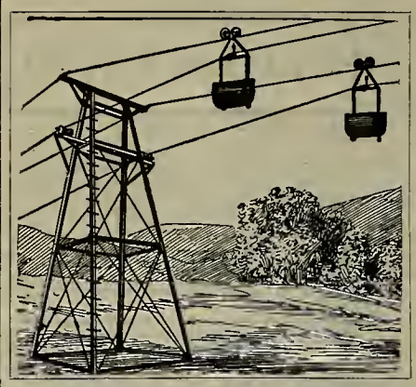


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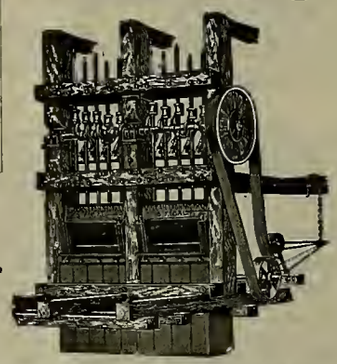


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Mill and Cyanide Plant From Below, Sultan Mine, Arizona.



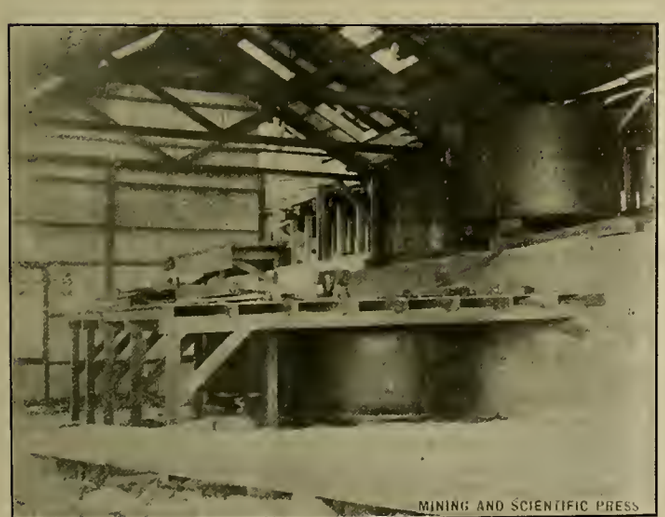
Side View of Mill and Partly Completed Ore Bin, Sultan Mine, Arizona



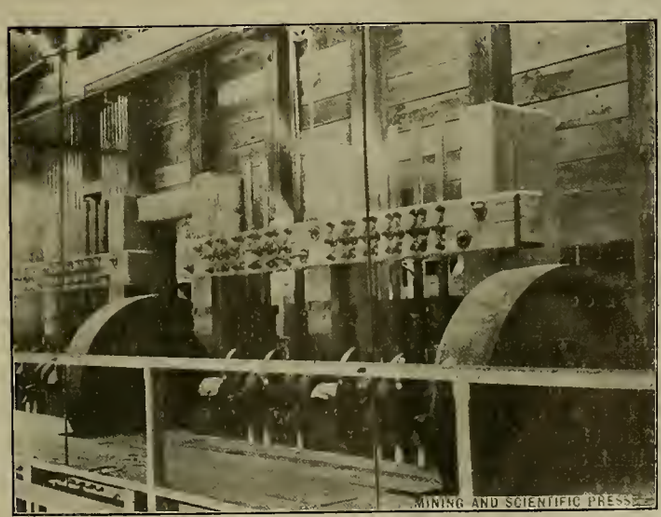
Ore Bin In Process of Construction, Sultan Mine, Arizona.



Filter Press and Leaching Tanks Under Construction, Cyanide Plant, Sultan Mine, Arizona.



Staging and Method of Placing Gold and Sump Tanks, Cyanide Plant, Sultan Mine, Arizona.



Cam Shaft Floor, Sultan Mill, Arizona.

An Arizona Gold Mill and Cyanide Plant. (See Page 166)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION.

United States, Mexico and Canada.....$3 00
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Entered at the San Francisco Postoffice as second-class mail matter.

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J. F. HALLORAN.....Publisher

San Francisco, September 12, 1903.

TABLE OF CONTENTS.

ILLUSTRATIONS: *Page.*

Mill and Cyanide Plant From Below, Sultan Mine Arizona ...162
Side View of Mill and Partly Completed Ore Bin, Sultan Mine.162
Ore Bin in Process of Construction, Sultan Mine, Arizona.....162
Filter Press and Leaching Tanks Under Construction, Cyanide Plant, Sultan Mine, Arizona.....162
Staging and Method of Placing Gold and Sump Tanks, Cyanide Plant, Sultan Mine, Arizona.....162
Cam Shaft Floor, Sultan Mill, Arizona.....162
A Best Tractiun Engine Used for Military Purposes in Central America.....168
Rothchild Gold & Silver M. Co.'s Property, Argentine, Colo ...170
Device to Stop Humming.....170
Tanks Used in the Manufacture of Carborundum.....171
Furnace at the Niagara Falls Carborundum Factory.....171
Mining and Metallurgical Patents.....172

EDITORIAL:

Government Inspectors to Protect Mining Investors.....163
Difference in Procedure in United States Land Offices.....163
American Miners Abroad.....163

MINING SUMMARY.....173-174-175-176-177

LATEST MARKET REPORTS.....178

MISCELLANEOUS:

Concentrates.....164
Lifting Water by Compressed Air.....165
Some Structural Features of the California Gold Belt.....166
An Arizona Gold Mill and Cyanide Plant.....166
Engineering as a Professiun.....166
The American Mining Congress.....166
Ore Deposits of the Northern Black Hills.....166
The Potsdam Formation of Bald Mountain District.....167
Pyritic Smelting.....167
Notes on the Metallurgy of Copper of Montana.....168
Good in Peace or War.....168
A Practical Suggestion.....169
Mining More Strenuous Than Formerly.....169
Leaching Low Grade Copper Ore.....169
Mines of Summit County, Colo.....170
Simple Device to Stop Humming.....170
Manufacture of Carborundum.....171
How to Determine if You Have a Concentrating Ore.....171
Mining and Metallurgical Patents.....172
Personal.....177
New Patents.....178
Notices of Recent Patents.....178
Commercial Paragraphs.....178
Obituary.....178

A GOVERNMENT Inspector to protect mining investors is a good idea merely as an idea, but it wouldn't work to any one's satisfaction. There is nothing about a Government Inspector that makes him superior to any one else, and his judgment as to what was or wasn't a good investment or a deserving field, for mining development would be no better than that of another. No man's judgment on such matters is infallible. Nothing but actual development work can determine the value or lack of value in a mine or prospect. It is a notorious fact that the Cripple Creek country in Colorado was "turned down" as being no good by famous mining engineers; so also was Tonopah, Nevada. As to "protecting" the would-be mining investor, if the Government ever starts in that kind of business it will have a big contract on its hands. There are a hundred ways for the unwise investor to drop his money besides unworthy mining investments, and as a cold fact it is extremely probable that there is less lack of legitimate investment proportionately in mining matters than in any form of placing money in hopes of profit. Of course there never can be any law, State or Federal, against any one making a fool of himself and many are constantly abusing such privilege.

THERE is a difference in procedure in United States Land Offices, in different States, as to requirements. Ordinarily in the case of plats on mining locations the several Surveyor-Generals of the different States deem that the letter and spirit of the law is observed in simply requiring that but one plat be placed in the case of where there is more than one mining claim in a group, and that were there forty mining claims in one group one plat would suffice. In the case of the Surveyor-General of California precedent and custom seem to make it obligatory in his office to furnish the locator a separate plat for each location. This, of course, involves considerable extra office work, but in the early days of California it was deemed necessary and desirable, and the custom has been followed through the years. It is noticeable, also, that there is some latitude in the matter of fees. While in some States from $30 to $35 is charged for this plat, and even then but one plat furnished for the entire group of say ten or twenty locations, in the office of the Surveyor-General of California there is a charge of $25, but no extra charge for the additional plats furnished for use, though as stated, the requirements of that office are that there shall be a separate plat for each location in the group.

American Miners Abroad.

"You don't appreciate the United States till you've been away awhile," is the keynote of two letters received this week from two eminent mining engineers—one just returned from a South American mine management, the other from a still farther location. Both go into detail to the effect that nothing but unusually high wages should tempt an American mining engineer to go to foreign lands, and even then it is questionable if such self-ostracism pays in the long run. The returned South American declares that the high salary he was paid did not make up for the inefficiency of his assistants, the constant vexation and annoyance, the general lack of much that the American takes as a matter of course, and the enforced delay so galling to any one who wants to see quick results. Indeed, much of his plaint is a statement that the best things in this life are not paid for in money, and that there is a whole lot to a position besides the salary connected with it—all of which has been said and sung before. When a man exiles himself he is supposed to take all that into account beforehand. The most noticeable part of the statement is where he says: "A great lure to the young American mining engineer, and the professional man generally, is the great chance to make a fortune in these countries. I have found this to be a myth. I can do more with $10,000 in the United States than I could with $100,000 in any part of South America that I visited, and do it five times as quick. All our Western mining States hold just as good mining and milling propositions as can be found in Mexico or South America."

There are many good mines in both countries mentioned that have long been worked with profit, and there is abundance of virgin ground that awaits development there, as well as an abundance of abandoned mines that could be made to pay handsomely under modern mine management. The same remark will precisely apply to this country as well. One need not go out of the confines of his own county to call to mind several good mining prospects that need only capital and intelligence to make them pay. Manifestly, then, there is abundance of raw material, and what is needed is skill and money—two things that are always sure of reward the world over.

The chief inducement to an American mining engineer, manager or superintendent is the usually higher salary he gets abroad; but when the increased expense and annoyance is reckoned, and the deprivation often of much that goes to make life comfortable or endurable, it is sometimes questionable if one betters his condition by going outside the national confines. To the average unmarried man the chief attraction or incentive is the change, the opportunity to "get experience," and a little of that old romantic taste of adventure. The American, whether miner or anything else, is a good deal of a nomad; we are all wanderers; a touch of the Arab is in us all; but there comes a time when the love of travel gives way to a homelier feeling. Many times mining engineers have said to the writer: "I would rather take considerably less salary and stay, for I am tired of rambling the earth over; I have friends and acquaintances here, and I would much prefer to remain; but I have the skill, they want me bad enough to pay me more than I am getting, and so I go." A man with others dependent on him feels that he must sell his skill in the highest market, and many a man is self-exiled because of such devotion to duty.

The other, who writes from a land where in the heavens the Southern Cross takes the place of the North Star, says about the same in effect as the returned South American, emphasizing his experience that the versatility of the American miner is painfully absent where he has charge; that only one thing can be expected from one man, and not much of that. While a miner in the United States can, when required, do a variety of things—be equally clever at blasting, timbering, tunnel work, sinking, looking out for swelling ground, taking care of himself and those around him, at a pinch being somewhat of a carpenter, fairly well acquainted with country rock and its attendant conditions, quick to note and put into practice possibilities of development and profit, and ready to take advantage of existing conditions and new phases as they arise—a parallel is drawn to the disadvantage of those with whom that writer is at present associated; the assertion being made that the cheap man is often dearest, and that one alert, quick-witted man is worth a dozen of the kind that see only what is before them—and that but dimly—and whose horizon is bounded by their daily wage, without hope or care for the future, and with no ambition as to progress. He says that the only redeeming feature about them is that they don't strike, and implies that even an occasional display of desire in that direction would relieve the monotony. (If he were managing a Colorado or California property at present he would have little to complain of in this latter connection.)

The flattering reference to the American miner's adaptability is deserved. The miner who does his thinking and talking in English is usually equal to anything that calls for immediate attention. It is all in the day's work, and he will sharpen a drill, lay out a ditch, upraise on a stope, follow the vein, build an ore bin, charge a furnace, make an assay, or boss the boarding house with equal facility. If he can't do it he will tackle the job anyhow, and is at all times ready with advice and opinion. That is the distinctive difference, and, though he has the faults of his good qualities, it is no wonder that the mine manager in foreign climes sighs for the swift dexterity and readiness that he is familiar with in this country.

The most noticeable point that these two correspondents make is where they both say in almost exactly the same words that so far as their experience goes there are better chances for capital and skill, for profitable mine development and permanent dividend producing propositions right here in this country than anywhere else. This may or may not be so. It is too sweeping a statement to be accepted, but certain it is that the resources of this country offer at least as good a field for the investor or mine manager as any other section of the globe.

We would not be human to omit another statement that both of our correspondents make, viz., that they never fully realized what a help to the mining engineer and manager the MINING AND SCIENTIFIC PRESS was till they read it in foreign lands, and got others in their employ to read it, the South American saying particularly that the improvement in the quality and quantity of the work was noticeable among those who read this journal. That, however, is usual, and is one of the things that has often been told us before, but which, of course, is always pleasing to be told, not in a flattering way, but by reason of its truth. Many times through the years mine managers, owners and superintendents have been kind enough to say that they knew of no better investment than to put out half a dozen extra copies of this journal among those with whom they were in daily association, to the ultimate good of all concerned. It is a part of the province and purpose of this journal to lay before its readers modern methods, devices and machinery, to the end that economy of operation may result in greater profit, and that the work may be carried on with less trouble and more satisfaction all round.

There is nothing easy about mining, no matter what part one plays in the great industry, and in the operation and management of a metal mine so much depends upon intelligent co-operation that no wonder the mine managers whose correspondence is here cited lay stress upon the kind of assistance that they miss in those with whom they are associated.

It is, however, to be borne in mind that efficiency in mining methods is not wholly to be claimed by the miners of any country. Many a good miner has come here from across the sea, able to see and oversee to his and others advantage. "Everybody is wiser than anybody," and possession of exclusive knowledge is not the sole attribute of any race or nation.

CONCENTRATES.

VOLUME for volume, carbonic acid gas is 2¾ times as heavy as marsh gas.

THERE is a total of nineteen coal mines operating in South Africa, producing nearly a quarter of a million tons of coal monthly.

THE Tamarack shaft in the Lake Superior copper district is nearly one mile in vertical depth, and the ore therein grows leaner with depth.

IN the case of a heavy sphere, 8 inches in diameter, being put into a conical vessel filled with water, the vessel being 10 inches diameter and of 12 inches altitude, there would be a displacement of 210 2 cubic inches of water.

WATER can be heated to any temperature that is possible to be produced by the sufficient pressure requisite for the stated temperature, but cannot be heated to a higher temperature than 212° F. under atmospheric pressure.

THERE are several long flumes in California. One at Madera is 53 miles in length, and has besides 18 miles of feeders. It is V-shaped, is 46 inches across the top; 36 inch sides, has a daily capacity of floating 400,000 feet B. M., and cost $270,000.

SCRAP PLATINUM will dissolve only in aqua regia, which is a mixture of three parts strong hydrochloric acid and one part strong nitric acid. After dissolving, the excess of acid is evaporated and the resultant platinum chloride crystallized out.

MISTAKES in our contemporaries are rarely noticed: we are too busy trying to keep mistakes out of our own columns to have time or space to devote to the errors of others. Every one is supposed to do the best he can and as near right as he knows how.

THE finding of gold and tin together in place is a rare occurrence. It is said that such a combination has been noted at the Royal Tasmanian mine, in the northeastern part of Tasmania. A similar occurrence is reported from Nigger Hill, South Dakota.

A QUARTZ MILL handling free-milling gold ore is not a "reduction works," according to the decision of the District Court at Reno, Nev., in the case of the Miners' Union vs. J. W. Phillips, in testing the Nevada eight-hour law passed by the last Legislature.

FIGURING a profit of $1 per ton on $6 ore where the cost of freight and treatment is $5, is only theoretical. In practice not over 90% metallic extraction could be counted on, and if the costs and receipts made even, it would, in the case specified, be good work.

IN the Moebius process of refining silver, the metal is deposited from a solution of its nitrate by a heavy electrical current, coming down in the form of loose crystals, which are brushed off the cathode and caught on muslin trays. The process is a commercial success.

THE Panama fee for taking up a mining claim is $10; the tax title costs $150. To "denounce" three pertenencias costs $500 for each pertenencia. The annual tax on each pertenencia is $40, whether it is worked or not. A "pertenencia" is a rectangle 1968 feet long and 797 feet wide.

A MAN can not be made a stockholder in a concern against his will, and the fact that his name was put upon the books of the company, either by mistake or otherwise, against his knowledge or consent, would go far toward exonerating him from any liability as a stockholder in that concern.

OZOCERITE (ozokerite) is a mineral wax having the appearance and consistency of wax or spermaceti. It is essentially a paraffine, being mainly of a higher member of the series; is colorless to white when pure, but often leek-green, yellowish to brown; occurs in beds of coal or associated bituminous deposits.

COBALT OXIDE is produced in the United States to the annual amount of about 14,000 pounds; five times that amount is annually imported. Most of the American cobalt comes from Mine la Motte, Missouri. It is prepared for commercial use at the American Nickel Works, Camden, N. J. It is used by makers of enamels and paints; there is scarcely any general demand for it.

THE melting point of silver is 954° C. It is the best conductor of heat and electricity of any of the metals. Taking silver at 100 the conductivity of gold would be, for heat, 53.2; of copper, 73.6. Silver is readily dissolved by nitric acid. Sulphuric acid attacks it only when concentrated and boiling. The surface only is attacked by hydrochloric acid, covering it with an impervious coating of chloride.

A TRIPLEX PUMP, cylinders 4 inches by 6 inches and making 74 revolutions per minute, will discharge 19.3584 cubic feet, 144 36 gallons of water per minute. For a 32-mile electric transmission for the delivery of mechanical power the constant current transmission would require dynamos and motors of two kilowatts total capacity, and for the delivery of low-voltage current dynamos and motors of three kilowatts capacity for each kilowatt of working capacity.

THERE is no legal limit to the number of mining claims one may file on public mineral land in the United States, nor to the number that may be so held provided the requisite annual assessment work is kept up. In Mexico the owners of a mining property may ask for an increase of the number of their claims, and for this purpose must subject themselves to the proceedings laid down for application for a concession.

IN every field of engineering the fundamental principle that limits progress in promoting efficiency is: Improvement may be carried to that point at which further advance will cost more than the gain, and at which a lesser efficiency would mean a sacrifice of economy more than equal to the saving in cost. A particular improvement will thus find its limit in application under given conditions at the financial critical point, however successful, practically, it may prove to be.

STEAM may exist in three forms; it may be wet saturated steam, or dry saturated steam, or superheated steam. The steam consumption of the engine will manifest influence by the nature of the steam supplied. If the boilers furnish very wet steam a large amount of entrained water is necessarily carried through the engine. Excessive condensation in the steam drum and feed-water heater can be remedied by having an exhaust steam separator fitted to the exhaust pipe after it leaves the feed-water heater.

THE California State Miners' Association is intact, and not wholly inert. It does the most of its work through committees, and on the activity of those committees depends largely its power. The work of the committees is assumed to be continuous, and but little is done at the annual conventions beyond hearing the reports of those committees and electing officers, though the convention voices its sentiments and outlines its policy for the ensuing year by the kind of resolutions passed. The Association has been of great benefit and the days of its usefulness are by no means ended.

SILVER SULPHIDE may be completely reduced by fusion with niter, but it is not acted on by sodium sulphate or lime. With potassium chlorate one-third of the silver is reduced to metal, the remaining two-thirds being converted into chloride. Sulphide of silver when roasted with common salt is partly converted by the joint action of sodium chloride and oxygen into silver chloride. Sodium sulphate is formed at the same time. At a red heat chlorine will quickly attack silver sulphide; in the cold chlorine water acts upon it slowly, with formation of silver chloride and sulphuric acid.

IT IS possible that the difficulty mentioned in the chlorination method may be because of impure chlorine. The chlorine so used should contain no hydrochloric acid, which dissolves the oxides, and tends to spoil the gold solution. In the case of sulphides it will form hydrogen sulphide and tend to precipitate gold from the solution. Then, too, if there be any substance in the ore likely to be attacked by free chlorine the best results of the method cannot be secured. The question hence involves not only the chlorine used, but the suitability of the ore itself to the chlorination process.

CONDENSED FOOD has been advertised for prospectors and others who have to pack their own "grub," but dessicated eggs and concentrated beefsteaks do not satisfactorily take the place of beans, bacon and coffee. These faddish foods are all well enough where one can discard them at will, but on a prospecting trip, while they may be taken as an experiment, it were not well to trust wholly to them. Nothing has thus far been found to fill the place in the prospector's outfit so long and usefully occupied by the sack of flour, the can of baking powder, the side of bacon and paper of coffee, which are good old standbys, coupled with what can be got along the way.

IN the sense that one speaks of a "current" of water there is no such thing as an electric "current," yet that term is used in want of a better one in talking or writing of electrical power or transmission. The word "current" embodies the idea of flowing velocity—weight, momentum. And when applied to the consideration of electrical phenomena one can hardly divest the word sufficiently of its accepted meaning to correctly indicate the action or function of dynamic electricity. Used in its electrical sense, then, the word "current" may be considered as expressing generally a condition or relation of electrical forces supposed to be in progression; an axis of power in every part of which both electric forces are present in equal amount.

A SINGLE LEATHER BELT, 1 inch wide and running at the rate of 800 feet per minute, will transmit 1 H. P. A double leather belt will transmit at this speed 1⅔ H. P. per inch width of belt, both pulleys of the same diameter going 180° contact. All belts over 12 inches wide should be made double. The old theory that atmospheric pressure caused a belt to adhere to the smooth surface of a pulley has been partially discarded, although the pressure of the atmosphere certainly does increase the coefficient of friction. The grain side of the belt should be next to the pulley. To determine the horse power a single belt will transmit when the arc of contact on the smaller pulley is 158°, divide the speed of the belt in feet per minute by 800, and multiply the quotient by the width of the belt in inches; then multiply the product by .92; the result will be the approximate horse power the belt will transmit.

THE maximum amount of water a pump can deliver per day is understood to be its "capacity." A pump of 3,000,000 gallons capacity is one that could raise 3,000,000 gallons of water in twenty-four hours. The work done by the pump is further determined by the height of lift or the pressure that it maintains. A pump of 3,000,000 gallons capacity lifting water a height of 100 feet would be of 1,500,000 gallons capacity if the height of lift were 200 feet. The power of a pump is the number of H. P. it can deliver; 1 H. P. is the performance of 550 foot-pounds of work in one second. If 1,200,000 gallons of water were to be raised through a height of 230 feet in twenty-four hours, the weight to be lifted in one second would be 116⅔ pounds and the power required 48.6 H. P. The effective power of the pump would have to be much higher, for work is lost in overcoming frictional resistances due to the flow in the pipe as well as the pump cylinders.

TO DETERMINE "the right price" for a gasoline engine is a difficult matter. The price of a gasoline engine, like that of any machine, depends primarily on the material used, and the amount and quality of work put on it. "Cheapness" is a relative term. The question for the purchaser to consider is: what he wants. One good way to get the right kind of an engine is to write to a reliable manufacturer, giving in detail just what the engine is expected to do; the kind of work planned, explaining at length the use to which the engine is to be put. It is necessary for the manufacturer to have this information, that he can recommend the kind of engine best suited to the stated requirements. And, as in everything else, if one wants a good article he must pay a good price for it. A high-grade, well-built machine will prove the cheapest in the long run, if special work be required.

SILVER CHLORIDE in nature is the mineral cerargyrite. It may be produced artificially by adding chlorine water or a solution of a soluble chloride to a solution of silver nitrate or sulphate, and washing and drying the precipitate. In this way it appears as a snow-white anhydrous powder, which blackens when exposed to light. It will fuse at about 360° C., forming first a yellow liquid and then a thin red one which will quickly permeate an ordinary clay crucible. It will volatilize slowly. When it solidifies it is of a pale yellow color, waxy or horn-like, and partially transparent. Silver chloride is almost insoluble in pure water; it will dissolve unchanged in ammonia water, will not dissolve in cold nitric and sulphuric acids, but is decomposed by both acids in the concentrated condition. Among metals zinc is considered the best reducing agent for silver chloride, and that method is often employed in establishments using the nitric acid process.

A DRAWBACK to the use of fine ore in the blast furnace is the large escape of dust from the furnace mouth, due to the strong air blast, the pressure of which must be increased in proportion to the size of the furnace, if the latter is to be driven to its full capacity. This loss, which in a 600-ton furnace will rise to forty or fifty tons per day, can be considerably reduced by using briquetted ore instead of the loose. In this regard it must, however, be remembered that any substance that can be used to make the particles of a mass adhere, when compressed at ordinary temperature, or at a comparatively low heat, loses its binding force at or even below red heat. Hence, some briquettes, instead of remaining whole until they melt down, have a tendency to crumble and spread while passing through that zone of the furnace where the formation of gas pockets might occasion unsatisfactory results. If the fine ore be fritted into hard lumps before being charged into the blast furnace, such lumps might become sufficiently tough to hold out until melted down.

CONCERNING the condition of copper mill plates, evidently too much cyanide of potassium has been and is still being used on the plates. Cyanide hardens the plates and renders them unfit for amalgamating gold. Plates may be annealed by applying moderate heat—enough to cause dry wood or sawdust to smoke. This softens the plates and they are then in better condition to amalgamate than before. A very good remedy for plates which continually become discolored with copper salts is to keep brushing them frequently and allowing the plate to accumulate a quantity of gold amalgam, which forms the best possible surface for collecting more gold. They should then not be scraped with chisels or steel scrapers, but with rubber only. In some cases where copper plates tarnished badly, a remedy has been found in placing strips of iron or zinc on the plates (heavy enough not to be moved by the current of water and pulp); this forms an electro, or galvanic couple, and has the effect of stopping discoloration of the plate in some cases.

Lifting Water by Compressed Air.*

The complete apparatus necessary for the successful raising of water hy the air lift system consists of an air compressor and the necessary air regulators; an air tank or receiver large enough to furnish a steady flow of air to the well, and to hreak up the pulsations of the compressor; a pressure gauge and valves suitahle for regulating the pressure and flow of air, and the necessary length of pipe of the proper sizes. In order to enahle the well to work successfully and economically the pipe should he properly proportioned. When the pipe is too large the water is apt to blow out in a spray and with great force, which is ohviously very wasteful hoth of air and water. When the pipe is too small the air is apt to rise to the surface of the water in small hubbles, and without producing the desired results. When the air pipe is outside of the water pipe, I have found the proper relation hetween the diameters of the air and water pipes to he as 1½ to 4, which gives a ratio of actual cross-sectional area of 6.24. When the air pipe is situated inside the water pipe the same ratio of actual cross-sectional areas should ohtain, and in this case the diameter of the water pipe is

$$D = \sqrt{\frac{a \times 6.24 + A}{.7854}}$$, in which a and A represent

the actual internal and external areas of the air pipe. The proper areas of the air and water pipes, together with the required depth of suhmersion and the introduction of the air into the water pipe at the proper point, are the principal factors which determine the success of the air lift.

The water pipe should he suhmerged to a depth of 18 inches for each foot lift above the lowest water level in the well; in other words, the hest results are obtained when suhmersion = .5, the lift heing measured from the lowest or the working water level, as it is called. It will be seen that the depth of suhmersion for the hest results should not he less than 1½ times the total lift measured from the working water level.

When the well is heing worked the water level falls helow the level reached before water is pumped out. To illustrate the foregoing rule, suppose we wish to elevate water 25 feet above the surface of the ground, and that when drilling the well, water is ohtained at a depth of 40 feet helow the surface. The lift is now 40 + 25 = 65 feet. Applying the foregoing rule for depth of submersion we have 65 × 1.5 = 97.5 feet, or practically 100 feet, thus giving a total height of 165 feet from the point where the air enters the water pipe to the point of discharge. After drilling to a depth of 165 — 25 = 140 feet, we are ready to find the working water level in the well. First put the water and air pipes into the well; then drop a float attached to a string into the well. Pass the string over a pulley and attach a weight to the free end. The weight should he just heavy enough to take up the slack in the string and at the same time allow the float to descend with the water level as the latter is lowered by pumping. The distance the weight rises will indicate the depth of the working level below the level first ohtained in the well, and the latter level should he employed when making calculations involving lift and depth of suhmersion.

A simple and convenient arrangement for measuring the fall of the water level in the well can be made as follows: Take a pulley whose circumference is twelve times the circumference of the shaft upon which the pulley is mounted; then wind the float string around the pulley and fasten another string to the shaft, so that it will he wound on the shaft as the float string unwinds from the pulley. It will be seen that this arrangement reduces the travel of the string on the shaft to a convenient distance and one that can easily he measured. Suppose the water level in the well falls 10 feet. The corresponding additional depth of submersion will he 10 × 1.5 = 15 feet, and if the well is not deep enough it should be drilled to a sufficient depth to permit the increased depth of submersion to be obtained, and this is done in order to make the total depth of suhmersion equal to 1½ times the lift, which proportion, as has been pointed out, is necessary for the hest results. If it is not practicahle to increase the depth of submersion after finding the working level, the height of the lift may he decreased a corresponding amount; otherwise the efficiency of the lift will be to some extent affected. If the well had been drilled deeper than necessary at the outstart, the increased depth of submersion could readily he ohtained hy simply lowering the pipes to the required depth. It will he seen that the lower water level in the well also determines the necessary change in the point at which the air should enter the water pipe. With a fall of 10 feet when pumping, the air should enter the water pipe at from 38 to 40 inches from the lower end of the pipe; with a fall of 5 feet the air should enter at from 24 to 26 inches from the lower end of the water pipe, and with a fall of from 1 to 3 feet it should enter at a point of 18 to 20 inches from the lower end of the pipe. For other distances the same ratio may be used. A well put down to the depth previously determined and fitted with pipes of the sizes indicated by the rule can be cemented over and huildings erected over it without fear of trouhle, because the well will need no further attention, and all that is required is simply to supply it with air as long as the pipes last. A numher of wells can, of course, he operated from the same compressor. The necessary machinery can be located in the engine room or in any convenient place, and the air pipes run to tLe different points of distrihution.

Coming now to the question of air required for raising water, it is estimated that 1 cubic foot of air will raise one gallon of water, hut in wells that are properly proportioned there will he a saving over the amount of from 40% to 47%; that is to say, the air used will be 60% of the ahove estimate as the maximum and 52% as the minimum. This serves to illustrate the fact that wells vary, as, for instance, along rivers, where the water rises and falls, causing the water level in the well to fluctuate. To illustrate the application of the rule for volume of air required, if we wish to raise 100 gallons of water we shall need 60 cubic feet of air as the maximum and 52 cubic feet of air as the minimum, the required volume carrying from the maximum to the minimum according to the conditions in each individual case. The average air pressure is sixty pounds per square inch. When starting to raise water it requires a somewhat higher pressure because there is a solid hody of water from the surface in the well to the point at which the air enters the water pipe, and this column of water has to he moved hy the first discharge of air. When the well has reached its normal working condition the water pipe will contain a numher of short columns of air and short columns of water. These short columns of air and water are discharged alternately, and in the pipe they form a continuous chain, the intermittent discharge continuing as long as the proper amount of air is supplied and as long as there remains water to he pumped.

The principle upon which the operation of the air lift depends may he explained as follows: The pressure of the atmosphere heing 14.7/10 pounds, in a perfect vacuum water can he lifted to a height of 34 feet. We know that as the water piston is drawn forward in the cylinder a partial vacuum is created hehind it and the pressure of the atmosphere on the outside of the suction pipe causes the water to rush into the latter. The suction valve then closes and on the return stroke the discharge valve opens the piston, forcing the water to a higher level.

In the air lift pump the pressure of the atmosphere is not removed from the surface of the water in the pipe, as it is in the suction pipe of an ordinary pump. We have the atmospheric pressure on the surface of the water outside of the well and also in the pipe. The short columns of air previously mentioned act as pistons in the air lift pump, the propelling force being that due to the difference in specific gravity between air and water. The specific gravity of a solid is the difference hetween its weight and the weight of a like volume of distilled water at 39.2° F., the weight of the water generally heing represented by unity, or 1. Taking the weight of water as 1, the specific gravity of air is .0012. Air being elastic and compressed to 3, 4 or 5 atmospheres, as the case may be, when liherated under the water is found to be very huoyant, and, as expansion is confined to the limits of the pipe, it forms a large hubble and carries the water above it to the surface, the air column hecoming longer as it ascends on account of the removal of the weight of water ahove it, thus allowing the air to continue to expand, until finally it flows from the pipe a little above atmospheric pressure. It will be seen that the water which is removed by the air lessens the weight of water in the pipe, or, in other words, the weight of the column in the pipe is less than that of a similar column outside of it. This in turn causes the water to rush in at the bottom, because of the greater weight of the column on the outside. Other buhbles are formed, thus causing a continuous chain of short columns of air and water as long as air is supplied. One important advantage to be derived from the use of the air lift pump where water is to be used for condensing purposes or domestic use is that the air during expansion absorhs heat, and this tends to lower the temperature from 2° to 4° F.; that is, water having a normal temperature of 50° in the well will have a temperature of from 48° to 46° when discharged.

There is no particular advantage to he gained by employing special arrangements for introducing the air into the water pipe. The air may enter from the side or at the center with equally good results. The economy of this system can be figured out by any engineer without much trouhle, because ahout all that is necessary is to find out how much steam will he required to compress 1 cubic foot of air to the required pressure, which may be taken at sixty pounds when making calculations.

*Condensed from a paper read by G. C. H. Freidrich before the Ohio Society of Mecbanical, Electrical and Steam Engineers.

THE volcanic ash deposits in Nebraska were partially worked last year to obtain pumice, the product, about 100 tons, heing used largely in the manufacture of soaps and scouring powders.

Some Structural Features of the California Gold Belt.

NUMBER IV.

Written for the MINING AND SCIENTIFIC PRESS by W. H. STORMS.

Ahout 6000 feet east of the system of fissures at Sutter Creek, which were described in the last paper, is situated the Baliol mine. This property has developed structural features of unusual character and interest. The rocks occupying the country intermediate of the Baliol and the Mother Lode consist of schistose and massive greenstones, slates and quartzites and grano-diorite. The metamorphic rocks (slates and quartzites) helong to the Calaveras formation. The rocks in which the Baliol ore deposits and veins occur are wholly amphibolite schist, which are the result of alteration of an ancient tuff, as shown hy microscopic slides made of this rock. The schist strikes ahout N. 20° W. The ore hodies occur as a series of quartz veins, mostly less than 4 feet in width—usually less than 1 foot—the intervening schist being impregnated with silica and containing from ½% to 3% iron sulphide. In some places the percentage is much larger, hut it will average ahout 1½%. These sulphides are auriferous, running from $25 to over $200 per ton, and averaging in the pay zone ahout $30. There are, however, some mineralized shoots where the values are much lower. Free gold accompanies these sulphides in greatly varying proportion. The ore hodies occur as a series of rudely lenticular impregnations, and do not conform ahsolutely with the strike of the schists, hut have a more westerly trend going northward, cutting the formation at an angle of 10° to 15°. Generally speaking, there are three distinct zones of mineralization, though in some places there are more—a hroad zone sometimes splitting up into two or more separate ones. In places the zone of mineralization is over 40 feet wide.

In dip the ore hodies appear to conform closely with that of the inclosing schists. The vein quartz is white, crystallized, with many vugs, and often a comb structure. The intermediate silicified schist is grayish and granular, resembling the texture and general appearance of grindstone, which has led to the rock heing called "grindstone" hy the miners. This is a condition common in the Utica and other mines at Angels, in Calaveras county, Cal. The "grindstone" forms the hest ore found in the mine. The Baliol has been developed to a depth of 700 feet (the lowest level), though the shaft is down 800 feet. The condition on the several levels is essentially the same, though no large hodies have yet been found below the 500-foot level. However, the highest grade rock has been discovered in the lowest level, though work was discontinued hefore a large ore hody, which prohably does exist, was found. There are numerous later fissures (crossheads) cutting the formation and the ore deposits and displacing them. The most peculiar and interesting geological feature, however, is the sudden disappearance of mineralization in certain portions of the mine, upon the floors forming the jointing planes of the rock. These floors lie nearly horizontal, and a large ore hody—20 to over 40 feet in width—will be found "cut off," as if hy a fault, though no displacement has occurred. At a higher or a lower level, in the same zone, the mineralization reappears, similar in character and value to that above or helow. This is known to he the case in at least four separate instances. An occurrence of this kind is somewhat discouraging to the owners of a mine, but it cannot be said that such geological phenomena render a mine more difficult to develop or to operate than those ore bodies of erratic distribution in limestone. Indeed, it is actually less so, as the ore bodies occur with more or less regularity, and within the same zones, repeatedly.

There are no gouges connected with the ore hodies excepting those resulting from movement subsequent to the mineralization of the several zones, and these, in some places, occurring on the walls, may suddenly swerve from their course and cut across an ore hody or leave it entirely. The mine makes comparatively little water considering the development, though varying considerably with the seasons, heing most abundant in the winter and spring months.

The minerals occurring in the Baliol mine are quartz, calcite and pyrite, with small amounts of chalcopyrite, galena and gold. In one vein a quantity of molyhdenite occurs with coarsely crystallized pyrite, but the ore body contained very little gold. Silver also is present with the gold, the hullion heing worth from $17 to $18 per ounce. The gold is generally very finely distributed, hut bright and easy to amalgamate on good plates. Ahout 160 tons can he crushed daily in a 40-stamp mill. Large amounts of ore were cheaply mined by open cut system in the early history of the mine, but the expense is considerably increased in the deeper levels which require in most stopes heavy timbering, though swelling ground, such as is found in the Mother Lode slates, is unknown.

(TO BE CONTINUED.)

An Arizona Gold Mill and Cyanide Plant.*

Written for the MINING AND SCIENTIFIC PRESS by ARTHUR H. HALLORAN.

The recognition of Arizona's importance as a gold producer is evidenced by the constant building of so many plants for the treatment of gold ore throughout the Territory. A noticeable recent installation is that of the Golden Link M. Co. at the Sultan mine, 18 miles west of Hillside, Yavapai county, Arizona.

This mine is about a mile from the Santa Maria river, and all water for the recently completed 20-stamp mill and cyanide plant is pumped from a tunnel run under the river bed to tanks 500 feet above.

The question as to the site of the mill was an interesting one. The tunnel levels of the mine are on the canyon side, 600 feet above the river. The mill could be located either at the river, involving the construction of 5000 feet of aerial tramway, or it could be located at the mine, involving a pumping plant and pipe line from river to mine. After some figuring, including cost of construction of road and hauling of all materials of construction, the latter plan was adopted, and the ore is now trammed either first into a 200-ton ore bin or directly to the grizzlies and rock crusher.

The mill was constructed under the supervision of C. E. Bunker and is designed to represent an advanced type of mill construction based upon California experience. The main driving shaft is located behind and below the mortars and is belted to the two driving wheels of the cam shaft, each capable of running independently of the other. Noticeable features due to construction are economy of ore handling by gravity, ample light and particularly the massive concrete retaining walls and concrete floors.

The engine room, boiler room and a machine shop are placed to the side and about 3 feet lower than the table floor. Oil for fuel is hauled 18 miles from the S. F. P. & P. R. R. and stored in iron tanks above the mill whence it is piped by a fuel oil circulating system to the boilers. A tandem Corliss engine is direct connected by gearing to a three-phase alternating current generator of 2300 volts full load with 12 5 amperes. This supplies current for incandescent lighting and for running a 20 H. P. induction motor, 220 volts, 50 amperes, direct connected to a 6x10 pump, the latter pumping 200 gallons per minute from the 60-foot shaft and 300-foot tunnel run out under the Santa Maria river to the plant.

As originally planned the cyanide plant was to be placed immediately below and parallel to the mill. But owing to the nature of the ground it was placed about 200 feet lower down the hill, and the pulp from the tables is run through pipes to the leaching tanks.

The equipment of the cyanide plant consists of two 14 feet diameter by 10 feet deep solution tanks shown in the general view, five 24 feet diameter by 5 feet deep leaching tanks, two 10 feet diameter by 6 feet deep gold tanks, two 10 feet diameter by 4 feet sump tanks, two double zinc boxes, cleanup tanks, air compressor and filter presses. An assay office and retort room are under same roof as the cyanide plant.

In constructing this plant, excavations being made and concrete retaining walls and bases being in place, the battery frames and mortar blocks were first placed, then the mill and cyanide plant buildings were framed, after which all equipment was placed as it was received from the railroad. The plates of the leaching tanks were put in place and riveted on the spot. The smaller tanks were made up where convenient and afterwards moved into place. Much inconvenience and loss of time resulted from lack of room for storing materials as they arrived and the subsequent handling of some material in moving to make room for other, and the fact that it could not be stored, where needed, pointed out the necessity for adequate ground for handling supplies.

Following are some details of the construction of the ore bin illustrated in the accompanying photograph. In its construction three beams 12 inches by 14 inches by 30 feet were placed parallel to each other about 7 feet apart, the rearmost one resting on short 12x14-inch blocks, the middle one on short 12x14-inch uprights and the one in the foreground on uprights tall enough to place it on the same level with the other two, the uprights being supported by 12x14-inch timbers imbedded in the ground. A temporary support was then made to the right and the posts of the first of the six upright members were laid so that their lower ends rested on the bin foundations and their upper ends on the supports. The cap and cross piece were then laid in place. In the same manner each of the remaining members were laid on the one to its right. As all are framed from 10x12 inch timbers with templet, before being moved each drops into its place.

A gin pole and windlass were then put up and each member, after its parts had been bolted together, was raised to a vertical position and tied to the next, as is shown in the picture. The whole is then boarded up with 2x6-inch plank.

In constructing such plants the chief difficulties to be overcome are those of transportation, water supply and labor. The climate is rather hard on the men and care as to water and food has to be constantly exercised in order to keep efficient labor.

*See illustrations front page.

Engineering as a Profession.

Engineering is a profession, not an art, or a trade. It is a profession to exactly the same extent as medicine, or the sciences, or law, based upon principles universally true. The knowledge of these principles cannot be acquired by individual experience, or by lucky discoveries. The experience of thousands of generations, the discoveries of ages and ages, logically arranged by the master minds of the past, constitute to-day these very principles. In order to become proficient these principles must be studied, their knowledge theoretically acquired. A trade can only be learned by actual practice. Skill in blacksmithing, or molding can only be acquired by repeatedly performing the various operations of these trades. Add to this skill the individual conception of the work, the imprint of the worker's personality, and the trade becomes an art. In each case the experience of the individual is essential for the success of the work.

But engineering principles are universally true; you must be conversant with the laws of statics before you can build a bridge or a smokestack; the rules on heat must be studied before you do blast furnace or steam engine work. The most skillful application of these principles is a question of experience and talent, as it is also in other professions. An eye specialist will meet with but little success in treating general diseases, a criminal lawyer cannot draw a modern charter, and an electrical engineer will build a poor rolling mill. A further requirement is a mind trained in logic, a mind which is taught to think, to grasp and weigh stipulations, build up mentally a problem in its entirety, all its details, and conceive all conditions governing it and all which are governed by it. We have a number of men, proficient in their respective fields, who have never visited an engineering school, who substitute, as they proudly claim, practice for theory, who have graduated from the shop. These men ought to be proud for having mastered by individual study, perhaps unconsciously, these very principles which are taught in concise and lucid form in our neighboring schools. Such men are the exception—they rank far above the average, both in energy and in mental outfit. And for this same reason I do not like these schools, where they make you an engineer while you wait. We are overrun to-day by such men. We want honest schools, where the average scholar, not the genius, and not the chump, may acquire honest knowledge by honest work, and I, for my part, will have none of these institutions where they spoil good mechanics to make poor draughtsmen, whether they be called evening schools or correspondence schools, or founded for the purpose of advertising so-called philanthropy.

Anybody who does not master these broad theoretical principles is not an engineer. Such a man might be able to copy, to reproduce what he has done before, but he cannot accomplish anything higher. Engineering teaches us as the highest goal to apply known principles to new problems, to do creative work. This ability to do creative work we offer to the world as the reason for our existence. As you see this world to-day, it is the work of the engineer. Where is the progress in the trades, where in art? Greek statues are still the choicest gems of art. Stone masonry and wood carving date back 4000 years. The early middle ages produced masterpieces in wrought iron and bronze, which are far beyond the limit of our modern metal butchers. Slow and conservative has been the progress of medicine, law, and even the sciences have made their progress felt more in a physical than a material way. But humanity was awakened, this old earth all at once swung into a new orbit, when some fifty years ago engineering was recognized as a profession and studied as such. And it is not the man who invents photographs, or talks to the inhabitants of Mars, but the solid rank and file of well-trained, well-balanced engineers, who have wrought in the last hundred years such miraculous, dumbfounding changes, that the whole development of mankind up to that time seems incomparably slow.

The evolutionist has taught us that the rapid advancement of man began with the substitution of artificial tools for the natural implements. If this is true we stand on the threshold of an equally momentous step in the development of the world, dating from the day when the engineer taught man to substitute the vast powers of nature for his own limited little strength.

Engineering is a profession, the youngest one, and in one respect has to learn much from her older sisters. Both the law and medical fraternities watch with jealous eyes over the professional conduct of their members, and while they cannot prevent the existence of shysters or quacks, they take prompt and proper measures to demonstrate the characters of such men to the public. This ethical aspect of his station in the world the engineer seems to have overlooked in his mile-a-minute development. His work, whether as an employe or as counselor of his clients, is a confidential one, requiring not only a mastering of his profession, not only skill in the handling of difficult problems, but a high degree of integrity, which alone can inspire confidence and will lend him that dignity which his profession deserves. The public might be dumfounded by the gigantic, or the daring of your work, but hearing that you are an engineer they will look for the overalls and the oil can. Let us pledge ourselves to guard our standing, to guard our dignity.—W. RIDDLE.

The American Mining Congress.

On Monday, Sept. 5th, the American Mining Congress held its sixth annual session at Deadwood and Lead, South Dakota, the congress continuing throughout the week. The aims of the congress are to advance the mining and metallurgical industries in all their various branches within the United States; to assist in bringing about a more perfect co-operation between the Government of the United States and the development of mining and metallurgy; to encourage education in practical and scientific mining and metallurgy and the dissemination of scientific information in relation to mining and metallurgy and their allied industries; to acquire and disseminate trustworthy information bearing upon the development of the metallic and non-metallic mining resources of the United States; to promote a more co-operative tendency in the evolution of agriculture, mining, manufacturing, transportation and commerce; and for the particular purpose of bringing the mining men of the United States into closer relation with one another and of promoting a friendly feeling for one another through social intercourse and the discussion of mutual interests.

The annual address was delivered by the president of the congress, J. H. Richards, and the usual speeches were made by others, followed by the reading of technical papers by their authors, several of which are reproduced herein.

Ore Deposits of the Northern Black Hills.*

Written by J. D. IRVING.

The Black Hills have been from the earliest time a region of singular economic interest. From the dates when Indian hunting parties visited them to obtain provisions for future use they have gradually increased in importance as a source of wealth, until their production has seen its culmination in the thriving mining industries of to day.

The gradual inroads of the hardy prospector to this Indian hunting ground first attracted attention to the region as a source of a different type of wealth.

In the several steps of its growth, mining in the Black Hills has followed quite closely the lines of its development in other regions. First, the attention of the early prospectors and those who followed them there was given to the more easily accessible deposits—the placers. As the value of these became evident, search was made for the source from which the gold in the placers was derived. The old gravel deposits which lie at the base of the Cambrian formation were then found, and for a number of years yielded almost fabulous sums to those who had located upon them. The impregnated lodes in the schistose rocks were discovered, and the mines which have now become the famous Homestake belt were gradually opened up. The lead-silver ores of Carbonate then became productive, and still further search revealed the beds of refractory siliceous ore, which have of late years become of such very great importance; then the Ragged Top ores were found, and finally a variety of smaller deposits was discovered. Regions where ore bodies were easily accessible at the surface were those first prospected; then those more remote and more deeply buried beneath the covering of barren rocks in turn yielded their contents to the efforts of the miners.

GEOLOGY.—As a problem in geology the Black Hills differ in some respects from almost any other to be found in this country. Surrounded on all sides by a flat and rather barren country whose general character is monotonous and without special interest, the Black Hills rise as an island, presenting within their borders geologic problems of great variety and interest, diverse types of ore deposits, and studies in land drainage, which, from their very isolation and circumscribed character, are easily grasped and understood, and are without the usual complicated connections with the surrounding country that make most geological questions so difficult to comprehend.

In his classic work upon this region, Henry New-

*Trans. Amer. Min. Congress, Deadwood, S. D., Sept. 7, 1903; (condensed).

ton has described the general geological character of the Black Hills as an elevated area, roughly elliptical in outline, comprising a central core of metamorphic crystalline rocks, which are grouped in rudely concentric helts, strata of later geologic age, dipping away in all directions from what is termed hy Newton the elevatory axis or region of the Hills.

Were the strata which originally covered the core of schists which forms the center of the hills still present, we would have an elevated dome of very great height, rising far ahove the level of the surrounding country. The gradual erosion or wearing away, however, of these uplifted rocks has gone on together with their upheaval, so that we have now remaining a country only slightly higher than the surrounding plains. In the center is the uncovered area of the schists, and at the sides the stratified rocks dipping outward heneath the flat prairie land beyond. The general trend of this central core of old crystalline rocks is in a due north and south direction, hut at its northern extremity it turns abruptly towards the northwest, forming a sort of geological cul-de-sac shut in on three sides hy upturned strata, hut separated from the main portion of the core to the south hy a narrow helt of Cambrian rocks and their included masses of porphyry.

Throughout this northern area erosion has not cut so deeply into the crystalline schists as farther south, so that, hesides the helt of enclosing strata, isolated patches of the old covering lie upon the higher hills within the area of schists.

If we examine the rocks which compose the different geological formations which are found in the northern hills, we find there are four groups of importance which can be readily distinguished from one another. The first is the lowest, or series of metamorphic schists. It consists of a series of crystalline mica schists, mica slates, or phyllites, and laminated quartzites. Together with these are found, in the southern portion of the Black Hills, and in the region known as Nigger Hill, large intruded masses of granite, very coarse in its texture, and sometimes containing deposits of tin. In the northern portion of the hills there is no granite present in the series, but its place is taken hy numerous dikes and great irregular patches of a dark, greenish hornhlende rock, termed amphibolite. Bodies of this rock are particularly noticeahle in the vicinity of Lead City, and extend as far south as Custer Peak. It is possihle that they may have had some connection with the occurrence of gold in the Homestake mines, but there is no definite evidence in favor of this theory. The rocks of this series are strongly laminated and everywhere tilted at a high angle. The lamination crosses the planes of original sedimentary hedding, as can he still seen in many places. Numerous closely spaced folds are also seen to exist in the series; hut the high degree of alteration that the rocks have undergone has now almost completely ohliterated their original structure.

The next series of rocks is that belonging to the Cambrian period, and comprises those rocks which lie upon the eroded surface of the underlying schists. These rocks are a heavy hasal conglomerate, or coarse hed of hardened gravel, a thick layer of quartzite, and a series of alternating limestones and shales, with some quartzite—in all a thickness of ahout 300 feet. Ahove these, and still farther out from the center of the hills, there is a yellowish limestone showing purple spots, and helonging to the Silurian age. This is ahout 80 feet thick. Ahove it comes a series of heavily hedded gray limestones, pinkish at the hase and averaging about 600 feet in thickness. It covers the other rocks throughout the entire western portion of the uplift.

(TO BE CONTINUED.)

Pyritic Smelting.*

Written by FRANKLIN R. CARPENTER, Ph.D.

This is a process of smelting applicahle to any raw ores not carrying lead, hut more especially to sulphide ores carrying copper.

From time immemorial man has roasted off the sulphur in pyrite ores and burned his iron to oxide in the open air, thus wasting what pyritic smelters consider good fuel. If it is admitted that a heat unit derived from the oxidation of iron or sulphur will do as much work as one derived from the oxidation of coke, the folly of this proceeding becomes apparent, provided this heat can be utilized. If it can, one might just as well waste his coke in a similar manner.

American engineers derived from Europe two raw smelting processes, which, unfortunately, are often confused. One was the Kongsberg process of pyritic smelting, where raw pyrite was added to the charge simply to produce a carrier, or matte, for the precious metals. This was all I had in view when I advocated pyritic smelting for the siliceous ores of South Dakota. By its means the small amounts of gold and silver in many tons of rock were concentrated into a few tons of matte. This process, broadly, is very ancient—so ancient that we know not when it was first employed. It will be observed later that it is the very opposite of the other class of pyritic smelting, in that the ores treated are siliceous, and pyrite is added for a carrier only.

The other sort of pyritic smelting is the outgrowth of principles discovered by Sir Henry Bessemer in steel making, who found that cast iron might be purified hy the oxidation, or burning, of its own contained impurities. The principles of Bessemer, much modified, are now everywhere applied to the refining of copper matte, where again the oxidation of the iron and sulphur furnish the heat to hurn and slag off impurities, giving us a very pure blister copper at one direct cheap operation, and without additional fuel. This is the heautiful operation of Mahnes, first employed in America by our Butte friends.

After the establishment of Bessemer's process in England, Hollway sought to smelt the Rio Tinto copper sulphide ores hy means of heat generated in the oxidation of their sulphur and iron. A short calculation will show that his conclusions were well founded. Without going into the investigation very fully, we may admit that 1 pound of iron pyrite hurned in the furnace is equal to 2,026 British thermal units, and that this, roughly, is equal to 40% of the value of a pound of carhon burned to CO; hut as our furnaces prohahly hurn perhaps a third of the carhon to CO_2, we may conclude that this value is too high, hence figure it as equal to only 26%, or one-fourth the value of 1 pound of coke, which is certainly a safe deduction.

Those who are interested in the suhject are referred to the forthcoming volume of the Mineral Industry, where E. C. Reybold, Jr., a young man employed at our Golden, Colo., works and formerly with me at Deadwood, has fully investigated the suhject.

For every 4 pounds of pyrite, therefore, hurned in the open air, we have lost the equivalent of 1 pound of good coke. Stated in another way, 4 pounds of pyrite will do as much smelting as 1 pound of coke, and, in so doing, it is smelted and has fluxed itself.

Our hlast furnaces, in ordinary matte smelting, are running with 16% coke, hut a charge containing 64% of raw pyrite should smelt itself; and if this is assisted with a hot air stove, which can he fired with a cheap low-grade fuel, even this percentage of pyrite may he much reduced. The fullest application of these principles has heen made hy Rohert Steicht at Mount Lyell, in Tasmania, where the first smelting is done absolutely without carhonaceous fuel of any sort. Let us now consider for a moment what they do. Their ores are pyritic, and of two classes. The Mount Lyell pyrite is so mined as to maintain a general average as follows:

Fe	40.30%
SiO_2	4.42%
$BaSO_4$	1.48%
Cu	2.36%
Al_2O_3	2.04%
S	46.01%
Ag	2 oz. per ton.
Au	0.0725 oz. per ton.

The second class is a siliceous hornite ore purchased from other mines, and quartz is employed as a flux. This is the direct opposite of the case first considered, calling for additions of silica in the place of additions of pyrite.

The Mount Lyell Co. operates eleven blast furnaces, which are arranged in two smelting plants. Those employed in the first smelter are five in number and are 42x210 inches at the tuyeres. The height of the ore column ahove the tuyeres is maintained at 9 feet and 6 inches. The other plant consists of six furnaces, five of which are 40x168 inches at the tuyeres. The tuyeres are all 3 inches in diameter, and the larger furnaces have thirty-two each, the smaller ones twenty-four each. In the first set of furnaces all the ore delivered at the plant is smelted, without roasting and without fuel, to a first matte carrying 15% copper. Formerly a hot hlast (528°) and 3% coke were used. But for a year past the coke has heen ahandoned and the hlast only warmed. No difference was noticed in this change save a greatly increased capacity; three furnaces now doing the work of four under the old method.

The matte from this first smelting is resmelted in the second set of furnaces to a 45% to 50% copper matte, which goes directly to the converters.

The process is, therefore, divided into three stages, all of which are oxidizing, and which may he said to he almost continuous Bessemerizing from beginning to end. Disregarding the time for cooling and transportation from one department to another, the time consumed from ore to copper is only six hours, and this is accomplished almost without extraneous fuel.

In the first smelting no limestone or coke is used, and but a slightly warmed blast. In the second smelting a small percentage of coke and limestone is used and a cold blast. The third stage is simple Bessemerizing or converter work.

These results having been attained at Mount Lyell by the application of principles long advocated hy pyrite smelters, there is no longer any reason, in my opinion, why the same or similar results cannot he had at Sudhury, Ontario; Ducktown, Tenn.; Keswick, California; and in Arizona and New Mexico, in fact, at any place where the ores carry sufficient pyrite, or pyrite can be had from outside sources.

(TO BE CONTINUED.)

*Trans. Amer. Min. Congress, Deadwood, S. D., Sept. 9, 1903.

The Potsdam Formation of Bald Mountain District.*

Written by JOHN BLATCHFORD.

In describing a portion of this formation I shall only touch on the geological part of it, describing the occurrences of the ore hodies in this formation. These ores were first discovered in 1877, hut there was very little done on them until 1890 and 1891, hecause up to that time all of the ore had to he hauled by teams and shipped out of the country to be treated. In the latter part of the summer of 1891 the Burlington and the Elkhorn Railroad Companies placed a numher of spurs into different mines, after which the work hegan in earnest. At that time it was not known how extensive those ore hodies would prove to be, hut, after continuous work for twelve years, we find that they are almost unlimited. Ores that we could not look at years ago, on account of their low grade, can he handled to-day, with our new reducing or cyanide processes, at a profit.

In some places in our mines the flat ore hody is known to lie and to he intermixed with a vertical ore hody, not showing any division hy quartzites. It is one of the occurrences which causes me to helieve that there are a numher of these vertical ore hodies, or quartz ledges, that are covered up hy this sedimentary formation. For instance, quite a portion of the Homestake ore hodies have heen more or less covered by this flat formation; hut in other places the flat portion, heing more or less eroded, left the vertical portion to he more easily prospected than it is in Bald mountain district. The eastern houndary of the flat formation hegins at the original Golden Reward and Buxton, and almost at the base of Bald mountain on the north, and to the west of Sugar Loaf mountain on the south. It starts with a thin layer of quartzite, lying on the schist, covered with sandstone and shales. It gradually thickens toward the west, not so much because the hill rises, but because the quartzite and schist drop. It drops variahle distances at various places until it is several hundred feet helow the surface, making a number of layers of different material. Ahove it, on and between some of these layers is where we find what is called "top contacts."

As we get nearer Terry's peak, the flat formation thickens more by the rise of the surface than by the fall of the quartzite, and, west of the peak, it keeps this increased thickness for a numher of miles. Towards this rise or thickening of the formation is where the top layers of ore hecome more numerous. How many layers, or so-called contacts, there are has not yet heen determined. There is continually something new cropping out.

In these upper layers we usually find a vertical, or crack, filled with ore, extending downwards for hundreds of feet, with a numher of lense-like hodies of ore hranching out at different intervals, in some places connecting with hodies from nearhy verticals. At present most of the work west of Terry's peak is on the upper contacts. In the Ragged Top district the ore hodies are in the lime, and are proving to he extensive and profitable.

Around Portland the workings are all in the shales, scarcely any work in that neighhorhood being done on the quartzite as yet. There is no douht in my mind that when they commence to look for lower ore hodies west of the peak they will find them large and valuahle on the quartzite.

The original dikes all have a north and south course, while a few of the later dikes, near the base of Bald mountain, have an east and west course, and the ore hodies mostly have a north and south course.

These ore hodies vary in width and thickness; we find some of them over 400 feet in width and of variahle thicknesses—from 6 to 20 feet—and of various values, ranging from $5 to $50 per ton, and a general average for cyanide ores in the neighhorhood of $8 to $10 per ton. To describe the condition of the quartzite we may compare them to the rolling waves of the ocean.

We find these ore hodies at the hase, on the steps and slopes of the folds, and most times on the top of these large uplifts, hut seldom find ore hodies in the "channel" proper. The most of the level places in the quartzite seem to he capped with large sheets of porphyry, but at every fault and in close proximity with it the capping is composed of shales and sand rocks. No douht this has much to do with the occurrence of the ore along the breaks; those heing in themselves an altered condition of these shales and sand rocks.

The Galena district has an extensive area of this formation.

The present developments there are very encouraging, although there has not been enough done to determine how large the ore hodies are, but they are numerous and the prospects obtained from them are good. There is still a very large area undeveloped.

There is room for a good many mines such as the Golden Reward Co.'s property, consisting of over 50 miles of underground workings, about two-thirds of this being on ore, while the other third is crosscutting. After following some of these ore hodies close onto 3 miles we find them still continuing.

*Trans. Amer. Min. Congress, Deadwood, S. D., Sept. 9, 1903 (condensed).

Notes on the Metallurgy of Copper of Montana.*

NUMBER VII.

Written by H. O. HOFMAN.

DETAILS OF PRACTICE.—The coal is crushed through a ¾-inch ring and passed through a 5-mm. screen; the oversize goes to the producers, the fines, forming about 30%, are burnt under the boilers. Owing to the high percentage of ash in the coal, the amount of fixed carbon retained by it is exceedingly high. The flue from the six producers serving one matting furnace has to be fired once in eight days to remove soot, tar, etc., and washed out once in six weeks to free it from ashes. An average analysis of producer gas, taken from a large number of determinations, gave CO_2, 9.4; CO, 16 8; CH_4, 2.9; H, 13 3; N, 57.6. The high percentage of carbon-dioxide is probably due to the excessive use of steam. Bunte has shown that the larger amount of steam that is admitted to a producer the larger is the volume of carbon-dioxide formed. The gases, however, pass off from the producers with a temperature of 700° C., which would seem to counteract the cooling effect of the steam and cause the carbon to burn rather to carbon-monoxide than to dioxide.

The hearth of the regenerative matting furnace, 42 feet 6 inches by 15 feet 9 inches, has the same width at the ends as at the middle. While this arrangement gives a larger hearth area than in the furnace tapering at the ends, it has the disadvantage that the sides tend to bulge inwardly instead of outwardly as is ordinarily the case. The furnace is built in five sections in order to allow for expansion. This amounts to 14 inches over all. The sections are separate in the roof; in the 18-inch side walls the necessary spaces are left between the bricks. The upper tie-rods run over 1 foot above the roof (9 to 12 inches thick), as this may rise as much as 9 inches; the lower tie-rods, placed 4 feet below the brick hearth supporting the quartz bottom, were passed at first through 4-inch wrought-iron tubes; when these burnt out, the new tie-rods were provided with a small central opening for water cooling. At present, the rods are solid, 1½ inches in diameter, and pass through a flue 2 feet 6 inches by 3 feet 8 inches, which is ample for air cooling. The checker work has a peculiar construction to permit cleaning and thus reduce the slagging of the brick through dust. The flues are horizontal, 18 inches high by 7 inches wide by 11 to 21 feet long, according to position, and are constructed of firebrick. The 9-inch brick forming the tops and bottoms are laid 4½ inches apart, leaving open spaces to allow the dust to fall and collect in a pit at the bottom, 4 to 5 feet deep. The heating surface is not very much diminished by this arrangement, as the sides of the horizontal bricks are exposed to the hot gases; this would not be the case if the bottoms and tops did not have the open spaces. The dimensions of the air chambers are: Width 8 feet 6 inches, by length 14 feet 7½ inches, by height 13 feet 9 inches; of the gas chambers, width 7 feet, by length 14 feet 7½ inches, by height 13 feet 9 inches. The heating surfaces, including exposed walls, are 4900 and 4200 square feet, respectively. While long-checkers save fuel, they tend to shorten campaigns; the reverse is the case with the short-checkers. Air enters the hearth through a single port. 15 feet 9 inches by 2 feet, the gas through four ports, 20½x30 inches. The products of combustion from the furnace descend in a chamber at one end of the checkers, and, after passing through these, ascend in the other at the opposite end. The life of the checkers is about three months. In order to lengthen it, experiments are under way to have the gases go during the charging period through a by-pass direct into the main flue, and thus prevent the inevitable dust from settling in the checker flues.

The working bottoms of the furnaces have a thickness ranging from 19 to 28 inches at the lowest point, the taphole. Both single and double bottoms are found. The single bottom is more common with ore smelting, as here the furnace had to carry a relatively light material in comparison with the refining furnace with which the double bottom is more prevalent. The bottom sand is a sugar-like quartzite, with 95% silica, the rest being alumina and ferric oxide. It is crushed between rolls to bean size, say, through a ½-inch ring; 80% of it will pass through a 5-mm. screen. Two examples of putting in a bottom will show how great are the differences in practice. One furnace has a hearth 20x50 feet, is direct-fired, and takes seventy-three tons of crushed sandstone. Supposing the furnace to be dry and warm, from six to seven tons of sand are charged and heated for six hours, being rabbled at intervals. These operations are continued until one-half of the total sand required has been introduced, when the whole is heated to the fritting of the surface. The other half of the sand is now charged in the same manner as was the first and brought to fritting. Converter slag is now poured in to cement the particles of sand more firmly together; from three to four charges of calcines are worked and the furnace tapped dry after the fourth charge. The furnace is allowed to cool for three to four hours and is ready for regular work. The time required for putting in the bottom is four days. The bottom under consideration was put in in February, 1900.

The other extreme is offered by a gas-fired furnace with regenerative chambers; the rectangular hearth is 42 feet 6 inches by 15 feet 9 inches. It is presupposed that the furnace is new and requires drying and warming. A light wood fire is started on the hearth in half a dozen places; the valves are reversed every half hour. In ten days the furnace will be at a dull red, in two days more it will be hot enough to ignite producer gas. The gas is turned on in small amount at first; after three days the wood ashes are taken out, and on the fourth or fifth day (the sixteenth or seventeenth after starting) the furnace will be a bright cherry red. Five tons of sand are charged through the hoppers in the roof and, when spread, cover the hearth to a thickness of 2 inches. The sand is calcined, turned over, and the furnace brought to a normal heat; charging of sand and heating it are continued in five to six hour intervals until about 60 tons have been introduced, care being taken to have the sand thoroughly calcined. The furnace is now brought in thirty-six to forty-eight hours to the highest heat that can be obtained without endangering the brickwork, and the sand brought to set, which amounts to about 3 inches in thickness. The high heat is maintained for sixteen hours, and the furnace then cooled down to a dull cherry red. Enough calcines (giving 45% copper matte) are dropped through the roof to cover the hearth to a depth of 3 inches. They are melted down and are absorbed by the sand bottom. The furnace is cooled as before, and a second charge of calcines given and smelted. Part only of the charge will be taken up by the hearth, the rest is tapped out. The furnace is again cooled, 12 to 15 tons ore charge are given, melted down, and the furnace is tapped dry and cooled to a dark red, but more slowly than before. It is again fired up, worked for three days as under normal conditions, and then tapped dry and allowed to cool to a cherry red. It is now safe for any kind of work. The time required to bring a new cold furnace to this point is three weeks. The object of the repeated coolings of the furnace is to harden the bottom. A bottom put down without cooling is liable to be mushy when it is hot, even though it be hard when relatively cool.

The ore charges consist mainly of roasted concentrates, with fines from first class ore; sometimes small additions of limestones are made. In converter plants, low-grade blast-furnace matte is often poured into the reverberatory matting furnace in order to raise the percentage of copper.

In regular work, the charge is collected above the furnace in from five to seven hoppers, having discharge pipes with gates, and dropped onto the hearth. With non-regenerative furnaces, the bulk of the charge is collected near the fire bridge; thus with five hoppers, e. g., seven and one-half volumes of the charge will be dropped through hopper No. 1 near the fire bridge, then six and one-half through hopper No. 2, five through No. 3, three through No. 4, and one through No. 5 near the flue bridge. With a regenerative furnace, having, for example, seven hoppers, charge will be dropped through the end hoppers that it may flow toward the center, then through the central hopper and its two neighbors, and lastly through the two remaining ones, the flow being regulated by the gates that there may be an even distribution. The charge is now melted down and stirred at intervals, in order to break up lumps. With a furnace that has been tapped dry, the bottom has to be rabbled in order to bring adhering melted parts to the surface. When melted and thoroughly liquefied, the slag is skimmed into a settling box or settling pot, that particles of the matte carried out by the slag may be collected and saved. With zinc-ose ore it is important to give a good fire before tapping, that there may be a good separation of the mushy, zincky matte (which being light floats on the surface of the heavy matte), and the slag. The overflow slag is collected either in waste slag pots of 5 to 6 tons capacity, hauled to the dump electrically and poured, or it is granulated and carried off by a stream of water. Granulated slag from the reverberatory matting furnace was first introduced in 1888 at the Anaconda Lower Works. In order to reduce the copper contents of this slag, fine pyrites has been sprinkled into it before the final firing-up, with the hope that slagged copper may be sulphurized and carried into the matte. The matte is removed from the furnace wholly or in part, depending on whether it is to be collected and shipped or transferred to the converters. When the furnace is to be tapped dry, which occurs only after several charges (with high concentrations as many as twelve charges) have been treated, and the hearth holds 18 to 20 inches of matte, this is run into sand moulds or cast iron moulds of similar form, or it is first collected in a steel ladle, and then poured into the form of flat cakes. With a converter plant, only part of the matte is removed after every charge, the aim being to keep the level as nearly constant as possible. With furnaces that are tapped dry, the sides are patched or fettled after every tap. With converter plants, fettling of the matting reverberatories is resorted to once every four or five weeks. As fettling material, siliceous gold ore has, in some instances, replaced the usual sand. A furnace runs about ninety days before it needs sufficient repairs to require shutting down.

(TO BE CONTINUED)

*Trans. Am. Inst. Min. Engs. (Condensed).

Good in Peace or War.

The traction engines made by the Best Mfg. Co., San Francisco, Cal., have found their way around the world, and are highly valued for purposes of peace, but it appears that they are also of value in times of war. The accompanying engraving shows one of those engines that was recently used in a Central American military campaign.



A Best Traction Engine Used for Military Purposes in Central America.

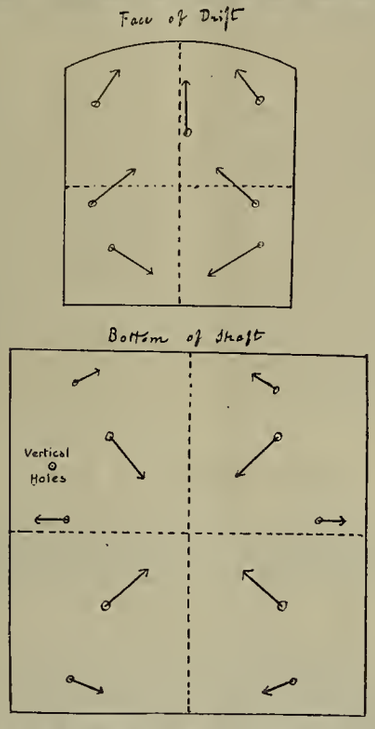
The Cia de Transportes de Matagalta Ltda. Co. of Nicaragua, C. A., purchased the traction engine and cars shown in the engraving for use in some Nicaragua concessions granted to the company by the Nicaraguan government in consideration of having free use of the outfit in case of war. The machine was used in a late war in that republic to carry 200 soldiers, six cannons, with carriages and ammunition, and also ammunition and guns for 1000 additional troops. The distance covered was 90 miles, through a very heavily timbered country and a rough mountain range; the stumps left on the ground in some places were from 8 to 16 inches high, over and through which the outfit had to climb. Under these hard conditions the distance was covered in less than forty-eight hours without a break, greatly to the satisfaction of the Nicaraguan purchasers and the

government authorities, the rough trip being a good testimonial to the enduring qualities of the Best traction engine.

There have been two similar outfits sold to the Russian-Chinese Bank at St. Petersburg, Russia, and are now being used in Siberia, after a 500-mile trip through an unbroken country by their own power. The engine shown in the illustration is 110 H. P. The carrying capacity of each car is sixteen tons.

A Practical Suggestion.

TO THE EDITOR:—Referring to your article of June 27th, "Danger in the Cut-off Holes," and the finding of some means, outside of the blasting by batteries and the placing of the primer near the bottom of the hole, to protect the following shift of miners from drilling in cut-off holes, I would suggest that a trial be made of providing miners with large printed cards representing, first, the face of the drift or bottom of the shaft; second, the left side of same;



third, the right side of same; fourth, the top of drift or the different walls of shaft, designated north, south, east and west, such cards to be of uniform printing and differing only in the mention of such indications. The crew which has just drilled should fill in on these cards before blasting the position and direction of holes drilled, as per the inclosed diagram.

These indications may not provide fully for the safety of the following shift, but would contribute in a certain measure to the location of the cut-off holes, and even if not sufficient to locate the same, would anyhow help the miners to keep from drilling near or by the previous holes. Some one may suggest something better for the protection of the life of the miners. N. E. T.

Baker City, Or.

MINING is manifestly more strenuous than formerly. In no department of the industry is this more noticeable than in the absence of so many reports formerly evolved from the inner consciousness of the imaginative. Time was when the week was a dull one that did not furnish something unusual in the way of gold or other metallic finds. Yet in this thirty-seventh week of 1903 not a solitary freak story has appeared. The bark from the hemlock tree near Olympia, Wash., which when burned gave ashes that assayed $77.84 gold to the ton; the goose at Grant's Pass, Or., which when butchered disgorged $4.75 gold from its crop; the mysterious stranger who visited Picacho, Cal., and who had 23 ounces "white gold" for which he was to be paid $24.10 per ounce at the San Francisco Mint; the discovery at Telluride, Colo., of an ore "half telluride and half platinum;" the petrified stumps near St. George, Utah, that assayed throughout $14,376 silver per ton; the chalcopyrite so abundant at Patapsco, Md., that yielded 49% copper; the man from Lecompton, Kan., who produced 22-carat gold from equal portions of antimony and fried carrots; the Providence, R. I., genius who "generated" gold by the bucketful from sea water; the Denver, Colo., man who produced "oil of gold," and the Washington D. C., genius who rearranged the "ions" of silver on a 32 to 1 basis to make 2 ounces of gold grow where but 1 ounce of silver grew before —all lack appearance this season. They no longer furnish momentary mirth to the miner, and probably the places that knew them once will know them no more forever.

Leaching Low-Grade Copper Ore.

Written for the MINING AND SCIENTIFIC PRESS.

Wet processes for successful treatment of low-grade copper ore long since emerged from the laboratory stage to be commercially profitable. Without being severely technical the following is designed as general answer to a multitude of questions thereon:

Not all copper ores are susceptible of leaching by any method. The first thing is to determine by careful and detailed experiment whether the particular ore in question can be so treated at all. Into this question enters a number of other factors, location, cost of mining, amount of available ore, transportation, cost of sulphuric acid, and other points that require consideration. For instance, some of the cases cited might present a situation where copper is present in the ore as metallic copper, yet not soluble (as a commercially successful proposition) in any ordinary solvent; in such a case, if there were so existent a large percentage of the copper in the form of metallics it would have to be saved in some different way, as, say, by concentration of the tailings after leaching. While oxides, carbonates, silicates (including roasted ores), dissolve in sulphurous acid, and from the solution obtained copper may be precipitated by boiling the filtered solutions, yet lime, magnesia, and to a certain degree alumina and iron, are objectionable, for they adulterate the copper precipitate and consume sulphur. Then, again, in considering the commercial possibilities of leaching a copper ore the contents of the ore in copper and the cost of sulphur must be taken into account. If the body of copper ore were close to a deposit of pyrites, from which could be cheaply furnished all needed sulphur, the existence of lime in the ore would not be an insuperable objection. But if the ore body were a long ways from sulphide ores, and the sulphur had to be freighted in the form of brimstone, the matter would not be so simple.

It is customary in many cases to manufacture the necessary sulphuric acid on the premises. The Black Warrior Copper Co., 7 miles from Globe, Gila county, Arizona, has such a plant with a stated daily capacity of twenty-five tons sulphuric acid. Much of their ore roasted runs 35% sulphur, though the ore mainly consists of copper oxides and carbonates, running about 60% silica. Their leaching plant contains fifteen lead-lined leaching tanks, made of redwood, boiled in asphaltum. Each tank has ten tons capacity and is hung on trunnions, provided with gearing so as to turn or dump it. Above the leaching tanks is a row of lead-lined acid solution tanks, reaching the ore in the latter from the bottom. On a level below the leaching tanks are a number of steel, lead-lined receptacles into which the exhaust solution is drained. By compressed air it is pumped up to the solution tanks, where it is standardized for use again. The solution is about 10% sulphuric acid, and it is stated that the requirements are four to five pounds of acid to recover one pound of copper. The copper in solution is precipitated by means of scrap iron within two "copper barrels," each 10 feet long by 8 feet in diameter. The resultant precipitate is about 85% copper, the balance iron.

In the Black Warrior plant sulphide ores are fed from a central hopper above into the several furnaces at the top. The center shaft in each furnace is turned by gearing, and attached to it are rakes that circle around on each shell, stirring the ore and dropping it through the apertures to the shelf below. When the fires are once started in these furnaces the sulphur in the ore is supposed to supply the fuel for continuous roasting. The sulphurous fumes and dust pass from the furnaces to an adjoining dust chamber, thence into ovens in which nitrate of soda is boiled with sulphuric acid to convert the nitrate to a sulphate of soda, and by this the nitrous fumes are liberated and used in condensing the sulphur fumes into the sulphuric acid. The gases from the niter oven pass up through a quantity of quartz within a lead-lined Glover tower, thence through a flue into the main acid chamber.

The Central Black Hills Copper Co., 12 miles from Custer and 6 miles from Redfern, South Dakota, owns large deposits of copper carbonates and has erected a leaching plant for the extraction of copper at what is claimed to be a much lower cost than has heretofore been attained. With the new plant 100 tons of ore per day can be treated. This plant consists of a four-story building, the ores going through by gravity. The ore is mined as stone is quarried—in benches. When mined the ore passes from the open cut to the ore bins in a chute and is taken from the ore bins to the mill over a trestle, so that it enters the mill at the extreme top, the mill being about 150 feet below the mine. The ore is first crushed, then it passes through a set of roughing rolls, a set of finishing rolls, and then to the leaching tank, where it is treated and put into solution. This solution is run into the precipitating vats, where it is precipitated and then gathered. The copper, after being precipitated, is recovered in small granules, and is then melted and run into bars. This process is asserted to in no way interfere with the gold and silver contained in the ores. As this ore is siliceous in character, it is considered a good cyanide ore. The tailings are being saved.

The wet process for treating copper ore in small quantities, known as Henderson's, is reported to be successfully used in the extraction of the 2% or 3% of copper contained in pyrites roasted at vitriol works for the sake of the sulphur therein. These residues contain a very small quantity of silver and a small proportion of residual sulphur. They are mixed with a sufficient quantity of common salt and heated in a muffle furnace to a moderate red heat. A muffle furnace is heated externally so that the products of combustion from the fuel can not gain admission. Air is allowed free access to the mixture, and any fumes evolved are withdrawn by flues. The copper sulphide present becomes copper sulphate, and this reacts with the common salt, forming copper chloride and sodium sulphate, while the silver is simultaneously converted into silver chloride. On withdrawing the charge it is transferred to large vats fitted with false bottoms covered with brushwood to serve as a filter, and there treated with water, which dissolves the chloride of copper and the common salt, the brine thus produced dissolving the silver chloride also. The solution is then filtered off into a separate tank and treated by Claudet's process, which consists in mixing it with a solution of iodide of zinc containing just enough iodine to combine with all the silver present. Silver iodide is thus produced, containing small quantities of gold and some lead, and, as it is insoluble in brine, it separates out into the solid state and sinks to the bottom. On filtering the liquid again, a solution of chloride of copper free from silver is obtained, and the solid iodide of silver, being carefully collected, is treated with metallic zinc, which decomposes it, reforming an iodide of zinc that may be dissolved in water and used to separate the silver from a fresh batch of ore, while the silver, now in the metallic state, is melted and refined. The working loss of iodine is made up by adding iodide of potassium. The solution of chloride of copper obtained in this way, or that of sulphate of copper recovered from ores that have undergone a sulphating wash, may be made to yield up the copper therein in a powdery but metallic form by the well-known process of placing fragments of scrap iron in the liquid in large tanks, or as it flows through long channels. The iron exchanges places with the copper, because its combining power for sulphuric or hydrochloric acid is greater than that of copper. It gradually dissolves into the solution, and a precipitate of copper separates in the form of cement copper, which is seldom sufficiently pure to be used direct, and is, therefore, subsequently refined in furnaces or electrolytically.

The Neill leaching process is a treatment based on the use of sulphurous acid for the recovery of copper from the oxide and carbonate ores. These minerals are reacted upon by sulphurous acid with the formation of cuprous sulphite (Cu_2SO_3). This salt is not soluble in water, but is soluble in water containing sulphurous acid—that is, the leaching solution must have an excess of the acid in it over that required to make the reaction. The copper is precipitated by driving off the excess of acid by heat. The precipitate is cupro-cuprous sulphite ($CuSO_3Cu_2SO_3 + 2H_2O$) and contains 49.1% of copper. It is a heavy, crystalline compound, of dark-red color, which settles readily from the solution and can be washed by decantation, dried and reduced to metallic copper by fusion on the hearth of a reverberatory furnace. Very small amounts of other metals are dissolved and the product is pure copper. In practice the ore is crushed to pass a 20-mesh, put in covered tanks and kept in a state of agitation while a current of sulphurous acid from the generators is forced through it. The copper will pass into solution in from one to four hours. The solution is drawn off through a filter press to separate the slimes. The latter and the sands are washed once with water, which is used over with the next charge. The solution in the precipitating tanks is heated with exhaust steam, precipitating the copper salt. The plant can be arranged to save nearly all the sulphurous acid except that combining with the copper. One pound of sulphur is required to convert four pounds of copper into sulphite, or, with the loss from the excess, one pound converts three pounds. The sulphurous gas can be obtained either by burning pyrite or sulphur. Roasting a copper sulphide ore to an oxide should provide ample acid for its own treatment. The recovery of the copper by fire alone effects a great saving over leaching, where iron is required to precipitate the copper.

The Conconino Copper Co. plant at Ryan, Arizona, was some time ago reported by Manager Jennings to have successfully solved some of the difficulties attendant upon leaching low-grade copper ores at a commercial profit.

In connection with this whole matter, it is as said to be constantly borne in mind that the cost of leaching works in actual operation is often as much as a smelting plant of the same capacity, and some of them may cost more. A leaching plant is of no value unless put up right. No one appreciates this more than those actually engaged in leaching. The wear and tear on a well constructed leaching plant is, however, less than on a smelter. Whether a leaching plant or smelting works is needed on a certain mine depends entirely on local conditions, and on the qual-

ity of the ores, etc., which must he studied carefully in each case. Most of copper ores can he leached, so also can they be smelted; the deciding point must therefore he the cost of the treatment. For instance: A mine with plenty of good sulphide ores at a place where fluxes and fuel are cheap would hardly consider the erection of a leaching plant; or if fluxes and fuel are expensive and distance from a railroad is great, a smelter is often out of the question, and it is then in order to investigate the different methods of leaching and select the one which will give commercial results.

It has been prominently asserted that the end result when copper sulphide ores are subjected to an oxidizing roasting will he copper sulphate exclusively, and that this can he leached out hy water, only provided the required skill is used and proper care is taken.

The process is about as old as the metallurgy of copper, and metallurgists in general would he pleased to learn of one place on the globe where such results are obtained in practice.

Authorities who record results of practice from wherever copper ores are treated do not record an instance, and most of them state that such results are not obtained, and that speaking from a practical standpoint they are an impossibility.

As to the results from a chloridizing roasting, it has been stated that the end results are cupric-chloride exclusively, provided the required skill and attention are used, hut where such results are obtained is not stated. This is not a new French process, which is manifest to any familiar with the so-called Henderson process, which has been in operation in England, Germany and other countries for several years.

Experienced metallurgists who have roasted thousands of tons of copper ore and matte, wish that these theories were correct, hut their experience denies it.

It has been further claimed that ores containing silicate of copper must of necessity he roasted before they can be leached; yet some of those leaching them on a large scale do not roast them, and claim that there is no absolute necessity for roasting them; indeed, they obtain a very good extraction hy leaching the raw silicate ores.

The salt cake and nitre cake method for leaching copper ores is not devoid of theoretical merit. The patent covering this process is valid, and it is of use at places where salt or nitre cake is of no value. But to produce salt cake or nitre cake for the purpose of using it as a solvent for copper is not economy. These compounds carry between 15% and 16% free sulphuric acid, which is the only ingredient in them that will dissolve copper. The glauber salt in them does not dissolve copper and is useless and cumbersome. Salt and nitre cake are never pure where made and thrown away as by-products, or used to make glauber salts, and as it would appear that eight pounds of it is required to contain one pound of free sulphuric acid, or, in other words, one pound of sulphuric acid will dissolve as much copper as eight pounds of salt or nitre cake, then where these compounds cost only half as much as sulphuric acid their use would still entail a cost four times as great per pound of copper as would the use of sulphuric acid straight. To any one hunting for new solvents for copper to get up some secret process might he suggested alum solution; this will dissolve copper out of oxidized ores, or if a mixture is needed to make the process still more mysterious, one might mix the alum solution with a common salt solution, and heat the mixture with the copper ore, and copper will he dissolved. Or if a plain everyday article will answer as well use vinegar.

Except under the conditions named, where salt or nitre cake are of no value at all, the cost of using these, or alum, or alum and salt, or vinegar, would not vary much; hut, of course, for the secret process man costs would he of slight importance.

As to the alleged reactions consequent upon the use of the following formulæ:

$$Cu_2S + 4O_2 + H_2SO_4 = 2CuSO_4 + H_2SO_4.$$

$$CuFe_2 + 4O_2 + H_2SO_4 = CuSO_4 + FeSO_4 + H_2SO_4.$$

The sulphuric acid (H_2SO_4) does not appear to he active in this reaction, hence might he replaced hy any other liquid which is not a solvent for copper sulphides, say water (H_2O) and the equation would look as follows:

$$CuFeS_2 + 4O_2 + H_2O = CuSO_4 + FeSO_4 + H_2O.$$

It has been stated that it will take from six to twelve hours for the reaction to take place when using sulphuric acid, and air is blown into the charge to provide the $4O_2$.

It would he of value if it would occur in as many days! The matter is of such importance that even a few months blowing would he in order, hut it is feared that the blower's patience would wear out if not his machinery, and the result would leave the $CuFeS_2$ undecomposed as before.

The well-known Ellsner's reactions, which occur when gold and silver are extracted from the ore hy potassium cyanide, does not warrant the conclusion that if these can occur the reactions pertaining to copper must also occur, as this overlooking of the fact that potassium cyanide is a solvent for gold and silver and its action is merely hastened hy an extra amount of oxygen present, and also hy the agitation of the blowing operation. Sulphuric acid is not a solvent for copper sulphides, and blowing air into the mixture for a century will not make it one!

In writing the equation, to make it of value it were well to use the one usually given to represent the treatment in vogue at Rio Tinto, viz:

$$x\text{-}H_2\text{-}SO_4 + Cu_2\text{-}S + 2Fe_2\text{-}(SO_4)3 = 2Cu\text{-}S\text{-}O_4 + 4Fe\text{-}S\text{-}O_4 + xH_2\text{-}S\text{-}O_4$$

Writers who give this formula and reaction add that in most cases it is impossible to extract in this way the copper as sulphate during a number of years, and this only from suitable ores. Now, if with a solvent present ($Fe(SO_4)3$) it requires many years to complete the reaction, how many years would the reaction require in which there is no solvent for copper present?

Still, in all such discussions it must he borne in mind that the subject is, like many others, two-sided and involves considerable experiment and research. Many of the theoretically perfect reactions do not prove successful when tried practically. Circumstances must determine when smelting or leaching processes should be employed. Experiments made at the Rio Tinto mine, in Spain, show that with ore carrying as high as 2% of copper, 75% of the copper was oxidized to sulphate and washed out; hut 25% remained behind. It is practically impossible to carry on the operation so that all the copper will become sulphate. This is shown hy the two following reactions which may take place between the sulphate and the sulphide not yet oxidized:

$$Cu_2S + CuSO_4 = \underline{3\,Cu} + 2\,SO_2$$

And

$$Cu_2S + 4\,CuSO_4 = 6\,\underline{CuO} + 5\,SO_2.$$

Oxides are the ultimate result of the roasting process, the sulphate being only the intermediate product, and, we must know that, as is always the case with intermediate products, is never obtained pure.

All furnace operations are extremely complex, and as a dozen chemical processes are in progress at the same time, it would not he possible to say that any one pure result was going to he obtained. While the hulk of the copper becomes chloride, yet some remains as oxide, some is sulphide and perhaps some remains as sulphate.

In all these various reactions the sulphuric acid, existing at the end just as at the beginning, seems a useless ingredient; but chemical reactions are frequently more complex than they seem, and the changes indicated may he the result of half a dozen intermediate reactions. The claim that in the presence of sulphuric acid oxygen from the air will unite with copper sulphide to form copper sulphate is faintly possible. Copper sulphide will unite with this amount of oxygen under other circumstances; it does so in the process of weathering, where it is left exposed in heaps to the action of the air.

It is, lastly, a mistake to assume the possibility of converting sulphurous acid into sulphuric acid hy the action of light and air. The sulphur from the ore could he converted into sulphuric acid—in fact, is so converted in many places—hut it must he done in the same way as if sulphuric acid were the object to he attained, and the method adopted must be the ordinary method of making sulphuric acid.

The subject is an important one to metallurgists, and is here discussed with a view to eliciting further light, for the last word hy no means has been spoken regarding the matter.

MANUFACTURERS of heavy machinery are reported commencing to use silicate of soda in foundations for engines, hammers, and various other lines of heavy machinery. The formula recommended hy large users is: three harrels crushed stone, one harrel gravel, one harrel cement, two quarts water glass. This material gives a homogeneous mixture and smooth surface, and prevents oils and greases from disintegrating the foundations.

Mines of Summit County, Colorado.

(FROM AN OCCASIONAL CORRESPONDENT.)

I send you herewith a photo of the mouth of the tunnel of the Rothchild G. & S. M. Co. of Argentine. This property is located on the western slope of the Continental divide, 13 miles from the railroad. The shipping point is Keystone. J. J. Reilley, superintendent of the property, is installing a 7-drill compressor, 100 H. P. boiler, 12 inch ventilating pipe and 4-inch air line. The tunnel is 2500 feet in length and has cut several veins of ore. Some of these run from $35 to $70 per ton. He expects to drive the tunnel 1500 feet farther during the year, a total distance of 4000 feet.



Rothchild Gold and Silver Mining Company's Property, Argentine, Colo.

Across the gulch from the Rothchild property is the Pennsylvania Co., operating the Pennsylvania and Ohio mines, also concentrating mill. This company will install a steam plant at the mill to enable them to run through the winter months. R. T. Williams has charge of the plant.

At Montezuma, 4 miles from Argentine, the Mine Developing Co. of Cleveland, Ohio, is operating the California and Sunhurst. This company owns five claims on Glacier mountain on Snake river. They have a tunnel 1000 feet in length and are sinking a shaft on ruby silver and silver glance ore. A. M. Campbell, manager of the company, states they are doing development work at present, hut expect to be shipping again soon.

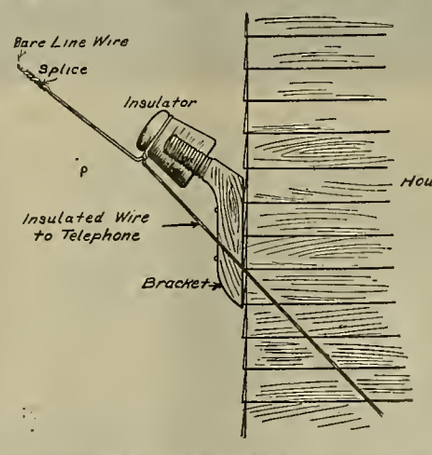
Graham & Miller, owners of the Harrison group, consisting of thirteen claims, have been doing development work the past year. The ore is heavy lead without zinc, and occasionally they strike some pockets of high-grade ore, running 4000 ounces in silver. The property is on Glacier mountain.

The ore around Montezuma has carried more or less zinc, which was at one time a drawback to the camp, hut if the present demand for zinc keeps up it will be a benefit.

Montezuma, August 30.

Simple Device to Stop Humming.

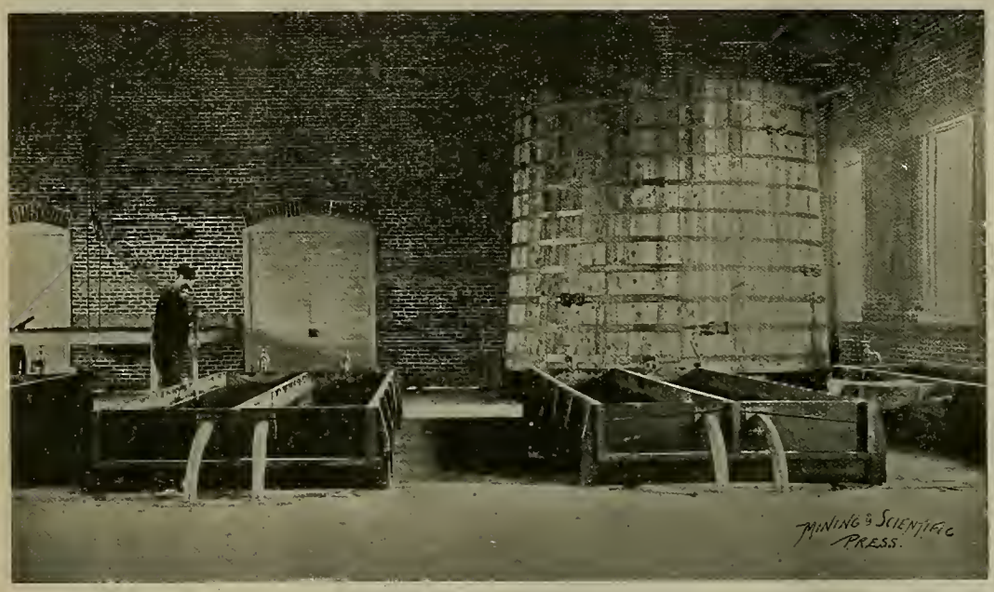
The American Telephone Journal recommends the device indicated in the drawing to stop the disagreeable humming sound in a house to which a bracket, having on it a vibrating telephone wire, was attached. To secure this result a piece of heavily insulated No. 14 copper wire is spliced to the bare line wire, as



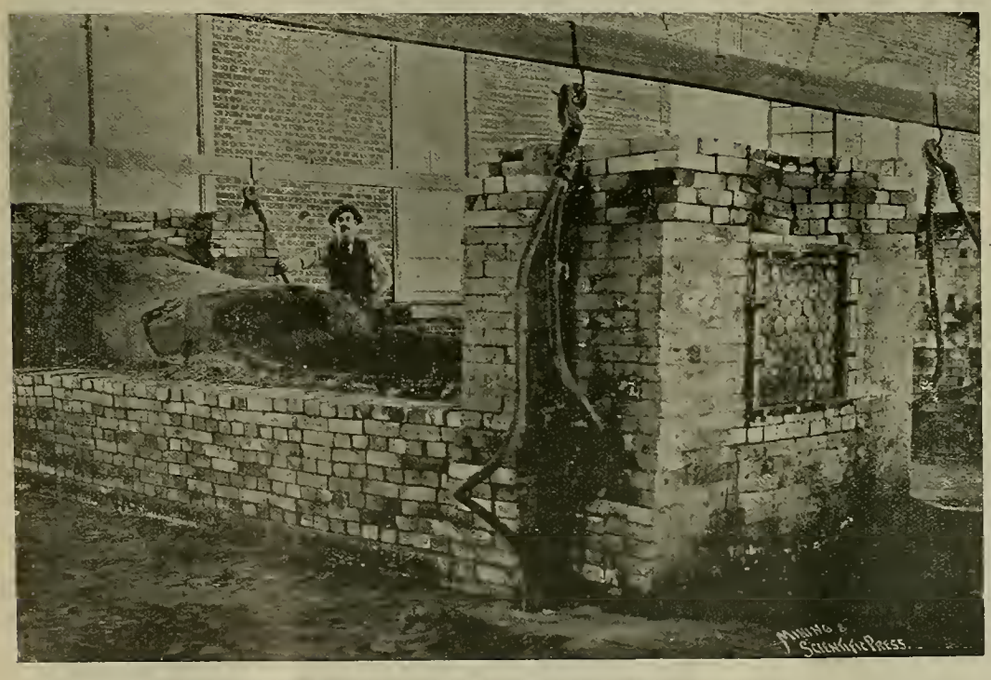
shown in the drawing, and the covered wire made up around the insulator. The loose end of the copper wire is then run to the telephone, care being taken to leave it quite slack. This scheme is stated to have proven entirely successful wherever used.

Manufacture of Carborundum.

The manufacture of carhorundum, as now carried out at Niagara Falls, N. Y., is as follows: The materials used are coke, sand (rich in silicon), salt and sawdust, the two latter to facilitate the operation of the furnace. These are mixed in proper proportions and introduced into the furnaces, which are of hrick, built up into four walls, so as to form a kind of rough hrick hox, no mortar or cement of any kind being employed. In the center of each end wall of the furnace is a large hronze plate, to which are connected the cables carrying the current. When complete the internal dimensions of a furnace are about 15 feet long, 6 feet wide and 5 feet high. Connecting with the inner surface of each plate are sixty carhon rods, each of which is about 30 inches long and 3 inches in diameter. The rods project through the walls of the furnace and form the terminals. When the furnace has been huilt up in this way the mixture is introduced, about ten tons making the charge. Through the center of the mixture a core formed of small grains of coke is huilt, and this serves to form a continuous electrical connection hetween the terminals. When the current is turned on, the core is soon raised to a high temperature. About an hour after the application of the current, carbon monoxide gas is given off freely, and, when a lighted match is applied, this hurns with a lamhent hlue flame and envelops the whole furnace. The current is kept on for ahout twenty-four hours and then the furnace is allowed to cool down, after which it is opened, when the core is found surrounded hy a cylinder of carborundum crystals varying in color from yellow to violet. The crystals in immediate contact with the core are in one solid mass; as the distance from the core is increased, the size of the crystals rapidly diminishes, until at about 15 inches all crystallization ceases and an amorphous material is found, of a whitish gray color, for a distance of 2 inches, when suddenly a hlack mass, composed of the original mixture, now held together in a cemented state by the fusion of the salt, is met. The crystalline and amorphous material, lying hetween the core and the outer hlack mass, is carbide of silicon. About two tons of carborundum are produced in one run. It is at once noticed that the core is changed in appearance; it now has a somewhat metallic luster, all impurities have heen driven off and a pure form of graphite re-



Tanks Used in the Manufacture of Carborundum



Furnace at the Niagara Falls Carborundum Factory.

mains. This may be an important hy-product of these furnaces. The presence of graphite denotes that the temperature, when the current was on, must have been nearly 7000°, which is the point of graphite formation. The makers of carborundum, however, take pains to keep the temperature of their furnaces under 7000°, care being taken that it does not run too high, as carhorundum is at its best when the furnace work is done hetween 6000° and 7000°.

The industry has increased rapidly; in 1893 6¾ tons were manufactured, in 1901 1690 tons were produced, and the power in use has been increased from 2000 H. P. to 3000 H. P., thus raising the output to 2700 tons. Carhorundum has found large use as an abrasive; of still more interest is its recent application in the steel industry, replacing to a considerable extent ferrosilicon. The present consumption of carhorundum for this purpose is seventy-five tons per month. Still more promise is shown hy the proposed use of this substance for making highly refractory materials. In this connection the discovery of Fitzgerald of "recrystallized" carborundum, which is prepared hy agglomerating the finely divided material and reheating in the electric furnace, is to he noted, as also that of Tone. for using for similar purposes the "amorphous" variety, which always forms a considerahle portion of the product. Each of the carborundum furnaces in use at Niagara employs 1000 H. P., the voltage starting at 200, and falling to 80 as the furnace heats up; the units are kept working at full power, the voltage being varied according to the progress of the reaction.

The power is distributed hy the Niagara Falls Power Company on the constant-pressure system, and it is therefore necessary to have some means hy which this variation in the resistance of the furnace can be coped with. The two principal ways in which this can be accomplished are to change the ratio of the transformer, or to add in another small transformer which can be used as a booster; in either case it is necessary to deal with the primary, as the secondary connection for such large currents can not easily be manipulated.

The American production of carhorundum in 1902 was 3,741,500 pounds.

How to Determine if You Have a Concentrating Ore.

Written for the MINING AND SCIENTIFIC PRESS by WM. H. KRITZER.

Obtain samples of the ore from all parts of the mine, using care. Then have complete and reliable assays made, and if the ore has a gross value of several times what the expense is to mine it, proceed as follows to determine the size of particles to which the ore should he crushed for treatment:

Crush an average sample to pass through a No. 4 mesh screen onto a No. 8. If the product remaining on the latter screen separates readily by hand panning, there will he no necessity of crushing it finer. If the product does not separate freely, then crush it so it will pass through a No. 10 and remain on a No. 16, and repeat the panning process.

This operation of crushing, panning and screening is to be continued through a No. 16, 24, 30, 40, and 60 mesh, respectively, or until the mineral readily separates from the gangue in the pan, weighing carefully each part which is left remaining on each screen, also the part that finally passes the No. 60 mesh screen. This procedure will give you a fair approximation of how the ore will crush, and if it will have many fines or slimes. Note how each lot separates; examine the tailings or waste under a magnifying glass to see if the mineral is released from the rock, for among the different samples one should he found that is clean or free from inclosed mineral. This will he about the size to which the ore should he crushed. Observe if the material that passes through the No. 60 mesh has much float mineral, also if it contains an unusual amount of mineral, for if so it will slime. From the weights you can ascertain about what can he expected in crushing, and if a large amount is secured from the fine screens it is an indication that the ore will slime more or less. If the material left on a coarse screen is free from mineral and comparatively large, no fine crushing will be required for concentration or separation, and the ore should be easy to work.

The percentage of concentrates in ore can he estimated by taking 20 83 ounces of ore (10,000 grains) crushed to pass through a 40 mesh screen and washing it very carefully in a batea or pan, as long as concentrates appear. Dry and weigh. Each grain will represent one-hundredth of 1%. If the concentrates weigh 300 grains, the quartz contains 3% of values, or, if 60 grains, six-tenths of 1%. If the concentrates are worth $150 per ton, the value of each tons of ore is $4 50, or, if six-tenths of 1%, 90 cents per ton.

To find the loss in tailings, take a sample every half hour (if you have no self-sampler) for twelve hours by passing dipper under the discharge, being careful not to allow it to overflow. Settle the material collected by sifting several teaspoonfuls of powdered alum over the surface of the water, allow it to remain quiet until the water becomes clear, then siphon it off and evaporate the residue remaining.

Mix thoroughly when dry and take three samples of 300 grams, or 5000 grains, each. Place one of these samples in a two-quart vessel and add about a quart of water. Stir thoroughly, and after having allowed it to stand for several minutes pour the wash water into a larger vessel. Continue doing this until the water from the sample is comparatively clear. To this wash water collected add powdered alum, and after settling remove the clear water and evaporate the material left at the bottom. Then weigh to ascertain the percentage of slimes, and assay.

After the sands have heen removed from the slimes separate into three sizes hy passing them through a 40 and a 60 mesh screen. Weigh each to ascertain the percentage of sands, and assay. If the assay shows that the greatest loss occurs in the slimes, then you are crushing too fine; hut if the assay of the coarse sands contains the most values, then you are not crushing fine enough. Mills, as a rule, crush too fine. This can he ascertained only by making tests

as above, changing the mesh of screens until the loss in the coarse sands and slimes is about equal, remembering that with the coarser screens you increase your crushing capacity.

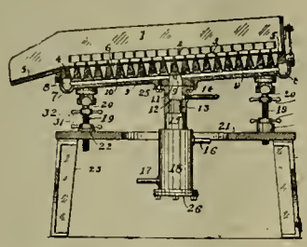
To test tailings, dry and weigh out 17.35 pounds (10,000 grains) and wash as described above. Dry and weigh the concentrates. Each grain will represent one-hundredth of 1%, and a loss of 2 cents, if the concentrates are worth $200 per ton. If the 10,000 grains in sample contain 4 grains of concentrates, the loss will be 8 cents per ton. If the concentrates are worth $50 per ton, multiply fifty by four, and 2 cents is the value of the concentrates in one ton of tailings.

Mining and Metallurgical Patents.

PATENTS ISSUED SEPTEMBER 1, 1903.

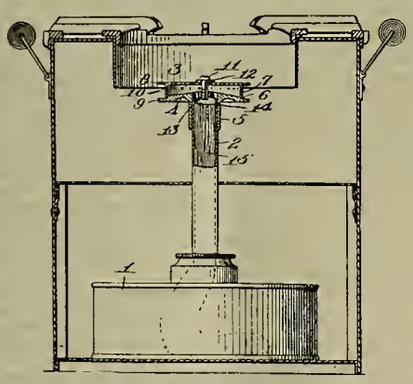
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

ORE CONCENTRATOR.—No. 737,326; C. A. Bonner & E. E. Euchenhofer, Dayton, Ohio.



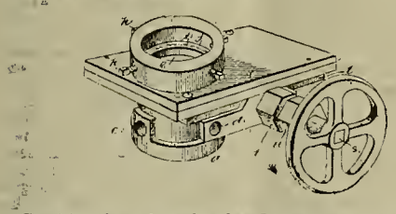
In ore concentrator operated by means of motive fluid pressure bed having diagonally arranged strips placed over flexible section supported by ribbed frame resting upon corrugated bottom having air passages diverging from opening in center, cylinder arrangement placed under opening of corrugated bottom, cylinder consisting of enlarged part in which is operated large piston to upper part of which is attached smaller piston which acts as valve opening, closing intake pipe for fluid pressure, means for holding and regulating position of machine.

HYDROCARBON BURNER.—No. 737,999; C. Cannom, London, Canada.



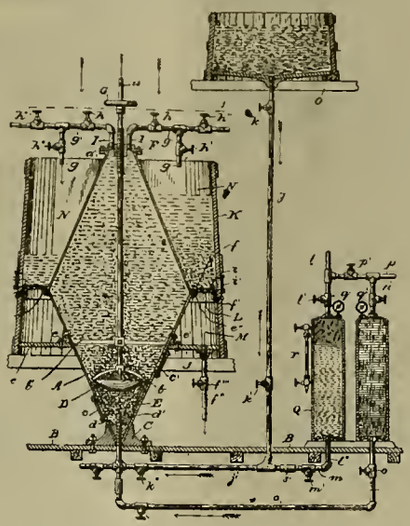
Burner comprising head provided with plurality of gas-inlet openings and with cone-shaped upper face and cap provided with plurality of gas-escape openings, combined areas of gas-inlet openings being in excess of combined areas of gas-outlet openings, thereby to maintain pressure within head.

CASING HEAD FOR OIL WELLS.—No. 738,001; J. Cochran, Bealls Mills, W. Va.



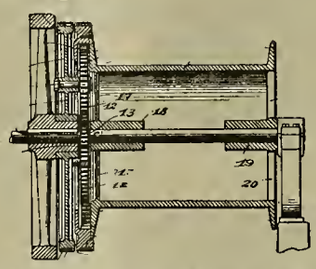
Combination of casing head composed of two separate parts, one fitting above other, parts being fastened together, both parts provided with vertically arranged perforation, and lower part being cut away for passage of rack, upper part fitting over lower part to leave recess into which rack may slide, with perforated tube ring secured in upper part of casing head, screws securing tube ring in place, packing between tube ring and upper part of casing head, rack mounted between parts of casing head, rack being provided with downwardly extending teeth, toothed pinion mounted in recess in lower part of casing head and engaging with rack, hand wheel for operating pinion and means for preventing oil from leaking out around shaft of pinion.

APPARATUS FOR EXTRACTING GOLD AND OTHER METALS FROM ORES.—No. 737,533; E. L. Van der Naillen, San Francisco, Cal.



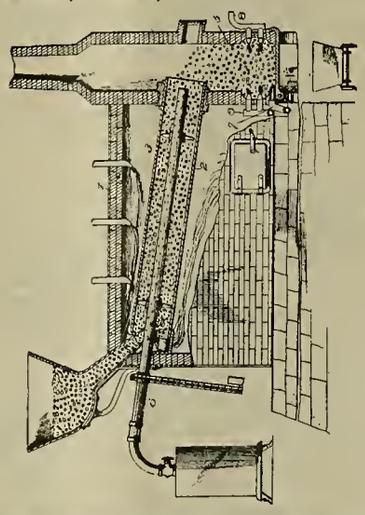
In apparatus for extracting metals from ores, combination of concentrating tank consisting of two cone-shaped sections secured together at their largest diameter by means of suitable flanges and provided with intermediate strip secured between flanges and projecting outwardly, settling tank disposed around concentrating tank, perforated diaphragm placed between concentrating and settling tanks supported upon intermediate strip, and suitable bracket bolted to settling tank and adapted to form two horizontal sections within settling tank.

HOIST.—No. 737,830; O. C. Duryea and M. C. White, Los Angeles, Cal.



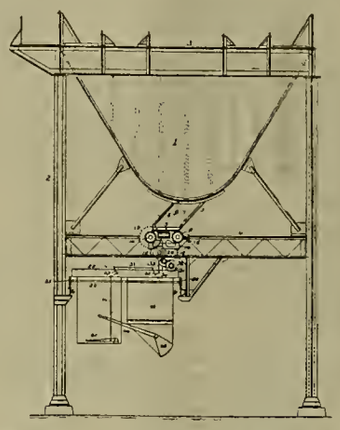
Base, webbed drum mounted on base, band wheel on drum, intermediate webbed hand wheel, gearing connecting two hand wheels, gearing being between web of drum and web of intermediate band wheel, friction hand on each hand wheel, means for tightening one friction band, means independent of first means for tightening other friction hand and means for driving gearing.

PROCESS OF REDUCING MINERALS.—No. 738,007; O. B. Dawson, Caldwell, N. J.



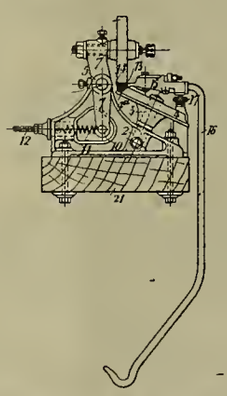
Process for effecting direct decomposition of minerals, and conversion of same into globular shot-like masses or nuggets consisting in subjecting ores without addition of flux, and, while atmospheric air is excluded therefrom, to continuously applied external heat for heating ores to about degree of beginning of incandescence in presence of hydrogen gas supplied in quantity in excess of that required for hydrogenizing elements naturally and previously combined with and extracted from metals, such excess gas serving to maintain metal in metallic, spongy condition and preventing formation of oxides, carbonates, etc., and, while still in metallic, spongy condition and in presence of hydrogen gas, concentrating metals in gangue to globular, shot-like masses or nuggets by subjecting them to higher degree of heat in air-tight chamber.

DELIVERY MECHANISM FOR ORE BINS.—No. 738,076; J. W. Seaver, Cleveland, Ohio.



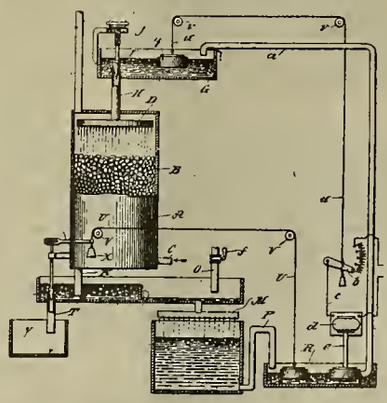
Combination of storage bin with inclined delivery spout having perforated transverse bar therein, and series of pins passing through perforations of bar and constituting grated valve for governing flow through spout.

AERIAL ROPEWAY.—No. 737,871; J. P. Roe, London, England.



Sheave mounting for aerial ropeway comprising guiding sheave mounted to rotate at angle to horizontal, and depression sheave that has periphery arranged above and forced toward periphery of guiding sheave with yielding pressure that will allow of its being moved away from guiding sheave, but will act to automatically return depression sheave to normal position when displacing force is removed.

PROCESS OF MAKING SULPHURIC ACID.—No. 737,625; J. B. F. Herreshoff, New York, N. Y.



Method of making sulphuric acid by causing liquid sulphuric acid and gaseous sulphuric anhydrid to travel in opposite directions in contact with each other, reserving portion of strong acid thus produced as final product of process, diluting and cooling remainder of strong acid, and returning such diluted and cooled acid to first stage of process to again absorb anhydrid.

Mining Summary.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

At Sunnyside, on the north side of Sum Dum bay, 55 miles from Juneau, the Oceanic M Co. reports development work progressing. The shaft is down 25 feet and hoisting machinery is being put in. The shaft will be sunk to 120 feet and the ledge crosscut.

ARIZONA.

COCHISE COUNTY.

At the Wolverine & Arizona mine, near Bisbee, Superintendent S Hunt says additional machinery, including a compressor and power drills, will be put in.

J. G. Pritchard reports work progressing on the Gold Nugget mine, at Fort Bowie, near Bisbee. The ore platforms on the Golden Fleece claim and on the Nugget claims have been completed, and a hoist will be put in for sinking on the Nugget.

The Benton M Co. is putting in hoisting machinery on the Little Devil mine, near the Stonewall, near Tombstone. There are ten men at work, and as soon as the hoist is running the number will be increased.

GRAHAM COUNTY.

The Irish Syndicate has been organized by Clifton men to develop the Irish group of claims on Chase creek, near Clifton, with N. L. Lewis as manager.

Work is under way on the aerial tramway for the Standard copper mines, near Clifton. The distance from the ore bins at the mines to the railroad is 3200 feet, with a drop of 800 feet. The tramway will be operated by gravity and is expected to convey the ore to the railroad for 5 cents a ton. The Standard mines continue their usual output.

The Arizona C. Co. is to work the Humboldt mine at Morenci and the Coronado mine at Metcalf to greater depths, says Manager J. Colquboun.

MOHAVE COUNTY.

Tuck & Co. of Needles, Cal., have started work on the J. H. More properties, east of Boundary Cone, near Chloride, which they have bonded.

Sinking continues on the Vivian mine, in Snowball camp, near Chloride, owned by J. Ewing.

The Cedar Valley M. Co., in Cedar valley, near Kingman, will develop a water supply at a spring in the mountain above the mines and carry it to the mill. Several other springs will also be developed and as as soon as this is done the mill will be started up again, says the Mohave Miner.

The German - American mines, near Kingman, will be started up Oct. 1st. Later a milling plant will be built at the mines and the ores treated by cyanide and amalgamation.

Preparations are being made to put in a cyanide plant at the Great West mine, near Chloride, says Resident Manager S. W. Toby.

The Cedar Forest G. & C. Co. has been organized by J. Rice and F. N. Rust of Los Angeles, Cal., with G. C. and A. E Davis and F. W. Morrison of Kingman, to take over the Davis gold and copper mines, near the Windmill, at the head of the Big Sandy. Development work will begin next week.

Work has been started on the Tyro group of mines, near Kingman, by Manager S. Dorsey of Los Angeles, Cal., who holds an option. He will run a tunnel for 100 feet to open up the vein at 100 feet below the apex. The group is 7 miles from the Colorado river.

YAVAPAI COUNTY.

The United Verde Copper Co. has men at work on the two new 500-ton water-jacket furnaces they are building, and it is expected to have them finished this month.

The smelter at the United Verde mine in Jerome was blown in last week, after being closed down for several weeks on account of not being able to get a sufficient supply of coke, says the Journal-Miner. The coke shipments now are coming in at the rate of fifteen cars a day.

G. E Moe and C. C. Farwell have bought the Wright interests in the group of four claims near Kirkland, operated by the Farwell M. Co.

J. H. Robeson of Georgetown, Colo., says he will reopen a gold-copper mine which he owns in the Bradshaw mountains on Castle creek, southeast of Prescott. Machinery will be put in.

L. Pfau of Cincinnati, Ohio, president of the Pfau G. M. Co., operating the B. B. mines at Cherry creek, says they are preparing to put in additional machinery for the mine, including two 60 H. P. boilers, a 50 H. P. friction gear hoist, capable of sinking to depth of 1000 feet, a six-drill air compressor, track, ore cars, a pump, etc. The two-compartment vertical shaft is down 172 feet, and they expect to strike the ledge at depth of 230 feet.

CALIFORNIA.

AMADOR COUNTY.

At the Defender mine, at Defender, in Pioneer district, F. B Joyce, owner, reports shipping a $4000 bar of gold bullion, the result of the cleanup of August's run of the 10-stamp mill.

BUTTE COUNTY.

The construction of a tunnel from Butte creek, near Oroville, to drain the ridge between Big and Little Butte creeks, is proposed. On this ridge was the Perschbaker (later known as the Magalia) gold mine. Owing to the flow of water, the mine had to be given up. Then a shaft was sunk at heavy expense and the mine worked by pumping the water, but this was abandoned. On and along this ridge are ancient channels covered by lava, and the object of the tunnel projected is to drain these channels. H. H. Yard of San Francisco, of the Butte & Plumas Railway, is said to be back of the proposition.

CALAVERAS COUNTY.

The Stockton Hill mine, near Mokelumne Hill, has been unwatered, and operations will be under way next week.

Sinking is in progress at the Union copper mine at Copperopolis, and at the 900-foot level a vein of ore 9 feet wide is reported found, assaying 6% in copper. There are twenty men working at the mine.

EL DORADO COUNTY.

Machinery is on the ground for development work at the Ancient Channel M. Co. mine at Latrobe.

Preparations are being made to reopen the Rosecrans mine, at Garden Valley, says the Nugget.

FRESNO COUNTY.

The Twenty-eight Oil Co., near Coalinga, has finished its No. 9 well at 1200 feet, which shows well ——Section Seven Oil Co.'s well was perforated last week and is flowing intermittently, often throwing a stream of oil over the derrick. This well has depth of 1200 feet, with 60 feet of oil sand, says the Reporter. It is estimated it will produce 300 barrels of oil per day.

During the month of August eleven new wells were brought in in Coalinga oil district and all of them produce at least 100 barrels daily, while one of them is said to reach 1000 barrels daily. How long these wells will continue to flow at this rate is not known, but wells in this field have been flowing one year without lessening production. Ten new wells were started during the month.

KERN COUNTY.

The Continental Oil Co. of Los Angeles has secured forty acres from the Bunker Hill Co. in Kern River field, near Bakersfield, and has let the contract for its first well.

The Merced mine, near Randsburg, under management of R. W. Cloud, began operations last week.

The Hope Spring and Star Hope 1, 2, 3 and 4 mines, in Goler district, near Randsburg, have been sold to the Bland G. M. Co

R. W. Jameson, of Pennsylvania, vice-president and manager of the Lockhaven Oil Co., says he is arranging for starting operations on their ground in Midway district, near Sunset. Fourteen wells will be sunk, and work will begin in October. There are two pipe lines on the property. The company is made up of Altoona, Pennsylvania men.

Twelve thousand barrels of heavy Kern river oil, mixed with one-fourth water, were pumped through the Standard Oil Co.'s Bakersfield-Point Richmond pipe line from the Kern river field to Pond in twenty four hours one day last week, says the Californian. The use of water with the oil is proving successful. The maximum capacity for water is 20,000 barrels daily.

The Associated Oil Co. reports work progressing on their San Josquin lease, near Bakersfield, where the boiler plant has been completed. New sump holes are being dug to conserve the oil with the least evaporation, steam pipes extended from the boiler houses to each well, and arrangements being made to pipe the oil from the sump holes direct to tanks, instead of conveying it in open ditches as heretofore. The company is producing 2000 barrels per day in excess of shipments, which are being run into storage tanks. The management expects the new wells coming in will enable them to store at least 1,000,000 barrels of oil before Jan. 1st next, which they desire to carry as a reserve. The boiler plant consists of six 70 H. P boilers. Another plant with four smaller boilers is being put in on the Central Point lease, where fifteen more wells are to be drilled before Oct. 1st, says the Californian.

NEVADA COUNTY.

Operations are suspended at the Malakoff mine at North Bloomfield, says Superintendent L. L. Myers. It is thought the shut down will be temporary.

The 6 inch pump at the Murchie mine, near Nevada City, used to raise water from the 600-foot to the 400-foot level, cannot handle the water coming in, and an 8-inch pump is replacing it. From the 400-foot level to the drain tunnel a 10-inch pump is used.

Superintendent Brockington of the New Orleans M. Co., on Houston Hill, near Nevada City, says the tunnel has broken into and is unwatering the old workings, for which they have been driving.

The Nevada City mine, one of the Champion group, near Nevada City, has ceased operations for the present.

G. Bonney has bonded the L C. A. mine at Selby Flat, near Nevada City, and will increase development work.

PLACER COUNTY.

A company, with E. Mallows of Keswick as president, is reported organized to operate on the gravel channels which pass under the town of Dutch Flat.

PLUMAS COUNTY.

J. M. Engle has bought the Tom Johnson placer claim, on Mill creek, above Rich bar, near Quincy.

SACRAMENTO COUNTY.

The Gray-Wing mine, near Folsom, is closed down temporarily while moving the plant to a new shaft, a few hundred yards from the old one. It will resume full operations in December.

SHASTA COUNTY.

The Bennington group of mines, adjoining the Iron Mountain mine on the north and east, near Keswick, has been bought by the Pittsburg & Mt. Shasta G. M. & M. Co. of Pittsburg, Pa., B. N. Scott president. They will begin development work next week. The group consists of nine claims, including the Dorset, Yorktown, Bennington and King. The Little Nellie is not included in the sale. The ore carries copper, gold and silver, and will be shipped to the smelter at Keswick. The Iron Mountain Railroad passes over the property. There is an abundance of water and timber.

SIERRA COUNTY.

Superintendent J. Connachie of the Kenton mine, on Kanaka creek, near Alleghany, has suspended operations temporarily.

SISKIYOU COUNTY.

(Special Correspondence).—The Yuba M. & M. Co. have shut down indefinitely, pending conclusion of lawsuits against the property. The merchants of Sawyer's Bar and the townspeople, also, will feel the effects of this shut-down. The company had a successful season last year and made a good mill run, covering all expenses and the cost of the improvements put in, the principal one being the tramway for conveying ore from the Alda, Flora, Blanche and Ohio claims to the mill. Patents are under way for all the company's claims. When all is settled regarding the patents and pending suits, the company will resume.

A. J. Ball & Co. are putting up a 2-stamp mill on the Ida May mine, adjoining the Yreka M. & M. Co.'s property. The Ida May has a good shoot of ore and enough already on the dump to pay for the mill and improvements.

The Hibernia ledge, in Eddy's gulch, is being developed by A. Ford, who reports promising results.——The Salmon River Hydraulic M. Co. have suspended operations on the Meyers claim, below Sawyer's Bar, and are moving their plant to Summerville, where they have a large area of ground to work.——At the Dannebrink mine at Gilta ten stamps are dropping on ore.——The King Solomon mine has changed hands.

Rollin, Sept. 5.

C. Saunders, of Sacramento, last week bought a group of claims owned by Tacoma men, at Oro Fino, 16 miles from Yreka. The property comprises seven claims and shows free gold ore.

Manager Draper, owner of the McKinley mine, on Humbug creek, near Hawkinsville, will increase development work, says Superintendent Jamison.

Superintendent D. B. Jackson has men at work on the Oregon G. M. & M. Co. ground (formerly the China Ock mine), near Fort Jones. He will put in a sawmill also.

The Classic Hill mine on Indian creek, 12 miles from Happy Camp, near Fort Jones, will be operated this winter, says Superintendent Head.

TUOLUMNE COUNTY.

The Grizzly mine, near Carters, has shut down, and only the pumps are running.

The Starr King mine, near Carters, is closed down temporarily pending repairs to the plant.

Preparations are being made to start the mill at the Longfellow mine, at Big Oak Flat, and more miners have been put on.

The line for a tramway from the Georgiana mine, near Carters, to the Grizzly mill has been surveyed and work begun.

C. A. Gillis of Sonora is reported having bought a half interest in the Santissima quartz mine for $10,000 and will start developments this month.

Owing to the bonding parties operating the Los Angeles mine, on the river below the Mohican, near Groveland, failing to meet their obligations, work on the mill and mine has been discontinued, says the Prospector.

YUBA COUNTY.

The California Debris Commission, composed of D. P. Heap, Major Heuer and Captain Harts, U. S A. engineers, having adjusted the differences between the land owners and the dredging people concerning the proposed improvement of the Yuba river at Daguerre Point, 12 miles east of Marysville, work will resume It is proposed to build two barriers above Daguerre Point to hold back the coarse mining tailings and to make a cut at the Point so as to carry the Yuba river out to one side and away from the tailings lying in the stream, which are now being washed down into the Sacramento and Feather rivers to the detriment of navigation. After the Government had agreed to purchase title to the land involved it was discovered that part of the land was valuable for gold dredging, and the owners refused to deal with the Government agents sent out to acquire the titles to the land necessary for the undertaking. The contract for building the barriers has been awarded to S. Montgomery and the work of making the cut at Daguerre Point to E. Malley. In the performance of the latter contract W. P. Hammon & Co., operating the dredgers, agree to build at their own expense certain training walls to cost $5000, with the agreement that they will be permitted to carry on their gold dredging without interruption.

COLORADO.

BOULDER COUNTY.

An automatic roaster and a cyanide plant will be put in at the Inter-Ocean mine, near Sunshine. The ore is said to run $5 per ton.

There are 100 men at work at the Nancy G. M. & T. Co. properties, near Wall Street. The crusher in the mill is running steadily. Ore is being hauled from the mine at the rate of forty tons a day, and men are stoping in the Last Chance, Gray Copper and Gillard drifts of the Nancy tunnel.

The Wood Mountain M. & M. Co., near Wall Street, has decided to build a cyanide mill to treat sixty tons of ore a day. G. M. Gray, president of the company, says in a basin 300 feet below the mill, the tailings are deposited which contain 50% of the original value of the ore, and this will be cyanided. The company expects to have the mill ready for operations in the spring. In the meantime development continues in the mine. The crosscut tunnel will be driven 500 feet farther into the mountain. It is in 1700 feet. The Wood Mountain group adjoins the Concord.

The Great Western M. & M. Co., working the Miser's Hoard group of mines in Gordon gulch, near Sugar Loaf, has twenty-five men at work and is shipping fifteen tons of ore a day. The ore is being treated at the Boyd mill in Boulder. The shaft is 175 feet deep, the lowest level in 400 feet. The company is putting in a 40 H. P. engine and 50 H. P. boiler, and has bought the stamp mill at Sunny Side, which is being removed to the mine. W. Rowen is manager and M. Jones superintendent.

CLEAR CREEK COUNTY.

The Capital Prize M. Co., operating at Georgetown, will put in a compressor plant for development work.

The compressor plant going up at the Sidney tunnel, near Silver Plume, is expected to be finished by Oct. 1st.

Regular weekly shipments have been resumed from the Anglo-Saxon Extension. Stoping is carried on in 14 inches of ore, which averages $35 per ton in gold.

The Red Elephant M. Co. has been organized in Denver to develop two groups on Red Elephant mountain, near Lawson. They expect to start operations this month. They will develop the larger group by an adit tunnel on one of the veins and a crosscut from the adit will cut the entire group of veins. The company will also continue sinking the shaft on one of the lodes on the flat, says Manager G. B. Sinclair.

The Cassatt-Homestake G. M. & M. Co. has been incorporated at Idaho Springs to develop a group of six claims on Santa Fe mountain. The ore shows values of $6 a ton in gold, and it has been found susceptible to cyanide treatment. Included in the sale are water rights. W. A.

Hamilton of Terre Haute, Ind., is president, with F G. Watrous, L. W. Herrin, R Wier. L. E. Cassatt, A. Norton and F. G. Shaffer as directors. L. E. Cassatt is superintendent.

The New Era G. M. Co. has resumed work on the Lone Tree tunnel, near Idaho Springs, and will develop the Lone Tree group. The Lone Tree tunnel has been driven 800 feet on the Great Western vein of the New Era Co. Within 600 feet they expect to enter the Lone Tree lode and will drive 4500 feet through the Lone Tree and Lone Tree Extension.

Besides the 200 H. P. hoist being placed on the Gem shaft, the Con. Gem M. Co., near Idaho Springs, is also putting in a compound air compressor of 1000 cubic feet capacity. The Silver Age mill has been dismantled and is being used as a compressor plant. The company has two other compressors there, one of 800 cubic feet capacity and the other 400. The hoist on the Gem shaft will be operated by a 150 H. P. electric motor. The shaft is down 950 feet, but when the raise connects with the shaft it will have a depth of 2000 feet.

CUSTER COUNTY.

Near Silver Cliff, Preston, Ray & Condell report opening up a body of ore in the Bismuth mine assaying 200 ounces of silver, $15 gold, with a percentage of lead. The ore was exposed in a shaft 20 feet in depth. They will put in a hoist.

A lead prospect on Lead hill, near Querida, carrying cerusite, has been bought by the Bogue Lead Co. of Denver. Improvements are under way, both in the mine and on the surface.

DENVER COUNTY.

The Grant smelter of the American S. & R Co. at Denver is closed, without any immediate prospect of resuming, and three furnaces only are working in the Globe plant. The intention seems to be to transfer the bulk of the business to their plant at Pueblo.

GILPIN COUNTY.

Christopher & Co., lessees on the Wood uranium property in Leavenworth gulch, near Central City, have overhauled their machinery and resumed development. The water has been taken out and after prospecting the levels they may deepen the shaft.

Sinking operations have been suspended at the Straub mine on Gunnell hill, near Central City, and the shaft is down 430 feet. The Ingalls G. M. & L. Co. will drive levels and open up additional ground. The shaft shows a vein with 18 inches of milling grade ore, reported to carry $15 per ton. The smelting ore shoot averages 4 inches wide and carries $100 to the ton. Superintendent Ballantyne says drifts will be run east and west and a crosscut also started.

The Elizabeth M. Co., operating in Lake and Illinois Central districts, near Central City, will put in a hoisting plant at the Skelly mine, in Illinois Central district.

The Wautauga mine, in Russell district, near Russell Gulch, is being operated by Bush & Co. of Idaho Springs under lease and bond from the Old Town Con. M. Co. with N. Pike as superintendent. He has thirteen men at work and has cleaned out the fifth and sixth levels, and is taking out some concentrating ores, which are being shipped to Idaho Springs by wagon.

B G. Granville and J. L. Hoefler of Central City have bought the Eagle mill, at the mouth of Chase gulch, on North Clear creek, at Black Hawk, and will treat custom ores. The mill is equipped with thirty-five rapid-drop stamps.

GUNNISON COUNTY.

At the Tin Cup mine, near Pitkin, Manager A. Lejune reports striking ore assaying well in gold, silver and lead. The mine is owned by J. J. Mastin & Co. of Kansas City, Mo. The strike was made north of the deepest workings at a depth of 300 feet, and is thought to be the shoot lost trace of through a fault encountered in 1880.

The C. G. Davis group of placer claims in the Box Canyon district, near Pitkin, has been leased to Moore & Hoff.

LAKE COUNTY.

The Yak tunnel at Leadville is shipping on an average 2500 to 3000 tons per month, in addition to 1000 tons handled by lessees.——The No. 4 Ibex shaft is completed to the tunnel level. The company has started a new level—the twelfth—100 feet below the old one.

Work has resumed at the Bug Gold mine, near Leadville, says Manager Dewey. The pumps are unwatering the workings and the shaft will be put down deeper. Additional territory has been secured.

It is reported operations will be resumed on the Pilot M. Co.'s group, near Leadville. The intention is to put down several diamond drill holes to test the formation. It is thought that conditions below the parting quartzite will be the same as those found in the downtown area

A. Hahnewald is carrying on prospect work in the Grayton shaft on Poverty Flat, near Leadville, and opening up manganese iron.

OURAY COUNTY.

It is reported that the Barston M. Co., owning the Bobtail mine in Commodore gulch, has decided to build their mill at Ironton, the plant to be completed this season.

SAN JUAN COUNTY.

Electric rock drills will be put in at the mines of the Sultan Mountain M. & M. Co., near Silverton, as soon as the buildings are completed. The company intends to complete the 600-foot tunnel to cut the Molas and Junior Warden veins and to drift 2000 feet on the Molas vein, says the Silverton Standard. The electric generator for the drills will be run by a 10 H. P. gasoline engine.

Reilly Bros. are preparing to develop a group of claims in Mill gulch, near Chattanooga, including the Red Buck, Crown Point and the Two Macks.

The pipe line at the Highland Mary mine, near Silverton, is expected to be finished and the mill in operation next week.

The Ransom vein, owned by the Freeport & Cripple Creek Co., having been exploited by the crosscut tunnel in Eureka mountain at Eureka, all work will be confined to Tower mountain properties—the Acme group—on the opposite side of the gulch from the Ransom mine, says the Silverton Standard. The development of the Ransom vein showed 20 feet of milling ore at a depth on the vein of 300 feet. The Acme tunnel on Acme vein No. 1 is expected to cut Acme No. 2 vein at 500 feet, the same being in 460 feet.

SAN MIGUEL COUNTY.

The Japan-Flora M & T. Co. was incorporated last week by D. Swickheimer, A. J. Clark, W. E. Humphreys, J. Wilkinson and T. W. Beam of Denver, to operate mines and reduction plants in San Miguel county. This is the reorganization of the Japan M. Co. and it is expected work will be started on a mill at Pandora and a tramway from the mouth of the lower Japan tunnel to the reduction plant.

Work has been started on the retaining dam which is to be built by the Tomboy, Liberty Bell and Smuggler-Union mining companies across the San Miguel river below the Liberty Bell mill, ½ mile east of Telluride. It will be 80 feet in length, 12 feet in width and 7 feet high. Heavy lumber will be used in the construction and stone will be thrown in between the sides. Valves will be set at equal distances and the tailings that accumulate during the winter can be flushed out when there is high water in the spring and summer months. It is expected the work will be completed by Oct 1st. This dam is being built as the result of a threatened lawsuit being brought against the above mentioned companies by the Keystone Hydraulic M. Co. to recover damages caused by the reduction plants of the quartz mining companies operating above the placer mines owned by the latter company. It was alleged that during the summer and fall months the sand and mineral contained in the tailings damaged the flumes and pipe lines of the placer company.

J. Ekman of Calumet, Mich., manager of the H. M. H. group in Bear creek basin, near Telluride, says development is opening up ore bodies carrying values in gold. More men are being put on and stoping ground will be opened up. It is not probable, however, that ore will be extracted for milling this year, but next spring a tramway will be built from the mine to the 10-stamp mill, a distance of 9000 feet. Last week Ekman secured an option on a group of claims in Bridal Veil basin, consisting of seven claims and a reservoir and millsite. Besides these he located four other claims adjoining the group, and has men working assessments. W. Hutchinson is mine superintendent.

J. D. Gale of Boston, Mass., says he will increase development work on the Mary group of claims in Swamp canyon, near Ophir. J. Manifold and J. W. O'Brien are also interested, and have had men working on the group since last spring. The ore carries gold, silver, lead and some copper. The veins are 10 feet in width, with a pay shoot of 2 feet. A crosscut tunnel, 200 feet in length, was run, which cut the veins at depth, and 200 feet of drifting has been done. Ore has been piled on the dump, which will be shipped to the smelters. The group consists of seven full claims and millsite. Gale says as soon as the organization of the company is effected arrangements will be made for putting in a milling plant.

At Telluride, H. Buckley, manager of the Silver Bell mine, has agreed to treat with the union and grant the men an eight-hour day, provided the union will not attempt to dictate to him the number of men he must employ, and will continue to agree to a fair cut in their scale of wages proportionate to the reduction in hours. The management of the Butterfly-Terrible mine refused to have any dealings with the union. The number of men at the Tomboy mine has been increased and seventy-five men are at work. About sixty union men left Telluride on the 9th inst. for points in Utah and farther west.

SUMMIT COUNTY.

(Special Correspondence) — About 1½ mile from Breckenridge, on Nigger hill, is the Washington mill. The property consists of 201 acres of patented ground, 20-stamp mill and placer ground. They are now handling fifty tons of ore through the mill. This output will be increased this fall by the erection of a new mill. The tunnel through which they are working is 1450 feet in length. The ore is taken down through a 280-foot shaft to the 240 level, and there taken through a mill hole 115 feet and trammed to the mill through an 800-foot tunnel. The mill contains crusher, stamps, plates and tables. C. S. Newsom is manager.

Breckenridge, Sept 5.

The Clark-Reithmann (Goldrick) property, consisting of placer and lode claims and improvements, and covering 1000 acres of mining ground in French gulch and near Lincoln, near Breckenridge, was sold last week at sheriff's sale to W. Lennox of Colorado Springs for $17,050.

Manager Whitehead of the Providence-Colorado group, on Gibson hill, at Kokomo, has ceased drifting and resumed sinking. The 300 feet of drifting on the vein at the 100 foot level shows a body of milling grade ore.

The Monte Cristo group, on Mount Quandary, near the head of the Blue, near Breckenridge, has been sold to the Quandary Mountain M. & M. Co. for cash. T. J. Cooper is president of the new company and has put men to work building roads, bunk and boarding houses, after which the quarry will be opened and a concentrating mill will be built. In the meantime, if a mill is necessary, it is thought either the Jack or the Eldorado mill will be used, says the Summit Journal.

It is reported the Union mine on Gold Hill, near Kokomo, will resume. The ores carry gold and lead.

The Robert Emmett group, at the head of Mayflower gulch, near Kokomo, has been sold to M. Miller et al. of Cripple Creek. The Emmett group embraces three full claims and is near the Gold Belt mine, the M. K. C. and Bird's Nest groups. The Emmett ore shows gold, silver and copper values. Work will begin next week.

TELLER COUNTY.

The Cripple Creek drainage tunnel, which has been in process of construction since January, 1903, was completed and put in operation Sept. 6 Under Superintendent Bainbridge, the valves in the bulkheads were opened. The flow was 2500 gallons a minute. Later in the day work was begun on the northern heading, a connecting branch, and when this is completed it is estimated the flow will reach 4000 gallons.——With military protection, the Findley, Strong and C. K. & N. mines were reopened on the 8th inst., giving employment to eighty men. The managers of those properties say they can obtain all the men they need, and will increase the number.——The Mine Owners' Association has announced that no members of the Western Federation of Miners will be employed in any of the properties owned by members of the Association. The Federation influence on the prosperity of the district has been pernicious, according to the mine owners, who openly declare that they will no longer tolerate its alleged dictation. The union officials are still confidently aggressive. It is reported the mine owners have arranged with railroads for reduced rates for laborers from southwestern Missouri, and it is expected that miners will be brought from the Joplin lead district to take the places of strikers. A small force of men began breaking ore in Stratton's Independence mine on the 9th inst., and the military guard line was extended to embrace this property. Operations were also resumed on leases in the Vindicator and Hull City placer ground. A petition is said to be in circulation among the miners of the district asking the American Federation of Labor for a charter for a miners' union, the purpose being to enable the miners, as union men, to return to work, under union conditions, for employers against whom they have no grievance.

Air drills were put at work last week in the tunnel on Grouse mountain, near Cripple Creek, by the Big Turkey M. Co., operating a group of claims there. The tunnel will be driven 1000 feet before any lateral work is done.

The Cripple Creek Enterprise Co., operating the Deadwood mine at Cripple Creek under lease, working through No. 1 shaft, is taking out three carloads of ore per week which averages two ounces gold per ton. The ore is being mined 300 feet from the shaft on the 415-foot level, where a vein 3 feet wide has been uncovered. Some sylvanite is found. The Enterprise Co. holds a lease on the Deadwood from the 400 foot level down and on the Trachyte claim, which adjoins the Deadwood, from the 400-foot level to the surface, and both claims are being operated from No. 1 shaft on the Deadwood. The same company is operating under the streets and alleys of Cripple Creek.

The output of Cripple Creek district for August is given below. The large amount of ore handled is explained by the fact that all the mills carry a reserve, and all of it is Cripple Creek ore, says the Cripple Creek Times. This reserve tonnage was handled during the month, and will be counted as having been sent out from the camp during August. The mines produced and shipped out ore until the 10th of August, and since then only intermittent shipments have gone out, and these were for the most part sent out by lessees. The output would have reached $2,000,000 had not the strike been declared. During July the gross output amounted to $1,866,900, with a tonnage of 56,300. The following table shows the output figures:

Plant.	Tons.	Total Value.
Smelters	4,665	$303,225
United States R & R. Co.	7,000	216,000
Telluride	5,000	150,000
Economic	3,400	88 400
Portland	4,075	122 250
Dorcas (estimated)	2,500	87 500
Globe	1,800	9,000
Gillett	450	1,800
Ingham	600	2,880
Other cyanide plants	300	1,500
Totals	29,790	$982,555

At Cripple Creek the shaft of the Molly Kathleen mine, adjoining the Gold King, on Womack hill, is to be deepened to the 1000-foot point.

The Eclipse shaft house, owned by the Sunset-Eclipse Con. M. Co., on the north slope of Battle mountain, near Cripple Creek, was destroyed by fire last week. Loss $15,000. The property was under lease to G. Keener. The fire is supposed to have started from live coals from the boilers, as the lessees banked their fires

IDAHO.

BANNOCK COUNTY.

At Pocatello, the Fort Hall M. & M. Co., L. A. West, has decided to put in an air compressor and machine drills. In a tunnel 825 feet long, two veins have been cut, one 19 feet and the other 35 feet wide, the ore being copper-bearing and showing some silver and gold.

On the Moonlight mine, east of Pocatello, copper ore is being saved for shipment to the smelter at Mackay. A 10-mile wagon haul is necessary. The Moonlight has opened a copper deposit 5 feet in thickness, with a tunnel into an extension of Mount Putnam.

The Fort Hall M. Co., 12 miles east of Pocatello, have a tunnel driven in 1200 feet. At the West mine, 5 miles to the north, silver values are being obtained.

BLAINE COUNTY.

The Cambridge M. Co. has been incorporated at Hailey to operate a group of seven placer claims and a water right near the head of Little Smoky and Smoky-Bullion creeks, above the Revis placer claims near Hailey, says the Wood River Times. H. A Walter, C. C. Ruthrauff, C Hernsheim, I. J. Wadley and W. A. Brodhead are directors. Superintendent Wadley has begun the work of making ditches, flumes, etc., and to get ready for hydraulicking in the spring.

BOISE COUNTY.

The Checkmate mine at Pearl has been sold to E H. Dewey, who says he will consolidate the Checkmate and Levan claims under one management. A greater depth can be attained from the bottom of the Checkmate shaft than from any of the other workings at Pearl. This shaft is down 270 feet, which gives a depth on the vein of 400 feet from the surface. He will sink the shaft another 100 feet, then drift on the vein both east and west and the shaft will continue down. Cross cutting south to explore the parallel ledges known to exist in adjoining claims belonging to the Checkmate will also be done.

C. F. Dill of Greenville, S. C, and his associates propose to develop a series of coal deposits which they have located near Garden Valley. An electric road will be built from Boise to Pearl and up the Payette river to Garden Valley. The coal is a lignite.

The Gold Coin M. Co. will build a road 2 miles long, from Lager Beer gulch, on the Forest King road, to their mines on the east side of Washington gulch, near

Idaho City, says Superintendent Emery. The company will put up a sawmill and quartz mill this fall, the latter to have a capacity of 60 tons daily. A hoisting plant will also be put in. Besides sinking on the Blue Bell, they will start work this fall on a tunnel to tap the ledges at depth and they propose next summer to build an electric plant on More creek, says the Idaho World.

The Big Ledge group, in Deer Creek mining district, has been bonded to J. H. Richards, of Boise, for $150,000. The water right on More's creek is also included in the transfer.

IDAHO COUNTY.

Near Warren the Silver King and Keystone mines are being operated under one management. On the latter there are sixteen men opening up the mine and a small mill will be placed this month. At the Silver King the mill is running steadily and table concentrators are used. The concentrates are being saved until next year, when they will put in a plant for extracting their values, which average $100 per ton. There are ten stamps in the mill and next season they will increase the number. They are crushing forty tons per stamp per day. There are twenty men on the Silver King.

Manager Hathaway reports at the Golden Rule placers on Grouse creek, near Warren, they have in the course of their placer work cut through a body of bituminous coal 25 feet thick which is 300 feet wide at that point.

In the Marshal Lake district, near Grangeville, D. Strong of Denver, Colo., has a working bond on the Irwin group of four claims for $25,000. He will develop the claims, on which is said to be a 2 foot vein, free milling and assaying $30.

OWYHEE COUNTY.

The shaft in the Afterthought mine on Mahogany flat, on War Eagle mountain, near Silver City, is down 430 feet, having cut the ledge at that point. A station was cut at the 400-foot level and a crosscut showed the vein 2 feet wide. Drifting south on it will be started. The water flowing into the shaft is handled by bailing skip.

SHOSHONE COUNTY.

Manager Steen of the Granite & Allie G. M. Co., near Murray, says he has the cyanide plant in operation. The reduction plant consists of a 10-stamp battery, from which the pulp (not fine crushed), passes to a 5-foot Huntington mill. No amalgamation is done. The pulp from the Huntington is conveyed in an iron pipe to the two cyaniding vats. At the mine the shaft is down 100 feet and showing a 6-foot ledge.

The Elk Star group of claims on French gulch, near Elk City, and near the American Eagle, Boyer Mill and Blue Ribbon mines, has been sold to Spokane men, who have incorporated the Elk Star G. M. Co. The price paid is said to be $20,000. The incorporators are H. W. Greenberg, G. C. Beck, R. E. Hutchinson, J. Harris and G. M. Davis. They will start development work next week.

MICHIGAN.

HOUGHTON COUNTY.

The annual report of the Lake Superior Smelting Co., near Calumet, shows that last year's product of the Tamarack amounted to 7125 gross tons of copper, while the product of the Osceola was 5989 gross tons.

It is reported negotiations are under way for a consolidation of the Copper Range Con. C. Co. and the Trimountain properties, south of Houghton.

The August output of the Atlantic mine, at Painesdale, is given at 299 tons of copper.

The August production of the Franklin mine, at Hancock, amounted to 367 tons of copper, as compared with 376 tons during July.

That the Arcadian mine, near Hancock, is to explore for the conglomerate on which the Franklin Junior is working is erroneous, says the News. The lode has already been cut in two places from the St. Mary's shafts at depth of 300 feet and was found barren. The Franklin's values are at greater depth, the seventeenth level being the best. The Arcadian shafts are dismantled, the tracks pulled up, and are being allowed to fill with water. The compressor, etc., still on the property, are sufficient for exploratory work. There is a tract, aggregating 1 square mile, still unexplored.

The Copper Range Con. C. Co. report labor is so scarce that a carload of men were brought from Chicago last week to work on the new South Range smelting plant at Houghton. At present 225 men are employed and foundations are going in.——The August output of their Champion mine at Painesdale amounted to 738 tons of copper, and the Baltic mine 667 tons.

The output for month of August of the Wolverine mine, at Kearsarge, was 517 tons, 935 pounds of refined copper.

Two miners report the discovery of workable iron ore outcrops near Covington. The district lies in a direct line between the westernmost limits of the Marquette range and the easternmost mines of the Gogebic range, says the News.

During the past two years the Wolverine mine at Kearsarge has increased its output of ingot copper by 41%, the last annual report covering the year ended June 30 showing a product for the twelve months of 8,260,386 pounds of refined copper, as compared with 4,907,646 pounds for the year ended June 30, 1901, says the News. During the last fiscal year the mill turned out 11,330,370 pounds of mineral, as compared with 5,852,646 in 1900–01. The present rock supply is being entirely drawn from the Kearsarge lode. As a reserve there are the Osceola amygdaloid and Kearsarge conglomerate lodes, these on the Wolverine property traversing 1250 feet in width. The output of refined copper for the present year is expected to reach 10,000,000 pounds.

KEWEENAW COUNTY.

The Phœnix mine rock bins at Phœnix are full and the mill will start next week.

The August production of the Mohawk mine, near Allouez, amounted to 333 tons 420 pounds copper.

ONTONAGON COUNTY.

At the Adventure mine, at Greenland, No. 3 shaft is nearing the ninth level and showing richer at the bottom. It is said the lode in the Adventure bluff is practically worthless, because the formation is so badly broken. The mill is running steadily.

MISSOURI.

JASPER COUNTY.

The powder shortage has been relieved and properties which were shut down have resumed.

The Oliver Lease Prospecting Co.'s 65-acre tract, adjoining the Lincoln mine, northwest of Zincite, has been sold for $34,000 to E. G. Rankin and J. L. Boogher of St. Louis. Besides the lease the sale includes two mines producing $1000 net per week, says the News. They have started work and will build a mill and increase the output. J. F. Boyd of Carthage is superintendent.

At Carterville the Minnie R. M. Co., composed of W. E. McCuley and W. A. Rhea, is building a mill on the Plutocrat lease. They have a run of 12 feet of soft ground at the 190-foot level, from which they expect to make six tons of ore per shift, and another in sheet ground at 198 feet. There is one vein of jack 14 inches in thickness. They expect to have the mill in operation by Oct. 1.

The Barrister M. Co. of Joplin and the John Durby M. Co. of Carterville have been incorporated.

The Lyon M. & Dev. Co. of Joplin was incorporated last week by B. W. Lyon, E. D. Nix and C. W. Bartlett of Joplin.

The S. H. & H. mine at Badger is developing ore. A pump has been put in. They have a face of ore measuring 50 feet. The drift is 30 feet wide.

STONE COUNTY.

At Galena, J. C. Moore, S. Cooper, G. W. Webb and J. W. Tate, who are prospecting on the city market square, report opening up a prospect at depth of 34 feet. They are drifting on an 18-foot face of jack.

MONTANA.

BEAVERHEAD COUNTY.

A. J. Noyes, manager of the Ajax G. M. Co., near Dillon, says he will increase the capacity of the mill to ten stamps and will also build a 4000-foot wire tramway this fall. The mill is expected to be completed by Nov. 1st.

FERGUS COUNTY.

C. Little has bought the Hazelton and Maricbette mining claims, in Cone Butte district, near Lewiston.

LEWIS AND CLARKE COUNTY.

The Red Bird M. Co, operating the Punches mines, 12 miles west of Helena, reports a strike of high-grade copper ore. This mine was originally operated as an iron proposition, the product being used as a flux at the smelter; but with depth copper values are said to be increasing.

Work on the mill for the Farmer group in Scratch Gravel district, 5 miles from Helena, has begun. The shaft is down 200 feet and the lead at that point is 7 feet wide, the ore averaging $6 per ton.

Work will be resumed on the iron claim in the Scratch Gravel district, near Helena, owned by M. H. Gerry of Helena.

MADISON COUNTY.

C. E. Damours, manager of the Damours G. M. Co. at Summit, near Virginia City, says he has increased the number of men at work in their mines.

MISSOULA COUNTY.

W. B. Tilden, manager of a Baltimore company, has bought the Copper Cliff mine, near Bonita, for $50,000. They are said to be also negotiating for the purchase of adjoining claims.

It is reported that the Copper Cliff group of claims, near Bonita, has been sold to Manager Tilden of Baltimore, Md., of an Eastern company. There are several thousand tons of ore on the dump which is said to run 7% copper.

SWEET GRASS COUNTY.

A deposit of marble is reported found in the Dear Creek section, near Big Timber, by R. F. Beal. The stone in the rough is translucent and workable. Considerable gypsum is said to accompany the marble.

NEVADA.

LINCOLN COUNTY.

G. L. Hardison of Los Angeles, Cal., has thrown up his bond on the Campbell property, in Crescent mountain, near Searchlight, and has a bond on the Edna mine, says the Searchlight.——G. Simmons is working his turquoise mine and also a gold mine, near Crossman's Springs.

The Searchlight M & M. Co. has been incorporated under Arizona laws to develop the Peerless group, owned by Day & Landon, with G. I. Myers of Leadville, Colo., as president.

Acting under orders from headquarters in Los Angeles, Cal., the Big Bug and Little Bug mines, near Searchlight, closed down last week, says the Searchlight.

The mill at the Homestake mine, in Deer Lodge district, near Stateline, is expected to be in operation this month.

STOREY COUNTY.

The work of reopening the Ward mine at Virginia City began last week and men are overhauling the machinery, etc.

WASHOE COUNTY.

The Jumper mine at Olinghouse, near Wadsworth, is to be worked by Jelinek & Jackson.——Golding & Fraser will put men on at the Hutchinson mine.

The No. 2 mine, in Olinghouse canyon, near Wadsworth, has been bonded for $35,000 to Manager Onn, who will begin operations next week.

NEW MEXICO.

GRANT COUNTY.

Work is reported progressing at the Casino group, near Silver City, by the owners, T. N. Stebbins & Co. Grading for the mill is finished, and it is expected the cyanide process will be used.—— T. Carter, lessee of the St. Louis mine in the Burros mountains, is taking out ore, and regular shipments will begin next week.——Portwood & Moses have a lease on two claims lying on either side of the Pactolus mine, and one of them they have subleased to Albert Owen of Santa Rita.

TAOS COUNTY.

The Cashier M. & M. Co. is operating a group of claims in Anchor district, near Red River. The ore is low-grade and free milling, and the company proposes to build a mill this fall, says the New Mexican. M. A. Bralden of La Jara, Colo., is president.

In Rio Hondo district the San Cristobal Copper Co. of West Virginia is developing a group of twenty claims. An experimental cyanide mill is in operation, and it is expected later on to build a plant with capacity of 200 tons per day.

OREGON.

BAKER COUNTY.

Manager L. G. Lilley of the Baby McKee M. Co., near Sumpter, says the Last Chance hoist building is finished and the machinery is being set up.

A 4-foot ore body on the Cleveland drift from the Standard tunnel is reported opened up at the Standard mine, near Sumpter. The shoot gives values in gold and cobalt, especially the latter, says the Sumpter Miner. E. W. Mueller, manager of the Standard Con. M. Co., says crystals of remingtonite, a rare cobalt mineral, have also been found.

W. Cable, superintendent of the Adelene mine in the Cracker Creek district, near Sumpter, says development work is progressing, and preparations will be made to put in a mill.

Manager T. F. Barbee, of the Crown Point mine, Cable Cove district, near Sumpter, says operations will be resumed. The lower tunnel will be driven another 200 feet, which, according to survey, will cut the main vein of the group. This tunnel is in 750 feet and will reach the ledge at a depth of 650 feet. Next season a reduction plant will be built.

DOUGLAS COUNTY.

The North Fairview M. Co., W. Faber, of Albany, president, report striking a body of ore carrying values in free gold. On the Maine, one of the 14 claims owned by the company near Bohemia, a ledge 4 feet wide has been opened. H. Leigh is manager.

GRANT COUNTY.

At Susanville, Sorenson & Sons of Greenhorn, who have a bond on the Big Snort mine, have work under way.

The Crane Flat placer mines are under option to F. Burbridge and A. Burch, who are developing the Independence mine. These placers are 5 miles northwest of Granite, on Crane Flat, and cover several hundred acres. Burbridge & Burch are arranging for thoroughly prospecting the ground, and it is intended to work the gravel with a dredger, should the tests prove satisfactory.

T. P. Carson, who is working the Milwaukee placers, near Granite, this season, reports operations progressing. He had to clean out 5 miles of ditch, as there had been no water through it for several years.

The Western M. & Dev. Co. has been incorporated by A. B. Campbell and A. Burch of Spokane, Wash., and F. I. Dutton, E. F. Whittum and M. J. Berry of Augusta, Me., to operate holdings in Granite Creek district, near Granite.

JOSEPHINE COUNTY.

A strike is reported made last week at the Granite Hill mines of Louise Creek district, near Grant's Pass, owned and being developed by the American G. Fields Co., of Chicago, Ill., W. J. Morphy, manager. In running a drift on the 125-foot level to connect the bottom of the vertical shaft with the drift an 11-foot vein has been opened, carrying values in free gold and sulphurets. The boiler and other machinery has been set up, and the air compressor and drills will be at work this week. The shaft will be continued down to 600 feet. The 5-stamp mill is crushing rock from the stope on the 135-foot level. A 10 stamp mill of 1000-pound stamps is going up.

The Eureka mine, on Soldier Creek, near Grant's Pass, has reverted to its former owner and A. F. Nelson is manager, and will increase development work. The mine is equipped with a 10-stamp mill.

SOUTH DAKOTA.

CUSTER COUNTY.

Superintendent Wright of the Extreme M. Co., owner of the Minnie May mine, says he will increase development and reduction work. The company owns 200 acres of ground 3 miles northwest of Custer. A few men are at work pending completion of a sawmill, with which the company will saw lumber to be used in building a 10-stamp mill. There is a large tonnage of free-milling concentrating ore on the dump which assays $6.

LAWRENCE COUNTY.

J. C. Sberman & Co. are getting the Amma Queen mill ready for operations at the Amma Queen mine, near Custer Peak. This mine has shown a ledge of free-milling ore.

Superintendent R. Fitzgerald of the Reliance M. Co has men at work grading for a millsite on Annie creek, near Deadwood. The site is 200 feet north of the main working tunnel on the property of the former University Co. The plant will contain three Chilian mills, each having capacity of seventy-five tons daily. The Burlington Railway Co. will build in to the site from the Juno spur, a distance of about 1500 feet, to deliver coal and freight. F. W. Medbury is manager.

Manager M. R. Maloney, of the Phœnix M. Co., operating on Blacktail gulch near Deadwood, says they expect to begin construction on their mill this week. Grading has been done. It is intended to give the mill at first a capacity of 200 tons daily, but it will be so arranged that this can be increased to 500 tons without suspending. At present but a few men are at work in the mine, timbering, running the pumps, etc. The pumps are operated by air, as will be the hoist when completed. Machine drills, also electric lights, will be used in the underground workings. The company has made arrangements to sink an incline shaft of two compartments through which the ore will be raised to the surface. This incline will be 800 feet in length. This shaft will be completed before the mill is ready to drop its stamps and the hoist will land the ore on the millsite. The shaft will tap the old workings of the mine, and with the tunnel should give a sufficient ore supply, says the Lead Call.

T. Goodman, superintendent of the Gold Hill M. Co., will put men at work on their holding, near Spearfish, next week. As soon as the shaft is unwatered, sinking will be resumed and continued until the quartzite is reached. The shaft is down 300 feet. Drifting on the quartzite will be done. The property is on the silliceous ore belt of the Ragged Top and Iron Creek districts.

TEXAS.

BREWSTER COUNTY.

At Terlingua three companies are operating quicksilver mines, and the district

is producing 500 flasks per month. Other companies are doing development work. Terlingua is in a bend of the Rio Grande river and near the Mexican line. The place is reached by wagon from Marfa, Tex. The camp contains 3000 people, mostly Mexicans, the labor being mainly done by Mexicans at present, who receive from $1.25 to $1.50 per day. The Kansas City & Orient Railroad, which it is expected will reach the line of Mexico in two years, will pass within 50 miles of Terlingua, and it is thought a branch will run out of it. Coal fields exist near the camp, the coal land being owned by the State. There is also good timber in the same section and spring water. There is no water at Terlingua. It is hauled from the Rio Grande, 7 miles.

UTAH.

Exclusive of the shipments of copper bullion from the independent smelters, which were 2,573 580 pounds, the ore and bullion settlements for products of Utah mines amounted to $1,771,550 for month of August. During July the settlements totaled up $1,829,250. Production was retarded by the large amount of development work which became necessary after the close of the first half of the year, says the Salt Lake Tribune. About 61,000 pounds more of copper bullion was produced than in July, distributed as follows:

	Pounds.
Bingham Con	693,440
Highland Boy	1,100,000
United States	780,140
American S. & R. Co.	1,200,000
Total	3,773,000

The American is expected to handle a larger tonnage by 4% or 5% this month and the United States will be able to treat more by reason of blowing in of an extra furnace.

BEAVER COUNTY.

Manager Botkin says operations will be resumed on the Old Catawba group, in Beaver Lake district, near Milford. He is also preparing to incorporate the Anchor group, which has a showing of copper ore.

Work was resumed on the Orphan Boy mine near Milford last week.

The Gold Crown group of twenty-one claims near the head of Indian creek, in the Newton district, near Milford, has been sold for $50,000 to the American Exploration Co., represented by W. Thompson, of Salt Lake City. No development work has been done on the property, but it is said to show a ledge of low-grade gold ore.

Contractor J. Dedrich, putting in the waterworks system for the Newhouse M. & S. Co. for the Cactus group of mines near Frisco, says the development of the Wah Wah springs has been completed and the reservoirs for storage purposes are about finished. In the vicinity of the springs and reservoirs 14,000 feet of piping will be required. Work is going ahead on the trenches for the main pipe line across the Wah Wah valley.

The Majestic Co. has awarded a contract for hauling a maximum of 500 tons of ore daily from the Harrington-Hickory, Old Hickory and O. K. mines, near Milford, to their smelter. It will require sixty teams to handle the contract when in full operation, but at the outset the hauling will be confined to the Harrington-Hickory, 100 tons per day, says the Milford Times.

The Royal Co. has started operations near Milton says Superintendent J. Forgie. Two hoists are being put in at the Montreal mine. Equipment will be put in for the Atlas-Monitor for sending the incline deeper, and work will be continued on the Beacon and other properties. It has been decided to sink a deep shaft at a point near the intersection of the two main veins. A prospecting shaft has already been sunk at this point to depth of 50 feet. A 40 H. P. gasoline hoist will be placed at this shaft, which will be enlarged, timbered and sent down to 500 feet.

JUAB COUNTY.

The shaft at the Dagmar - Northwest mine, northeast of Eureka, is at depth of 350 feet where a station is being cut. Sinking will be continued to the 500-foot level.——Now that the Mammoth M. Co. has closed a contract with the American S. & R. Co., an additional force of 150 men are being put on at the mine; but the mill will be kept closed. The ore bins at the mill will be emptied and the contents shipped. There is a large body of low-grade ore at the mine which averages $3.50 per ton, containing copper, gold and silver, says the Deseret News.

Work in the lower levels of the La Clede copper mine, near Diamond, has been suspended and the pumps were pulled last week. Manager Weir says no further effort will be made to rescue the diamond drill which was lost at depth of 300 feet, but the development of the property had not been permanently dropped. A new diamond drill with greater capacity will be put in, when a prospect hole will be put down from the surface, thus avoiding the expense of maintaining a pumping plant.

Shipments for the month of August from Tintic district were:

Mine.	Cars of Ore.
Bullion-Beck	28
Carisa	10
Centennial-Eureka	87
Eureka Hill	11
Gemini	35
Grand Central	108
Mammoth	56
Victor	18
Yankee Con	12
Ten others, a total of	42
Total	407
Iron Ores:	
Black Jack	37
Dragon Iron Mine	98
Noon Iron Mine	16
Total	151
Concentrates:	
May Day	7

PIUTE COUNTY.

Operations will be resumed by the Boston & Gold Mountain M. Co. at the foot of Mount Baldy, south of the Annie Laurie mine near Marysvale.

The Annie Laurie mine at Kimberly, which has been shut down for several weeks on account of an agitation started by the Western Federation of Miners, has resumed with a number of non-union miners, says the Times.

SALT LAKE COUNTY.

Superintendent Thornton of the Vallejo mine, at Alta, says the International Leasing Co. will increase operations on the property this week. Men will begin breaking down rock in the Burgess tunnel, and shipments will be made as soon as transportation facilities can be obtained. The Vallejo workings carry low-grade silver ores, with occasional pockets of high grade. The main trouble with the Vallejo, as well as with other properties, is transportation. An aerial tram is being considered, which would be serviceable the year around.

SUMMIT COUNTY.

Negotiations are under way by the directors of the California & Comstock Co., operating at Park City, for consolidation of the two properties. Underground surveys are said to show that the California and Comstock veins divide in the latter property, and the one that has been worked is almost entirely in California territory. As they go down, the ore bodies apparently converge.

The J. I. C. mine, at Park City, is temporarily closed down on account of a flow of water caused by cutting the water bearing fissure in sinking. Superintendent Turner reports a pump being put in.

Superintendent C. T. Mixer of the Creole mine, near Park City, says he expects to put in a compressor plant at the mine this month. The shaft is down to the 600-foot point. Crosscutting will begin for the contact on this level. The leasers at the upper workings are shipping ore.

TOOELE COUNTY.

Superintendent B. F. Fleiner, of the Blaine mine, near the Juab county line, says he is preparing to make ore shipments. The ore carries values in lead, gold and silver, and is hauled to Jericho on the San Pedro railroad. The Blaine is owned by the Blaine G. & S. M. Co., of Salt Lake City, W. D. Mathis, secretary.

UTAH COUNTY.

The mining of ozokerite (mineral wax) is reported improving. A New York company is taking out fifty tons per week near Soldier Summit, and several other deposits are being explored. This product is said to be worth $250 per ton, refined.

WASHINGTON.

FERRY COUNTY.

A diamond drill plant is at work on the Little Gem mine, near Orient.

R. L. Boyle of Indianapolis, Ind., says a company has been formed to build a smelter at Keller, on the south half of the Colville reservation. A sawmill is being set up to cut timber for the smelter. Surveyors are at work for a ditch 1 mile in length to furnish the water power to run the plant. The San Poil river runs through Keller. The incorporators are R. L. Boyle, H. Hildebrandt, J. F. Reed, J. S. Badger and H. A. Denton. It is expected the smelter will be in operation this winter. Keller is 9 miles north of the Columbia river. The ores of the camp carry copper, gold and silver.

OKANOGAN COUNTY.

Superintendent J. M. Hagerty says he sent last week to the smelter at Nelson, B. C., a car of ore from the Ruby mine, on Mount Chapaca, in Similkameen district, which was hauled to Curlew for transportation by railroad. It was assorted to run $125 per ton, principally in silver. The Ruby mine is 3 miles west from the Night Hawk and Six Eagles mines. It has been opened by two tunnels, which have developed a vein at 150 and 250 feet deep. The lower tunnel strikes the vein at 226 feet in from the portal, and drifts have been extended on it 300 feet. He will start another tunnel to strike the vein 600 feet deeper than the present workings, which will give a total depth of 850 feet below the apex. September 15th he will start up a concentrating plant, crush the ore from the Ruby mine with two mills and use two tables and a belt machine for concentrating. Hagerty is also manager for the Similkameen Falls Power Co., which is putting in a hydro-electric plant for supplying power to the Six Eagles, Ruby and other mines. A power line with poles and wirage 25 miles, from the Golden Zone mine to the Ruby, and thence to the Six Eagles, Night Hawk, Similkameen Falls and Oroville, is being built.

PIERCE COUNTY.

Coal deposits are reported located 60 miles south of Tacoma, near the line of the Northern Pacific Railroad, being only 6 miles from the main track, says the Telegram. It is of a semi-lignite character. The seam opened up is 12 feet thick and was struck at a depth of 100 feet.

STEVENS COUNTY.

High-grade silver ore is reported found in Rattlesnake Butte mining district, on the south half of the Colville reservation, says H. L. McIntyre of Spokane. The district is 35 miles southwest of Myers' Falls and 30 miles west of Colville and near Rattlesnake Butte.

WYOMING.

CARBON COUNTY.

The Southern Wyoming Aerial Tramway, which connects the Boston-Wyoming smelter at Grand Encampment with the Ferris-Haggarty copper mine at Battle lake, 16 miles away, is in steady operation, and the smelter is expected to be blown this week. Delay in blowing in was caused by the roaster, which had not turned out enough roasted ore to begin operations.

LARAMIE COUNTY.

The Omaha Co., operating a mine in Slate Creek district, west of Wheatland, is arranging to put in a mill. Ore from this mine shows values in gold, silver and copper.——Nickel ore has been found in the Three Cripples property in Laramie Peak district, northwest of Wheatland.

UINTA COUNTY.

J. Acocks of Evanston reports finding a body of coal 10 feet in thickness and extending northeast to southwest. Eight entries have been made on the streak, which dips at an angle of 20°. It is 4 miles southwest of Cumberland, from which point a spur of the railroad can be laid without heavy grades, and a good water supply is close at hand.

BIGHORN COUNTY.

J. Hilliard, E. Mann and B. Dunshee report finding gold-bearing quartz near Basin City and on the north end of Bald mountain.

FOREIGN.

AFRICA.

RHODESIA.

At the Ayrshire mine, in Mashonaland, 75 miles from Salisbury, and connected with the main line of railway by a 2-foot gauge line, work is about completed on the mill. The surface equipment of the mine will consist of a 60-stamp back-to-back mill with 1300-pound stamps, and driven by steam. This engine is one of three, so arranged as to drive either electric generators or the mill. A jet condensing plant is being provided, capable of handling 15,000 pounds of steam per hour, the circulating water being cooled by means of an open type, natural draught cooling tower. Steam will be supplied to the engines from four 155 H. P. boilers, arranged to burn either wood or coal. Electricity is to be largely used, the current being taken from a 200 kilowatt 3-phase generator and distributed to various parts of the mine. Among others it will drive a 50,000-gallon per hour pump, supplying water to the mill from the Maquassi river, workshops, cyanide plant, fuel haulage and the whole of the surface and underground workings will be lighted by electricity. At the main shaft the rock-breakers will double-crush the ore, which will be sent to the mill reduced to ¾-inch size. This will be driven by two 3-phase 50 H. P. induction motors. A 16-drill cross-compound compressor will be used, the steam being supplied from three 155 H. P. boilers. Special arrangements have been made for filtering and heating the feed water. The sands from the mill will be run by gravity to a cyanide plant, consisting of a series of steel tanks.

TRANSVAAL.

In the Witwatersrand district the "Deep Deeps," or third row propositions, are being brought into the producing stage, says South African Mines. The Village Deep is ready for production. A tailings wheel has been put in. South Nourse is also being developed, while the Knight's Deep of the Con. Gold Fields group around Germiston is already a gold producer.

At the Great Eastern colliery at Springs the shaft which caved has been repaired and operations resumed. Fully two weeks were lost in waiting for timber. A small air shaft, 230 feet from the old shaft, has been enlarged and timbered, and a new head gear erected. The hauling engine has been removed and fitted up near the new shaft, and a platform put up which connects with the screening plant formerly in use.

BRITISH COLUMBIA.

BOUNDARY DISTRICT.

R. Plewman of Rossland, managing director of the Winnipeg mine, near Boundary Falls, says work will be resumed. A 10-drill compressor and a 150 H. P. hoist will be put in. About 3000 tons have been mined and shipped, of average value of $12.

Operations and shipments will be resumed at the Winnipeg mine in Wellington camp, near Hartford Junction, 2 miles east of Phœnix, says R. Plewman, president and managing director of the company owning the mine. On May 30, 1902, fire destroyed the shaft-house, the seven drill air compressor pumps, boilers and other machinery, and since then nothing has been done at the Winnipeg except to keep the water out of the workings for a few weeks.

A strike is reported on the Onondaga mines in Waterloo camp, showing a quartz lead of free-milling gold carrying values of $10 across the vein. The principal owners are L. & A. Will, of New York City. They have a 10-stamp mill up.

CASSIAR DISTRICT.

Manager J. W. Haskins, of the Rosella M. Co., has put men to work on the Dease River claims of the company, near McDame, in Liard mining division. They went in by way of Wrangel and Telegraph Creek, and are making preparations to put in machinery.

EAST KOOTENAY DISTRICT.

It is reported oil has been struck in a well being sunk in Flathead valley near Atlyn, near Fort Steele, by a Montana company at depth of 300 feet.

B. Layton, manager of the Sullivan mine near Fort Steele, says the mine will be reopened this fall.

NELSON DISTRICT.

E. M. Wilson has bought a half interest in the Emerald claim, near Ymir, for $4000. The claim is on Lost creek and shows a 3-foot ledge carrying galena. On this a shaft has been sunk 30 feet, besides several open cuts. Assays run 30% lead, 12 ounces silver and $5 gold. Wilson will open up the mine.

SLOCAN DISTRICT.

The freight and treatment rate on dry ore from Slocan has been raised from $9 to $11 a ton in Nelson, and from $11 to $12 at Trail, says the Rossland Miner.——The Reco mine has opened a body of good ore and more men will be put on and shipping resumed, says Manager Harris.

Surface stripping on the Legal claim, on Lemon creek, near Slocan City, has exposed 2 feet of gold-bearing quartz.——On the Howard Fraction, on Lemon creek, a crosscut tunnel will be driven to tap the ledges at depth. It will be 1000 feet in length, and in that distance is expected to open four ledges at vertical depths approaching 700 feet, which have been located on the surface.

WEST KOOTENAY DISTRICT.

The Kootenay Con. M. Co., with headquarters at Minneapolis, Minn., has been organized as a merger of the following mines in Lardeau section: Old Gold, Primrose, Mountain Lion, Treadwell, Black Warrior, Lardeau Duncan, Guinea Gold Extension, Spring group, Silver Moon, Comstock, Rio Grande, Baltimore and Amazon.

A free gold group of prospects, consisting of the Nelson, Goldflake and Gold Medal, at the head of Ten Mile creek, near Sable creek divide, near Camborne, was bought last week by C. Menhinick, G. Sandham and G. Young. On the Nelson claim there is said to be a lead 10 feet wide of quartz which carries free gold.

A find of quartz carrying free gold is reported in Lardeau section, near the north end of Trout lake, near Trout Lake City. It is 30 miles from the Poplar Creek discoveries.

CHINA.

MANCHURIA.

Manager Yugovitch, chief engineer in construction of the Chinese Eastern Railway, has completed an agreement with the Chinese Governor of Hylomtsian Province for exploitation of two coal mines in that Province, by which the Chinese Eastern Railway is granted the right to exploit the coal mines on a strip of land 30 Chinese versts (about 20 miles) on both sides of the railway line, besides preferential rights to exploit coal mines beyond these limits. The railway company agrees to indemnify all private parties whose lands may be taken for any damage done to buildings, graves or crops, and to pay the Chinese Government a royalty for every 1000 Chinese pounds of the output of coal. To the company is also conceded the right to cut timber in the Province, both in Government and private forests, for a remuneration to be hereafter fixed, says R. T. Greener, U. S. Commercial Agent at Vladivostok.

MONGOLIA.

A. S Bigelow of North Columbia, Cal., superintendent of the Peiger and Capsilvar mines, owned by the Franco-Russian Co. des Aimaks in northern Mongolia, says the company has a concession from the Chinese government covering 600 square miles of territory for placer mining. American methods and implements are being introduced there. The main difficulty in mining operation in that section is the lack of grade; canals are run on light grades, and 6 to 7 miles of pipe are necessary in order to obtain an hydraulic head of 200 feet. Formerly the "long Tom" was used, and horses hauled the gravel to the place of washing and afterwards removed the tailings. Russian peasants are employed, working ten hours a day for 1 ruble (50 cents). They go on at 6 A. M. and come off shift at 6 P. M., taking out an hour at noon and a half hour at 9 and 3 o'clock to eat and smoke. They require to be immediately instructed in all the details of their work. The Mongols are not miners. During the last two seasons there has been a lack of rainfall and snow, causing a scarcity of water for mining. Victor von Grot is manager.

CANADA.

ALBERTA.

The International Coal & Coke Co., controlled by the Granby mining interests of Grand Forks, B. C., are planning for a plant capable of producing an output of 2000 tons daily of coal from their mines at Blairmore.

ONTARIO.

To operate the McRae mine at Minnehaha lake, near Wabigoon, owned by B. J. Morningstar, of Buffalo, N. Y., the Fechter M. Co. has been incorporated, with L. Fechter, of Buffalo, N. Y., as president. Development has shown a vein 6 feet wide, carrying free gold.——At the Jubilee mine, the machinery is in place and operations resumed. The shaft will be sunk.——The Big Master stamp mill is running steadily. The hoist which is being set up will be effective to depth of 1000 feet. Concentrates are being shipped to the smelter.——At the Twentieth Century mine twenty stamps are dropping steadily on quartz from the raise between the third and second levels, where the vein is 10 feet wide. Owing to the water supply from the creek proving insufficient, other arrangements are being made.

The Sultana gold mine, near Rat Portage has been unwatered, using a 3-ton bailing skip, making fifty trips per hour.

On HW 43, near Wabigoon, being operated by the Escanaba Co., considerable preliminary work has been done. A working shaft will be sunk.

A prospecting drill has been put to work on the Twentieth Century M. Co. ground, in Manitou district, near Beaudro's Landing.

GERMANY.

The annual report of the Oppeln Chamber of Commerce says the average wages of coal miners over sixteen years of age in Silesia fell from 1029 7 marks ($245 14) in 1902 to 972 1 marks ($231 33) in 1903. This includes all classes from the apprentice to the skilled laborer. There was a reduction of wages in the years 1892 and 1893. Comparisons will show an increase, however, of 66% in the last fifteen years. While in 1899 the average of $218.25 was set over against each workman above sixteen years of age, the actual amount paid to miners in a certain section of Silesia was $278 22. The helpers of various kind were paid as follows: Drivers, $173 50; carpenters, etc., $236.57; general help in the mines, $166 32; top men, $172 55. The wages paid to the miners who pick out the coal is in many cases more than 1200 marks ($285.60); and in a few, 1500 and 1600 marks ($357 and $380.80).

MEXICO.

AGUAS CALIENTES

The smelters at Aguas Calientes are treating 1500 tons of ore per day. Five of the furnaces are devoted to treatment of copper ore and three to lead.

CHIHUAHUA.

G. B Jacobs of Chihuahua reports having secured options on a group of silver and gold properties in Los Otates section in western Chihuahua and southwest of Ocampo.

Work is progressing on the Encinillas M. Co.'s smelter at Santa Rosalia and is expected to be ready this month. The company is planning to put up additional furnaces as a customs plant in connection with the 80-ton plant, which will be used for the treatment of the Encinillas ores.

COAHUILA.

The Mexican Coal & Coke Co., E. Ludlow manager, reports making a contract to furnish 22,000 tons of coke to Smelter No. 3 at Monterey from the Las Esperanzas coal mines in northern Coahuila. The vein is 8 feet thick and they are producing 2000 tons per day.

DURANGO.

Operations have resumed on the Trinidad mine at Cuensame. The principal values are in silver, with some gold.

At Tacitita, a free-milling gold camp, Manager Rawlings says they have a 10-stamp mill and a small cyanide plant in operation. The principal part of the ore comes from the Socavon group. There are 5000 feet of tunneling. The ores are brought to the mill by gravity tramway, the mill being operated by water power. The company has denounced a number of old dumps on mines at one time operated by the Spaniards and will build a 75-stamp mill to treat them, which will also be operated by water power.

GUANAJUATO.

Arrangements are made for driving a drainage tunnel in Guanajuato mining district. The La Luz Drainage and Transportation Co. has been organized at Guanajuato to carry out the enterprise, which involves the construction of tunnels several miles long at a depth of 400 feet below the lowest workings of the flooded mines.

GUERRERO.

J. G. Tucker is reported to have bought the quicksilver mines of Huitzuco, being La Cruz y Annexas group, covering 568 pertenencias and thirteen mines, three of them producers. The main shaft is down 800 feet, with five drifts to distance of 150 feet. He claims the value of the property lies in the large low-grade deposits, although occasional pockets of rich ore are found. The mines are equipped with a smelting plant of six furnaces, together with condensers. A gravity tramway connects the mine with the smelter. Water is plentiful. The mines are 20 miles from the railroad station of Iguala.

JALISCO.

A St. Paul, Minn., company has bought a three-fourths interest in the Altamira group of seven properties of 64 pertenencias, near Etzatlan, and will begin work as soon as air drills and other machinery arrive at the mine.—— Douglas, Lacey & Co. are reported to have started work last week on the Buena Ventura, Veta Grande, Fenix, San Salvador and Iguana mines adjoining the Santa Domingo mine, near Etzatlan. The mines are of silver and gold.

A Fort Worth, Texas, company has started work on the gold, silver and copper mines of La Cruz, Dos Amigos, El Cobre and Texas mines, 15 miles west of Etzatlan, which they have under option.

MEXICO.

The Mexican Light & Power Co., Ltd. (the Canadian Co), putting in an 80,000 H. P. electric plant at Necaxa, Puebla, to furnish power for the City of Mexico, has announced its intention to put power into El Oro mining camp for use in the mines, says the Chihuahua Enterprise. Work for the first installation of 40,000 H. P. is being rushed. For this three tunnels have to be constructed. Three towns located in the reservoir site are being bought up so as to remove them.

The Victoria mine at El Oro is preparing to increase its development equipment, including heavier hoist and pumps. The shaft is down 360 feet, with the first crosscut run from the 300-foot point. Drifts are being run both north and south.

MICHOACAN.

A. E. Abbott, interested in the Agostitlan coal fields, says the Southwestern Michoacan Exp. Coal Co. has been organized to exploit the coal measures. His company has a 5-foot body of lignite coal. A railroad 44 kilometers long from Irembo on the Michoacan Pacific road to Agostitlan is to be built and the work started this fall.

OAXACA.

The Esmeralda M. Co. has been organized in Delaware to exploit a group of gold mines in Oaxaca, with principal offices at Wilmington, Del., with W. R. and J. T. Wallace, O. G. Noble and C. T. Downham as officers.

A strike of high-grade gold ore is reported made near Ejutla. A number of prospectors have gone in there.

SAN LUIS POTOSI.

R. Ipina, having bought the hacienda of San Miguel, near San Pedro camp, proposes to establish a smelter there. San Pedro is 15 miles from San Luis Potosi, and the ores carry gold and silver. The camp is producing 4000 tons of ore monthly.

One of the features of San Luis Potosi camp is the cyanide plants which are working over the old dumps which were left as waste by the Spaniards, says the Mexican Investor. Ardilla & Co. own a number of tailings dumps, amounting to about 250,000 tons, and they are working them in two separate plants, treating fifty tons daily in one and thirty in the other. F. Eschauzier & Bros. are also cyaniding dumps. They have a large tonnage and two plants with a capacity of fifteen and eleven tons per day, respectively.

SONORA.

The Ventana mine has been bought by H. Smith, manager of the Palimentas mine, for Philadelphia, Pa., men. The property is 4 miles from the Palimentas mine, on the Bato river, in Pilares de Terres district. It has a vein averaging 6 feet wide, containing gold, silver and copper values. The vein is defined between porphyry and lime.

The Anglo-American G. & C. M. Co. will increase development work on the Enriquita mine, and ore shipments will be started from their Garciala. The Enriquita is 4 miles south of Cananea, and the Garciala 25 miles south.

The Ures Con. M. Co. within the past two years has been developing its mines, 1½ miles from El Gavilan on the Sonora river. On the Eureka & Ramona development has opened ore with average value of $10 per ton. The equipment consists of a 10-stamp mill, friction hoist, three water tanks of 5000 gallons capacity each, etc. The mill will be started Sept. 1st.

The Santa Ana M., M. & S. Co. has been incorporated to work in Sahuaripa district, near the Bufa mines. Their holdings include four groups which aggregate 50 pertenencias of ground—Las Verdes Bufa, La Plomosa de Santa Ana, La Plomosa de Guadalupe and Las Gatitas. E. Kingae is president and manager, Z. T. Rawson, vice-president and superintendent. Developments will be started.

The Yaqui River C Co. has closed down work in its mines at Campo Santo Nino.

The Sierra Madre M. Co. has been incorporated at Douglas, Ariz., by A. J. King, manager, with O. C. Kennedy and D. S. Smith. Their holdings are 7 miles from the El Tigre mine and 5 miles from Pilares de Teras, in Moctezuma district.

ZACATECAS.

The Mazaprel Copper Co. at Conception del Oro continues regular operations. The mine has a deposit of lead and copper ore. The reduction plant consists of copper furnaces, four lead furnaces, and a Bessemer plant for refining the copper. In addition the company owns a railroad 150 kilometers long, running from Saltillo to Conception del Oro. From the mine to the plant are 20 kilometers of overhead tramway. W. Purcell is president and J. Lynch is manager. The company has 4000 men at work.

PERSONAL.

M. J. BRIDE of Nome, Alaska, is in San Francisco, Cal.

W. B. PITTMAN of Tonopah, Nev., is in San Francisco, Cal.

R. R. SWAIN has returned to El Paso, Tex., from Denver, Colo.

F. KLEPETKO has returned to New York from Parral, Mexico.

B. LAYTON is manager of the Sullivan mines near Fort Steele, B. C.

PHILLIP ARGALL has returned to Denver, Colo., from New York City.

L. HERFOOT of Chihuahua, Mexico, is in New York on mining business.

R. W. CLOUD is superintendent of the Merced mine, near Randsburg, Cal.

F. W. MEDBURY is manager of the Reliance M. Co., near Deadwood, S. D.

J. B. FARISH, E. M., has returned to Denver, Colo., from San Francisco, Cal.

A. MORRISON is superintendent of the Noonday copper mine, near El Dorado, Cal.

G. MAINHART of Grass Valley, Cal., is in San Francisco, Cal., on mining business.

G. SALMON is superintendent of the North Star mine and mill, near Custer, S. D.

H. W. NELSON has resigned as superintendent of the Alpine mine, near Sumpter, Or.

H. BRATNOBER, interested in Alaska mines, returned to San Francisco, Cal., last week.

B. F. GRAHAM, of Bisbee, Ariz., of the Copper Queen M. Co., is in the East on business.

F. A. JONES will have charge of the New Mexican mining exhibit at St. Louis, Mo.

W. MAGUIRE of Dutch Flat, Cal., interested in Placer county mines, is in San Francisco, Cal.

JAMES A. MCCLURG has returned to Denver, Colo., from an extended trip through Europe.

W. L. CRAWFORD, interested in Mexican mines, is in San Francisco, Cal., from Tuxpan, Mexico.

W. T. MCGREGOR is mine manager for the Premier Special Claim at Waiorongomai, New Zealand.

B. F. FLEINER, superintendent of the Blaine mine in Tooele county, Utah, is in Leavenworth, Kansas.

H. KEY has resigned as superintendent of the Adventure mill at Edgemere, Houghton county, Mich.

GEORGE ROSS, master mechanic of the United Verde Copper Co. of Jerome, Ariz., is in San Francisco, Cal.

J. PROSSER is superintendent of the Paparoa coal mine at Coromandel, in Hauraki district, New Zealand.

A. J. NOYES, manager of the Ajax G. M. Co., returned to Dillon, Mont., last week from a business trip East.

HENRY STEWART, manager of the S. S. Machinery Co., Denver, Colo., is in San Francisco, Cal., on business.

MANAGER D J. JACKLING of the Utah C. Co. is in Colorado Springs, Colo., on business, from Salt Lake City, Utah.

N. PIKE is superintendent of the Wautauga mine of the Old Town Con M. Co., near Russell Gulch, Gilpin county, Colo.

J. F. BOYD of Carthage, Mo., is superintendent of the Oliver Lease Prospecting Co. mines, near Zinclte, Jasper county, Mo.

G. J. MCCARTY of the Crestone-Colorado mines in Sonora, Mexico, has returned there from a trip to San Francisco, Cal.

J. PIPER, of Ishpeming, Mich., of the Negaunee mine, is superintendent of the mines of the Mitchell Dev. Co., near Bisbee, Ariz.

E P. LAW of Honolulu, and having mining interests in Nevada, will represent Hawaii at the Mining Congress at Deadwood, S. D.

J. H. ROBESON, of Georgetown, Colo., is visiting mines in which he is interested, in Bradshaw mountains, southeast of Prescott, Ariz.

R. C. DUNSTAN is superintendent of the mill of the Adventure Con. C. Co. at Edgmere, Houghton county, Mich., vice H. Key, resigned.

E. S. TOPPING, formerly of British Columbia, interested in Baker county, Or., mines, has established his headquarters at Sumpter, Or.

T. H OXNAM, manager of the Palmarejo & Mexican Gold Fields, Ltd., is at their mines at Chinipas, Chihuahua, Mexico, from Los Angeles, Cal.

C. A. CUNNINGHAM of Guthrie, Oklaboma Territory, secretary of the Endless Chain M. Co., is at their mines near Patagonia, Santa Cruz county, Ariz.

E. C. BANKS, chief chemist of the Waihi G. M. Co. of Waihi, New Zealand, is at Deadwood, S. D, investigating the cyanide practice of the Black Hills.

F. W. OLDFIELD, recently of the Palmarejo and Mexican Gold Fields Co., has gone to Ecuador, as assistant manager of the South American Dev. Co. at Zaruma.

J. F. HYDE has been appointed Professor of Economic Geology and Mining at the State University at Eugene, Or., as it is intended to build up a department of mining there.

W. HUTCHINSON, formerly superintendent of the Tomboy mine, near Telluride, Colo., has been appointed superin-

tendent of the H. M. H. group, in the same district.

A. E. WELBY returned last week to San Francisco, Cal., from a year's stay in Peru, where he superintended construction of a railroad for the J. B. Haggin mining interests.

P. REARDEN, formerly superintendent of the Kurtz Chatterton mine at Grand Encampment, Wyo, is superintendent of the Alpine mine, near Sumpter, Or., vice H. W. Nelson, resigned.

New Patents.

DEWEY, STRONG & CO.'s SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR WEEK ENDING SEPT 1, 1903.

737,812.—EVAPORATING APPARATUS—W. C. Anderson, San Jose, Cal.
737,893.—NUT LOCK—A. D. Asdell, Lakeview, Or.
737,896.—POWER TRANSMITTER—P. W. Bettinger, San Jose, Cal.
737,822.—PRINTING ATTACHMENT FOR ROLL PAPER HOLDERS—R. E. Brunacci, S. F.
737,822.—TROLLEY WHEEL—E. S. Cobb, Los Angeles, Cal
737,709.—CAR BUMPER—T. Collins, San Jose, Cal.
738,002.—PINE NEEDLE MATTRESS—Mathilde R. Corda, S. F.
737,823.—CLOTHES HANGER—Carrie F. Cox, Los Angeles, Cal
737,830.—HOIST—Duryea & White, Los Angeles, Cal.
737,897.—BUCKLE—H. S. Englebright, North Ysmbill, Or.
737,725.—BICYCLE MUD GUARD—H. Fesenfeld, Hoquiam, Wash.
737,832.—BEVELING MACHINE—C. Finnegan, Fairhaven, Wash.
737,607.—FRUIT TRAY—J. H. Gunby, Chico, Cal.
737,924.—WINDOW CLEANING CHAIR—J. H. Hanavan S. F.
737,736.—MATCH SAFE—W. A. Harmon, Skagway, Alaska.
737,515.—FRUIT CUTTER—O. Harpold, Santa Paula, Cal.
737,833.—MOWING MACHINE—A. T. Haynes, Wheatland, Cal.
737,622.—VEHICLE BRACE—P. Hebert, Hazeldell, Or.
737,928.—PUMP—N. A. Heyman, Los Angeles, Cal.
737,737.—GAS ENGINE—C F Hitchcock, S. F.
737,738.—VAPOR GENERATOR—C. F. Hitchcock, S. F.
738,038.—STOVEPIPE FASTENER—R. H. Hodge, Centrapoint, Or.
737,841.—TILE MACHINE—W. A. Houts, S. F.
737,842.—BRICK MACHINE—W. A. Houts, S. F.
737,843.—TILE MACHINE—W. A. Houts, S. F.
737,743.—BED AND SOFA—L Kragen, S. F.
737,747.—GAS GENERATOR—J. Kuijis, Portland, Or.
738,115.—ENGINE VALVE—C. E. H. Lincoln, Douglas, Ariz.
737,756.—STILL—W. Maybury, Los Angeles, Cal.
737,757.—TOY—S. E. Miller, Crockett, Cal.
737,760.—OIL BURNER—A. Moorefield, Stockton, Cal.
737,765.—GRUBBING MACHINE—G. Olsen, Port Blakeley, Wash.
737,769.—FASTENER—L C. Preston, Weaton, Or.
737,966.—CANDLE HOLDER—Pauline Rummelin, Portland, Or.
738,129.—PACKING—E. W. Tucker, S F.
737 886.—CIRCULATOR—J. P Urbanek, York, Wash.
738,130.—COMBINATION TOOL—A. A. Waymire, Woods, Or.
737,8 5.—TABLE—C E. Wehn, Los Angeles, Cal.
737,981.—BELT SHIFTER—J Welchhart, S. F.

Notice of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

TILE MAKING MACHINE.—No. 737,841. Sept. 1, 1903. W. A. Houts, Oakland, Cal. The object of this invention is to provide a suitable machine for the manufacture of pipe or tiling from compositions containing asphaltum or such materials as are rendered plastic by heat and have the quality of setting into a hard resistant mass when cooled. The invention comprises a mold, means for feeding material to the mold, means, including a plunger core, for compressing the material therein, and rings engaging the core to free the tile from the mold and core.

BRICK MAKING MACHINE.—No. 737,842. Sept. 1, 1903. W. A. Houts, Oakland, Cal. This invention relates to improvements in machines for pressing and molding bricks and the like. The object is to provide a continuously operating means for forming bricks from compositions which have the quality of becoming plastic on the application of heat and of setting into a hard cohesive mass when cooled.

TILE MAKING MACHINE.—No. 737,843. Sept. 1, 1903. W. A. Houts, Oakland, Cal. This invention relates to improvements in machines for manufacturing drain tiles, conduit sections and the like. Its object is particularly to provide an apparatus suitable for the manufacture of pipe or tiling from compositions containing asphaltum, sand and the like.

EVAPORATING APPARATUS.—No. 737,812. Sept. 1, 1903. W. C. Anderson, San Jose, Cal. Assigned to Anderson-Barngrover Mfg. Co., of San Jose, Cal., a corporation, of California. This invention is especially applicable to the evaporation of fruits of all kinds. It consists in the construction of a furnace and drying tunnels disposed in independent longitudinal channels, each adapted to receive a line of drying trays, and in a means for regulating the application of heat, so that an approximately even division of the heat may be made and constantly directed through each of the drying tunnels.

PRINTING ATTACHMENTS FOR ROLL PAPER HOLDERS.—No. 737,822. Sept. 1, 1903. R. E. Brunacci, San Francisco, Cal. Half assigned to Barone Carlo Sobrero, of same place. This invention relates to improvements in devices that are intended to be attached to a wrapping paper roll support or rack and which devices are adapted to print the name or an advertisement or other matter upon the wrapping sheet as it is unwound. Its object is to provide a simple compact printing and advertising machine adapted to receive printing and inking rollers of different diameters and lengths and having various tension devices for adjusting it to to the several rolls and to the paper roll as the latter is diminished.

Commercial Paragraphs.

THE Redfield Drill Co., Denver, Colo., report the sale of two of their hand drills for Australia; also one to W. L. Murphy, Keller, Wash., and one to W. D. Wilcox, Glendale, Or.

THE following orders are reported received by the Mine and Smelter Supply Co. of Denver, Colo: One eight-drill Cincinnati duplex air compressor for Boulder, Colo.; one 350 H. P. Babcock & Wilcox boiler for Cripple Creek, Colo.; four Wilfley tables and two Wilfley slime tables for the Beaver Creek M. Co. of Oregon; nineteen Wilfley tables for the Federal Lead Co. of Missouri.

IN the case brought by the Wilfley Ore Concentrator Syndicate, Ltd., against the Central Cookman's G. M. Co., the Victoria, Aust., Chief Justice has granted an order restraining the defendants from making or using any concentrating table constructed in accordance with the Wilfley specifications or in colorable imitation thereof during the continuance of the patent. The concentrator to which exception was taken by the plaintiff company is reported to have been manufactured for the defendants by a South Australian firm.

THE American Concentrator Co., of Joplin, Mo, state that among recent shipments made by them are the following: New Century jigs, rolls and ore feeders to the Missouri Copper Mt M. Co, Sullivan, Mo., and to the Holston Zinc Co., Mascot, Tenn.; New Century jigs to the Tybo M. & Reduction Co, Tyho, Nev.; Whitepine M. Co., Sargents, Colo., and to the Holthoff Machinery Co., for the Old Dominion C. M. & S. Co, of Globe, Ariz. Eight coal washing jigs for jigging anthracite coal were sent to the Delaware & Hudson Co., to be used in their Plymouth No. 2, Carbondale and Wilkesbarre breakers, they having decided to adopt these machines after trial of one of them at their Plymouth No. 2 breaker where a high grade of chestnut coal is being removed from the material formerly rejected to the culmbank.

Obituary.

W. B. WINN, editor and proprietor of the Pacific Oil Reporter, of San Francisco, Cal., died on the 9th inst, at Berkeley, Cal, the cause of death being inflammation of the ear drum, which affected the brain. Deceased was 45 years old and a graduate of Brown University. He is survived by a widow and four children.

Latest Market Reports.

SAN FRANCISCO, September 11, 1903.

METALS.

SILVER.—Per oz., Troy: London, 26⅝d (standard ounce, 925 fine); New York, bar silver, 57¼c, refined (1000 fine); San Francisco, 57¼c; Mexican dollars, 45¼c San Francisco, 45½c New York.

Silver is still at a fair price, and, according to the statement of Geo. E. Roberts, director of the U. S. Mint at Washington, D. C, made in his address before the American Mining Congress at Deadwood, S. D., it has seen its worst days, and in his opinion it will soon reach and maintain a stable standard of value.

COPPER.—New York: Standard, $13.75; Lake, 1 to 3 casks, $13.75@13 87½; Electrolytic, 1 to 3 casks, $13.62½@13.75; Casting, 1 to 3 casks, $13.37½; San Francisco: $15.00. Mill copper plates, $17.00; bars, 18@24c. London: £57 7s 6d spot per ton.

LEAD.—New York, $4.35; Salt Lake City, $3.50; St. Louis, $4.00; San Francisco $4.50, carload lots; 4¾c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5½c; pig, $4.75. London: £11 3s 6d per long ton.

SPELTER.—New York, $6.00; St. Louis, $5.00; London, £21 2s 6d per ton; San Francisco, ton lots, 6¼c; 100-lb lots, 7c

TIN.—New York, pig, $26.85; San Francisco, ton lots, 28½c; 500 lbs., 29c; 200 lbs., 29½c; less, 30c; bar tin, ℔ lb, 30c @32c. London, £122 spot.

PLATINUM.—San Francisco, crude, $18.00 ℔ oz.; New York, ingot, $19.00 per Troy oz Platinum ware, 75@80c per gram.

QUICKSILVER.—New York, $47.00@47.50; large lots; London, £8 12s; San Francisco, local, $44.50 ℔ flask of 76½ lbs.; Denver, $49.50. Export, $43.00.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

SOLDER.—Half-and-half, 100-lb. lots 18.75c; San Francisco, Plumbers', 100-lb. lots, 15 50c.

NICKEL.—New York, 50@60c ℔ lb.; ton lots, 45@48c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, $17 85 @18 85; gray forge, $15 60; San Francisco, bar, 3c ℔ lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $27 00@29.00; open hearth billets, $28.00 @30 00; San Francisco, bar, 7c to 12c per lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer	$18 00@19.00
Foundry Northern 1	17.50@18.00
Northern 2	17.00@17.50
Northern 3	16 50@17.00
Southern 1	16.35@ ——
Southern 2	15 85@ ——
Southern 3	15.35@ ——
Forge	14 85@ ——
Charcoal	20 50@21.00
Billets, Bessemer	28 00@29.00
Bars, iron	1 55@ ——
Bars, steel	1.75@ 1.80
Rails, standard	28.00@30 00
Rails, light	34 00@40.00
Plates, boiler	1.90@ 2.00
Tank	1.75@ 1.80
Sheets, 26 store	2.90@ 3 00
No. 27	2 90@ 3.00
No. 28	3 00@ 3.10
Angles	1.75@ ——
Beams	1.75@ ——
Tees	1.80@ ——
Zees	1.75@ ——
Cbanneis	1.75@ ——
Steel melting scrap	14.50@15 50
Relaying rails	28 00@30 00
Dealers forge	12 50@13.50
No. 1 railroad wrought	14 50@15.00
No. 1 cast, net ton	14 00@14 50
Iron rails	19 00@20.00
Car wheels	19 00@20.00
Cast borings	5 50@ 6 50
Turnings	11.00@11.50

LUMBER.—(Retail): Pine, ordinary sizes, $24.00@25 00; extra sizes bigher. redwood, $28.00@30.00; lath, 4 feet, $4.50 @5.00; pickets, $21.00; shingles, $2.50 for No. 1 and $2.25 for No. 2; shakes, $13.50 for split and $15.00 for sawed; rustic, $28 00 @35.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, $3.35; Cut, $3.55; 10d to 16d, Wire, $3.45; Cut, $3.35; 8d, Wire, $3.50; Cut, $3.50; 6d and 7d, Wire, $3.60; Cut, $3.60; 4d and 5d, Wire, $3.70; Cut, $3.70; 3d, Wire, $3.85; Cut, $3.85; 2d, Wire, $4.10; Cut, $4.10. Special rates for carload lots.

LIME.—Santa Cruz, $2.35; Roche Harbor, $2.35 per bbl.

CEMENT.—Imported, $2 50@2 75 ℔ bbl; California carload lots, $2 25 f. o. b. at works; small lots, $2.50 ℔ bbl. in sacks, 4 sacks to bbl.

GENERAL SUPPLIES.

POWDER.—F. o. b. San Francisco: No 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11c ℔ set: 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 23@24c ℔ lb.; carloads, 23@23½c; in tins, 30c; soda ash, $1.95 ℔ 100 lbs.; hyposulphite of soda, 2½@2½c ℔ lb.; caustic soda, in drums, 3@3¼c ℔ lb; Cal. s. soda, hhls., $1.20@1.40 ℔ 100 lbs.; sks., $1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb tins; roll sulphur, 4@5c; powdered sulphur, 2@3c; flour sulphur, French, 2@3c; alum, $2.00@2.25; California refined, 2@2½c; sulphide of iron, 8c ℔ lb; copper sulphate, 5@6c; chloride of lime, spot, $2 50@2.75; sulphuric acid, in carboys, 66% B, 2½o ℔ lb.; nitric acid, in carboys, 8c ℔ lb.

OILS.—Linseed, boiled, bbl., 44c; cs., 49c; raw, bbl., 42c; cs., 47c; Lucol oil, boiled, bbl., 41c; cs, 46c; raw, bbl., 39c; cs, 44c. Kerosene—Pearl, per gal., 20½c; Astral, 20½c; Star, 20½c; Extra Star, 24½c; Eocene, 23½c; Elaine, 26½c; Water White, in bulk, 14½c; Mineral Seal, iron bhls., 18½c; wooden bhls., 21c; cs, 24c; Mineral Sperm, cs, 26½c; Deodorized Stove Gasoline, bulk, 17c; do., cs., 23½c; 86° Gasoline, bulk, 21c; do., cs., 27½c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 16c; do., in cs., 22½ c; Lard Oil, E. W. S., bbl., $1.00; cs., $1.05; Neats-foot Oil, pure, bbl., 75c; cs., 80c; Sperm, crude, 70@60c; Natural White, 65c; Bleached do, 50c; Whale Oil, cs, 50@55c.

COAL.—San Francisco, coast, yard prices: Wellington, $8.00; Seattle, $6.50; Coos Bay, $5.50; Southfield, $8.00. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymho, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $13; Cannel, $8.50; Welsh Anthracite, $13.00; Rock Springs, $8.50, long ton; Colorado Anthracite, $14.00. Coke, $10.50 per ton in bulk, $13 in sacks; Sunnyside, $8.50, long ton.

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6c; less than 500 lbs., per lb., 6½c; in 25-lb. tin palls, ½c per lb. above keg price; in 1 and 5 lb. tin cans, 100 lbs. per case, ½c per lb. above keg price. Dry Lead—In bbls., 1 ton and over, 6c; do. in kegs, 6½c.

BONE ASH.—Extra No. 1, 5@6c per lb. No. 1, 4@5c.

RED LEAD.—500 lbs. and over at one purchase, per lb., 6c; less than 500 lbs., 6½c.

LITHARGE.—Pure, in 25-lb. bags, 8 @9c per lb.

BORAX.—Concentrated, 6@7c per lb powdered, 8@10c; fused, 20@25c.

BORAX.—Crystal, 7c; calcined, 25o.

MANGANESE.—Pure, ℔ lb., 60o.

SODIUM.—Metal, ℔ lb., $1.00.

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BISMUTH.—Subnitrate, per lb., $1.75.

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PHOSPHORUS.—(American) ℔ lb., 75c.

SILVER.—Chloride, ℔ oz., 90c@$1.00; nitrate. 55c.

ALUMINUM.—No. 1, 99%, small lots, 37c ℔ lb.; 100 lbs., 35c; 1000 lbs., 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

URANIUM.—Oxide, ℔ lb., $3.50.

ZINC.—Metallic, chemically pure, ℔ lb., 50c; dust, ℔ lb., 10c; sulphate, ℔ lb., .04c.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

SITUATIONS WANTED.

A THOROUGHLY COMPETENT ASSAYER and Analyst, 15 years' experience, with a good practical knowledge of mining, milling and smelting, is open for engagement, with chance for advancement. Excellent references. Address "Everett" care of this office.

MILL FOREMAN WANTS POSITION—Concentration, amalgamation, cyaniding and assaying; 20 years' experience. Best of references. Address "Millman," 1055 South Gaylord St., Denver, Colo.

MINE SUPERINTENDENT WANTS POSITION with a substantial company that has a mill on property. A qualified mining engineer who can run a mine or mill, cyanide plant, assaying and surveying. Address "Mining," this office.

POSITION BY PRACTICAL MINING ENGINEER; 20 years' experience in U. S., Alaska and Mexico. Reference Al. Specialty, commercial mining. Address W., care of this office.

POSITION DESIRED AS DRAUGHTSMAN, Surveyor, Assayer or Bookkeeper. Good references. Address H.W.K., Box 74, Long Beach, Wash.

WANTED BY AN EXPERIENCED MINING Engineer and Manager, a position as mine manager in gold, silver or copper proposition, with a first-class corporation. Have had 35 years' experience in U S and Mexico; prefer Mexico. Speak Spanish, German, French and English. Am well acquainted with Mexico, and am employed now. Desire a change between November and January 1st, 1904. Salary expect d not less than $5000 per annum. Can furnish the best of reference. Address "Mine Manager," care of Mining and Scientific Press, San Francisco, Cal.

WANTED—POSITION WITH SOME MINING and milling company desiring an electrical and mechanic familiar with all leading electrical machinery and having experience with hydraulic plants, engines, boilers, compressors and milling plants. Will be pleased to correspond with interested parties. Address "Mechanic," care of Mining and Scientific Press.

WANTED—POSITION BY A MINE SUPT. OR manager of 30 years' experience in practical mining and milling; past 17 years spent in superintending, managing and examining mines. Profitable handling of low grade ores a specialty. Climate no object. Reference from first-class companies. Address "Utility," this office.

THE CALIFORNIA DEBRIS COMMISSION having received applications to mine by hydraulic process from C A Posge, in Phelps Hill Mine, near Washington, Nevada County, Cal., draining into Jefferson Creek which reaches South Yuba River; from Plumas Minea Co, in Plumas Mines, near Quincy, Plumas County, Cal., draining into Squirrel Creek which reaches North Fork of Feather River; from Excelsior Hydraulic Mining Co., in Excelsior Mine, near Lowell Hill, Nevada County, Cal, draining into North Fork Steep Hollow Creek which reaches Feather River, gives notice that a meeting will be held at Room 96 Flood Building, San Francisco, Cal., Sept. 28, 1903, at 1:30 P. M.

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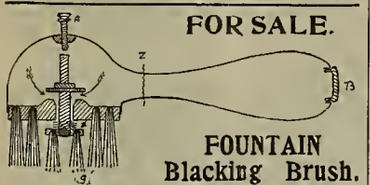
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With no pressure on bristles the small brush is kept in position shown by dotted lines F, by the spring X. With pressure on bristles, as by rubbing, the small brush is raised to position shown in cut, opening the valve and allowing the blacking to flow onto the bristles as indicated by arrows. Thumb screw J securely locks valve, making brush absolutely tight. Bottle in which liquid blacking is sold can be made to fasten on brush at line Z and serve as a handle.

Pat. in U. S. and abroad. For sale separately or as a whole. For particulars, address E. R KING, Lafayette, Contra Costa Co., Cal.

NOTICE

of Receiver's Sale of the Electric Plant, Apparatus, and Other Property of the Cochiti Gold Mining Company.

Notice is hereby given that the Receiver, by appointment of the District Court of the Second Judicial District of the Territory of New Mexico, for the County of Bernalillo, in that certain cause pending therein wherein Raymond P. Ripley and others are defendants, will, under and by virtue of an order of said court made August 20, 1903, receive bids for the purchase and sale of all the property of the said Cochiti Gold Mining Company, now in his possession as such receiver. Said property consists of a complete cyanide mill of two hundred and fifty tons capacity, built of structural iron, various other buildings such as stores, boarding house, store house, hunk houses, etc., etc. The machinery consists of dry crushing apparatus, Davis and Allis finishing rolls, twenty steel leaching tanks of two hundred and one hundred and thirty tons capacity; also sixteen thousand dollars worth of mining and mill supplies; office furniture, etc. And also, situated at Madrid, N. M., an electric power plant and structural steel building, one eight hundred horse power engine, one 600 K. W. generator, complete switches, etc., etc., for a twenty-thousand-volt transmission, and other property such as is generally used in connection with such a mill run by electricity, including one hundred miles of copper transmission wire.

Also the Albemarle, Pamlico, Huron, Ontario patented mining properties, and the U. M. C. and three-fourths interest in the Red Cloud, containing in all almost one hundred acres and having five thousand feet on the strike of the vein. These mines and the mills are situated at Albemarle, Sandoval County, New Mexico, twenty-four miles from Thornton on the A. T. & S. F. Ry.—the other property at Madrid on said railway.

Bids will be received by the undersigned for the sale of said property, or any part thereof, for sixty days from the date of this notice. For the Madrid power plant property, and the electrical machinery, bids must be itemized, fixing the price to be paid upon each separate article; and, also, separate bids must be submitted for the wire, on account of conflicting interests in the property. The buildings and other property may be removed by purchasers from the premises on which they are located.

A reasonable deposit, certified check or cash, must accompany each bid as a guaranty of good faith and responsibility.

Lists of the property and all other information requested will be furnished upon application to the Receiver. WILLIAM SPENCER, Receiver.

P. O. Address: Albuquerque, New Mexico.
August 21, 1903.

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WANTED—A First-Class Assayer and Chemist,

with extended cyanide experience, for position of Assayer and Chemist with large gold mining company, with cyanide plant. Must have best of references. State age, experience and salary wanted. Address "Chemist," care of Mining and Scientific Press.

WANTED.

A Double Drum First Motion Hoist Engine, not less than 16x32 or greater than 20x40; capable of sinking 1500 feet or more Round rope preferred. Capping stone and all connections required, including sheaves. All must be in first-class condition. Name lowest price f. o. b. cars. Address PITTSBURGH & MONTANA COPPER CO., Lock Box No. 1098, Butte, Montana.

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ASSESSMENT NOTICE.

INYO MARBLE COMPANY OF CALIFORNIA.—Location of principal place of business, San Francisco, California; location of works, Inyo, Inyo County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 18th day of August, 1903, an assessment (No. 37) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 30, fifth floor, Mills Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of October, 1903, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 18th day of November, 1903, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES E. ANDERSON, Secretary.

Office—Room 30, fifth floor, Mills Building, San Francisco, California.

ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the Golden West Consolidated Mining Company will be held at the office of the company, at Iowa Hill, Placer County, California, on Saturday, the 26th day of September, 1903, at the hour of 9 o'clock A. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the meeting. E. M. ARMSTRONG, Secretary.
Office—Woodland, Cal.

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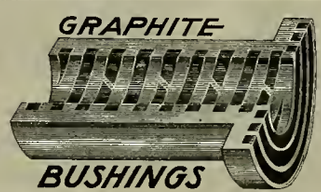
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spending the balance on underground work and develop bonanzas.

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THE STRONG MINE,

in Cripple Creek district, was among the first prominent mines discovered. Mr. F. E. Kearney became interested in it shortly after its discovery, bought a "Common Sense Steel Whim" and put the shaft down 150 feet, opened up a small body of ore which gave the mine its start, and today it is worth $1,500,000.

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MINING AND SCIENTIFIC PRESS

Whole No. 2252.—VOLUME LXXXVII. Number 12. SAN FRANCISCO, CAL., SATURDAY, SEPTEMBER 19, 1903. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Working Costs.

It has been said "anybody can run a mine," and this is true, but there is a very important factor in the manner in which a mine is run—the personal equation is a very large and extremely variable one. There are scores of instances where business men—by which is meant men who have made a success of business along commercial lines, usually merchandising, and professional men (not mining engineers) and others with neither college nor business training who with perfect confidence in themselves—a confidence born of success in other lines—have undertaken the management of mines, probably having heard that "anybody can run a mine." Of the large number who represent this class very few of them have recorded success during the first years of their mining experience, and where an exception has been found, the mine and not the manager, was responsible, for truly almost any one could have made it pay—such mines are more rare than the individuals who essay to conduct mining operations without experience in the business.

In the direction of mines the question of cost is paramount, whether the mine be large or small, rich or low grade. If the mine pays handsomely the conscientious and capable manager will strive to make it pay more; if it pays a small profit he will endeavor to increase this small gain, if only by a few cents per ton. If the mine fails to pay by a small margin then the manager must work and plan and direct affairs in such a manner as to reduce all costs to the lowest possible figure. He endeavors to increase capacity without greater expense. If the ore requires much handling he schemes to avoid this, and to make the rock travel by gravity as far as possible, from stope to stamp. It may be necessary to make many changes under ground, on the surface and in the mill to accomplish this, but if the tonnage justifies it the changes should be made.

There are many instances of record where a mine in operation returns about the cost of working it, but the management was either inexperienced or too parsimonious to make the needed changes. A new man appointed to the management saw at once where money was being wasted. Needed reforms in the working force were made, necessary changes in the method of mining introduced, the transportation problem was revised and changed for the better, and the mine entered at once upon a career of prosperity which attracted the attention of the mining world to the mine and to the manager.



Forty-Stamp Mill, Baliol Mine, Near Sutter Creek, Cal. (See Page 183)

In one instance a mine was operated through an inclined shaft. The ore was delivered from the skips into a bin in the head frame at the collar of the shaft. From there it was trammed several hundred feet to a chute and dumped. From this chute it was drawn into cars on a lower tramway trammed and dumped a second time into a vertical shaft connecting with a tunnel. Here the ore was reloaded and trammed to the mill, where it was distributed to two rock breakers, requiring the services of two men per shift. The disposition of the breakers and grizzlies was such that when the ore bins were not nearly full it was necessary to put men into the bins to shovel the ore to the doors leading to the feeders—and this was often the case. A new manager was appointed who made many much-needed changes in the arrangement as described. He first put in competent foremen, and in a short time had a far better working force. The rock breakers were removed from the mill and a larger single breaker placed near the shaft to receive the ore from the bin in the head frame. It was then trammed to the vertical chute by an extension of the tramway along the hillside so as to dispense with the trammers on the intermediate section of the tramway. The track leading to the mill was changed from the center of the building at the back to the end so that the cars could enter at that place that the ore might be dumped in the bin wherever desired. These changes cost about $3000. The mill was hung up meantime, but this permitted an opportunity to do development work and to put in much needed raises in order that mining might be more economically conducted. By the changes made four trammers and two breaker men were dispensed with, making a direct saving of nearly $500 per month, beside which shoveling in the mill bins was no longer necessary, and the mill was constantly supplied with ore by reason of new development. The extension of the tunnel on the mill level to the shaft furnished a means of drainage more than 100 feet lower than the collar of the shaft, and also greatly improved the ventilation of the mine. Had this tunnel been properly planned in the first place it could have been made the main adit from the shaft and the rock breaker set below the bins that might have been built near its portal which would have still further improved matters, but the tunnel had been drived in several hundred feet prior to the advent of the new manager.

The above is a bona fide instance where a mine emerged from a non-paying to a profitable enterprise. The accomplishment was not through any secret means, but by the exercise of good judgment—the result of experience and technical training. Any other mining engineer with experience and good sense would probably have made similar changes and have scored a like success.



Hoist and Head Frame, Main Shaft Baliol Mine, Near Sutter Creek, Cal (See Page 183)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION.

United States, Mexico and Canada.....$3 00
All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

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CHICAGO, 1115 Monadnock Block. DENVER, 606 Mack Block.

J. F. HALLORAN..... Publisher

San Francisco, September 19, 1903.

TABLE OF CONTENTS.

	Page.
ILLUSTRATIONS:	
Forty-Stamp Mill, Baliol Mines, Near Sutter Creek, Cal.	179
Hoist and Head Frame, Main Shaft Baliol Mine, Sutter Creek.	179
The Berrigan Separator	184
Sectional View Pyritic or Matting Blast Furnace	184
General Arrangement of Reduction Plant at New Gooh Gold Mines, Witwatersrand, South Africa	186
Mining and Metallurgical Patents	189
EDITORIAL:	
Working Costs	179
"Hobby" of Inexperienced Mine Managers	180
An Untimely Dividend	180
Does Not Eliminate the Risk	180
Two Important Meetings	180
Complication in Nevada Over Whereabouts of Tonopah	180
The Present Labor Situation	180
MINING SUMMARY	190-191-192-193-194
LATEST MARKET REPORTS	195
MISCELLANEOUS:	
Concentrates	181
Raw Copper Prices	182
The American Mining Congress	182
Some Structural Features of the California Gold Belt	183
Gold Fields of the Atlantic Slope	183
Copper Matting Pyritic Smelting	184
New Engines for the Santa Fe Co	184
Berrigan Centrifugal Separator	184
Topographic Map of Part of Southern California	184
To Assist a Severe Electric Shock	184
Notes on the Metallurgy of Copper of Montana	185
Cyanide Treatment of Sands on the Rand	186
Ore Deposits of the Northern Black Hills	187
Pyritic Smelting	188
Mining and Metallurgical Patents	189
Personal	194
Obituary	195
Commercial Paragraphs	195
Catalogues Received	195
New Patents	195
Notices of Recent Patents	195

WITH some inexperienced managers their "hobby" is to keep every man busy, but if this manager does not know what a man is capable of doing or what he should do in a shift's work the men quickly find it out and impose upon him, even in his presence. Under such a man the pay roll usually carries from 10% to 40% too many names, though all are "busy."

AN untimely dividend is often forced from a company's directors in opposition to their judgment and wishes by impatient stockholders, who can not understand why money in the treasury could be better used in insuring or creating conditions that would enable the company to pay bigger and more permanent dividends later on. The best way to prevent dissatisfaction or suspicion is to be frank. Few stockholders will want to adopt a suicidal policy if they can be shown that the best interests of the corporation can be better served by betterment of the company's property than skinning the treasury in an effort to satisfy the unthinking by declaring a dividend out of money that could be well employed in development and improvement.

FLOTATION of bonds on a mining proposition does not eliminate the risk, nor does the new guaranty plan of trust companies "guaranteeing" the mining stock change the speculative feature of any embryo mine development. The value of a prospect is just what its very name implies—prospective—and no amount of cuttle-fish "guarantys" can extract the speculative feature. Fortunately this is almost invariably manifest and constitutes one of the attractions of the game, though in the sometimes sinister effacement of values, the grim reflection forces itself on one's attention that the principal mistake was in not requiring a guaranty for the company that "guaranteed" the prospect. Nothing will ever wholly eliminate the element of risk from development of a prospect, and nothing will so tend to minimize that risk as the exercise of the same common sense and judgment, the same intelligent stick-to-itiveness that makes a success of the development of any business, whether mining, professional, mercantile or manufacturing.

Two Important Meetings.

The American Mining Congress concluded its sixth annual meeting at Deadwood, S. D., on Saturday, the 12th inst. The mining men of the Black Hills did all possible to render the stay of their visitors pleasant and profitable. The meetings were well attended, notwithstanding the stormy weather (there being an early snowfall throughout the Hills during the congress), and the numerous papers will form a valuable feature of the transactions of the Association. Those of a technical or practical character are reproduced in the MINING AND SCIENTIFIC PRESS for the benefit of those who were unable to attend the congress in person.

During the present week the Irrigation Congress is in session at Ogden, Utah. It is one of the most important gatherings of men ever held in the West to discuss the problems of irrigation. It is the more noticeable that a mining man—W. A. Clark of Butte, Mont.—has been chosen president of the congress. The primary object of the congress is to secure a proper disposition and expenditure of the money devoted by the Government to irrigation in the West. There are millions of acres of semi-arid land in the West, a large portion of which would become fertile if supplied with proper irrigation facilities. For several years past the Government has been making investigations along these lines under the auspices of the United States Geological Survey, and a large amount of money has been expended in furtherance of the plans and suggestions of the Government engineers. The irrigation papers and special volumes devoted to hydrography and irrigation form some of the most interesting publications of the Geological Survey. Much has already been accomplished by the Government in the way of conservation of water, and elaborate plans have been prepared for further work in this direction.

The subjects for discussion coming before the congress will be of an important character, and great good can only result. Miners as well as agriculturists are interested in the great water problems—how to perpetuate the average annual rainfall and by what means to care for it. Under existing, though already greatly improved, conditions, there is a tremendous waste of storm waters throughout the West, where the water is most needed, as the more humid climate of States from the Mississippi valley eastward render irrigation unnecessary.

Plans have been, and are still, being devised by the Government engineers looking to the utilization of this wasted water. In the high uplands of the West farms without water are almost worthless, while with it they become valuable property. Mines can not operate without water, excepting in a few instances where the ore is high grade, and even then water can not be dispensed with entirely, and it is often necessary to haul it many miles in tank wagons. This is particularly the case on the deserts of California and Arizona and in the Great Basin region, and often, too, within plain sight of mountain ranges covered with snow, where there is abundance of water, all of which is lost shortly after it flows out on the desert plain. It is to impound this wasted water that the Government has undertaken the task of searching out suitable reservoir sites, and, by making careful stream measurements, to estimate the probable amount of water that may be depended upon in any particular locality.

The conservation of water also contemplates the preservation of the forests, as far as possible, for the general opinion is that if the mountains be denuded of the forests the average of annual rainfall will decrease, and in some sections dwindle to almost nothing. Good authority is responsible for the statement that the removal of large areas of forest trees in some regions has been followed by a marked decrease of rainfall.

AN interesting complication has arisen in Nevada over the whereabouts of Tonopah. For the past three years, it has been generally believed to be in Nye county, though there were those who contended otherwise. About a year ago an engineer was employed by the county of Esmeralda to determine the disputed question and he stated, after a survey, that Tonopah was situated over a mile east of the Esmeralda county line in Nye county. The County Commissioners of Esmeralda county, being still dissatisfied, appealed to the Interior Department at Washington. An engineering corps was sent to Nevada and, after a three months' campaign in the field, it was determined that Tonopah is almost wholly in Esmeralda county, and the business and greater part of the residence section, as well as many of the mines, are in Esmeralda.

The Present Labor Situation.

Throughout the greater part of last summer and up to the present time, from almost every mining State of the West has come weekly the news of strikes, shutdowns, lockouts, and the other features resulting from the attempts of organized labor to enforce its demands for shorter hours, higher wages, "recognition of the union," etc. The situation at this date shows but slight improvement on the whole, though winter is approaching with its rigors, and it will find thousands of miners in the West unprepared, but apparently little thought is given this phase of the situation.

In the Cripple Creek, Colo., district, a few men are at work in several of the mines under military protection, and at the same time the municipal and county officers seem to be endeavoring to handicap the military authorities in every way possible. On the 15th inst., a consignment of Krag-Jorgensen rifles and 60,000 rounds of ammunition were sent into the district by the Government for use of the militia. As the presence of State troops appears obnoxious to some of the citizens, steps are to be taken by some of them to test the power of the militia, getting the case before the Supreme Court as soon as possible. Under the constitution of the State of Colorado, the militia has scant authority, there being very little latitude given the commanding officers, and the power of declaring martial law is denied the Governor of the State. An attempt is being made to secure a large number of miners in the southwest Missouri lead and zinc mines, for the purpose of breaking the strike in the Cripple Creek district. This plan was successfully adopted in 1894 in Leadville. Undoubtedly the advent of Missouri miners into the troublous district about Cripple Creek will be the signal for immediate trouble, unless the militia is sufficiently strong to prevent it; although Missouri miners have heretofore demonstrated their ability to take care of themselves, pretty well.

In the San Juan country, in southwest Colorado, the mining industry is practically at a standstill, on account of labor troubles. All the large mines of Marshall and Savage basins are closed, except the Tomboy, where twenty-five men are at work. The Smuggler-Union is closed, the electric machinery removed from the mine and the hoists painted and covered as for a long period of idleness. A few of the smaller mines are working, the unions for some reason not extending their demands beyond the larger concerns.

In Yavapai county, Arizona, little headway is being made in resuming work in the idle mines. In a few instances small crews of men have been put to work, but the strike is practically still on throughout that country. The mines of southeast Arizona are in operation. In the Clifton and Morenci section the troubles of early summer have been adjusted or new men have taken the place of the strikers.

In the Searchlight, Nevada, district the mines still remain closed, the owners showing no disposition to recede from their position. The mine owners and operators of the district, as in many other sections, organized an association, announced their intentions as to hours, wages and their attitude toward union labor, and this appears to be the only mine owners' association that has held rigidly to its expressed determination.

In the Randsburg district of California about seventy miners were brought in from the Missouri zinc mines in Joplin district and the Yellow Aster mine and mill are again in operation. The saloons of the district are reported closed by the local authorities, and thus far no trouble has resulted.

The Dunsmuir coal mines on Vancouver island, at Ladysmith and Cumberland, are again working to their full capacity and there is no lack of miners. The local union decided to renounce the Western Federation of Miners and withdrew from that body, since which time they have worked steadily.

CONCENTRATES.

THE coefficient of linear expansion of concrete is 0.0000099 per 1° C.

THE Pittsburg Reduction Co. is almost solely the producer of aluminum in this country. The price varies from 32 cents to 36 cents per pound.

ABOUT 75% of the yield of Mexican mines is silver. In former years the proportion was much greater, but of late gold and copper have been mined in larger quantities.

IT is the practical experience of many successful mining superintendents that for every ton of ore extracted there ought to be enough men at work to open up another ton.

PERPENDICULAR does not always mean at right angles to the horizon. Geometrically it means a line drawn at right angles to some other line. Vertical always means at right angles to the horizon. A plumbline hangs vertically.

THERE is no present competition to any great extent on the Pacific coast between foreign and domestic coal, but there is the keenest kind of competition between coal of any kind and fuel oil, with the odds very much in favor of the latter, as an economical factor in the cost problem.

A "BUSHEL" of charcoal is understood to be a heaped bushel, which would equal 2688 cubic inches. The "struck," or ordinary bushel of dry measure, contains 2150.42 cubic inches. The legal bushel measure is a cylinder 18½ inches diameter and 8 inches depth, inside measurement.

PORCELAIN ENAMEL COATING has been recommended for cast iron pipe. It would add about 20% to the cost of the pipe, but would insure the full carrying capacity of the pipe during its life, besides being proof against electrolysis. The sand blast method of cleaning before coating is also recommended.

MEXICAN mining law does not recognize "extralateral rights." On that subject it says: "The unit of concession or mining claim shall be a solid of indefinite depth, limited as to its exterior boundaries by a section of the surface embraced within horizontal planes measuring 100 meters on all four sides, and in depth by vertical planes passing through the same."

STEAM TURBINE tests show a very low steam consumption, in one case less than eleven pounds per indicated horse power. Even higher efficiencies are claimed under unusually favorable conditions. One of its strongest claims to practical use is its adaptability to the use of superheated steam at temperatures entirely beyond the range of the reciprocating engine.

IN roasting galena the sulphide of lead goes largely into the form of sulphate, which can be completely decomposed only by means of silica; but this involves a high temperature, and the loss of lead is so large that the practice of slag roasting has now been generally abandoned in the United States. The temperature required for the desulphurization of zincblende is also high, and, when ore contains lead, the loss of that metal by volatilization is also high.

BUT one asphalt mine is now being worked in the State of California, the augmented increase in that State's oil yield occasioning such an increase in the production of asphalt as a residual product of oil refining as to make that the most economic source of supply. Asphalt is a compound substance, its principal constituents being petrolene and asphaltene. Asphaltene is a solid and extremely brittle. Petrolene is a thick, black, viscous fluid, volatilizing at a temperature of 450° F., and remaining stable at ordinary atmospheric conditions.

KUNZITE, the new gem recently discovered at Pala, San Diego county, Cal., is a lilac colored spodumene. Spodumene is usually white, grayish white, greenish, yellowish green to emerald green and rarely amethystine purple. The lilac color is still more rare. The crystals are prismatic, often flattened and striated in the direction of their principal axis. The new variety occurs with lepidolite and pink tourmaline (rubellite) in a large pegmatite dike. Hiddenite is a yellowish green variety of spodumene. The mineral is a composition of lithia, alumina, silica and oxygen.

ASBESTOS, felt, magnesia and other packing is usually secured to the iron pipes, boilers or other metallic surfaces around which they are placed, by wrapping with drilling, canvas or other strong fabric, and then fastened by metal bands made for the purpose. In the case of boilers wooden strips may be substituted for the canvas. No paste or glue would give satisfaction where heat is to be applied, for the reason that the packing, being very porous, would absorb a large quantity of any mucilaginous substance that might be employed, and even if it did form a satisfactory paste while cold, its properties would be destroyed by heating. In lining small vessels, good results are sometimes obtained by placing a cylinder of iron within another of greater diameter and filling the annular space between them with the packing.

ONE good way to keep draftings and drawings clean is not to wash the triangles in soap and water; just wipe them off with a clean, dry rag, and instead of sliding them over the paper pick them up, or, at least, slide them only on their corner, so as to have as little of them as possible in contact with the paper. Never, if possible, slide anything over the paper; keep the elbows and the points of the fingers off the paper. Nor should a pad ever be put on a drawing When it is necessary to figure, put a piece of clean paper on the drawing, and then put the pad on it.

THE maximum permissible temperature of dynamo and motor coils is 150° to 160° F; watts equal volts multiplied by amperes; 1 watt equals 44½ foot-pounds per minute; 746 watts equal 1 H. P.; 1000 watts equal 1 K. W.; 1 H. P. equals 0.746 K. W.; 1 K. W. equals 1.34 H. P.; nine to ten 16-candle power lamps require 1 H. P.; one 16 candle power lamp at 100 volts takes .048 to .06 ampere; the efficiency of small dynamos is about 84%; efficiency of large dynamos is about 91%; 1 K. W. requires from 1¾ to 2 indicated H. P. to generate it. Keep damp, dust and oil off wiring and insulation.

THERE is no more of a gamble in mining than in any other business pursuit, certainly not near as much chance, uncertainty and likelihood of disaster as in farming, which is held up as the safest of all occupations and the surest as to results. In mining the result is unaffected by the drought of the desert, the deluge of destroying waters, the burning heat of the sun, the depredations of the locust or caterpillar, and the hundred other destroying influences that burden the life of the farmer but have no effect on the miner, or upon the great natural storehouses of wealth that he uncovers.

IT IS a part of a modern mining outfit to have a good photographic appliance. A series of pictures for present use or permanent reference would be of value, often increasing with the years. The matter could be made to constitute a complete history of surface and underground development. It is the experience of "Concentrates" that solio is much cheaper and easier handled than velox. It is also better where it is intended that the photographs shall be engraved. Velox is no good for the use of the engraver or illustrative artist. Velox costs a little more than solio, is a little harder to manipulate, but is more permanent than the solio paper.

NO LIST of names in any department of mining, engineering or metallurgy can be compiled that is of other than the most transitory value. Most of such "lists" are made for show and are worthless. Care and judgment, with some knowledge of existing facts and requirements, can at considerable expense compile a list that is of some immediate value, but they soon rapidly deteriorate and soon become comparatively worthless. The best lists are found in the subscription lists of journals that have a good many subscribers who think enough of the publication to have it sent to them, no matter how many changes of postoffice address they may make during the year.

GASOLINE alone is not considered to be an explosive; to secure an explosion with gasoline it is necessary to have present a certain proportion of air. Gasoline is a product of petroleum midway between benzine and kerosene; that is, it consists of a series which in the selective distillation of petroleum is obtained after the benzine has been evaporated, and before kerosene begins to be distilled. In the oil trade it is known as naphtha, and is divided into three grades, A, B and C, A naphtha being that last given off, and hence having the greatest specific gravity. By the retail trade it is generally known as gasoline, and is sold according to its specific gravity, which is designated by so many degrees, on an arbitrary scale known as Baume's scale. Stove gasoline having a specific gravity of 72° Baume is that generally employed for gasoline engines, although gasolines from 66° to 76° may be used with success when employed with a vaporizer.

THE increasing number of questions received make it necessary to greatly condense the answers, and in this regard inquirers are requested to make their inquiries as brief as possible, consistent with clearness. This sometimes requires that the exact word necessary be used, to prevent confusion and to insure clearness of meaning and accuracy in the desired answer. "Concentrates" also respectfully states that it is manifestly much easier to ask a question than to correctly answer it; that many of the questions answered in this column take considerable time (a question asked last March is answered in this column, the question being from Montana, and the answer only obtained last week from South Africa), and that it is not always possible to obtain answers of any value to every question asked. To those who suggest that the question should be published, as well as the answer, it can only be repeated that to publish the questions would take up nearly all the space in the paper. Even as it is, and omitting the questions, the answers have to be boiled down to the bone, and every possible word omitted to get room enough. The page of "concentrates" used to be copyrighted for a while, but there came so many remonstrances from other mining journals and exchanges desirous of copying the matter that the copyright restriction was withdrawn some years ago, and any publication has the privilege of republishing those little paragraphs, subject, of course, to the usual courtesy of crediting them to their original source.

IN the lead smelting of zinc slimes, as practiced at Johannesburg, South Africa, instead of treating the slimes with acid, in some instances they are taken direct from the filter press to the lead furnace. The slimes are mixed with litharge and a flux of assay slag and put into a furnace of the same type as is used in the Siemens & Halske process. A slow fire is made, to drive out all moisture, and then it is made more intense, until the mass is in a molten state. Sawdust is likewise used as a reducing agent The molten mass is continually mixed, to prevent the formation of lumps, etc., and when the slag shows the proper consistency—that is, a glassy, viscous black—it is drawn off at the slag door. The lead is run into moulds from another opening. The bullion from the lead furnace is purposely kept low, 7% to 8% being considered a good grade of bullion. The lead pigs are then taken to a cupellation furnace. Across the surface of the molten lead an air blast is played, the litharge being driven across the test in quiet riffles to a hole in the bone ash, where the molten litharge runs out into a special pot. The gold and silver from the cupel are run down into a plumbago crucible, and cast into bricks.

IF alloys of silver and copper be roasted with a free access of air both metals will be oxidized, the copper in much the larger proportion; silver when roasted with salt is converted into chloride; copper into black oxide. If the silver-copper alloy be alternately treated with dilute sulphuric acid and exposed to the air the copper will go into solution as sulphate, but the silver will remain as metal. If a silver-lead alloy be melted at a red heat with free access of air the lead will be oxidized to litharge and the silver will remain unaltered. A silver-mercury alloy is an amalgam, as all such compounds of mercury are called. The proportion of such composition is 43.7 parts of silver to 100 parts of mercury. Should silver be plunged into mercury there will be produced at the surface of the metal a very thin layer of amalgam, which will prevent any further action of the mercury. This is why grinding is of such universal necessity in the amalgamation of silver ores, for the resultant film of amalgam is removed by the friction, and fresh surfaces of silver are constantly exposed to the action of the mercury. In a similar way clean siliceous sand helps amalgamation, while clay or any similar substance which would increase the viscosity of the mixture will hinder the amalgamation.

CEMENTED gravels, containing fine gold should be easily treated in a stamp mill of ordinary type, if, as stated, the gravel can be pulverized in a hand mortar and the gold amalgamated with mercury. There is, however, a noticeable difference in crushing rock under stamps and crushing and grinding it in a hand mortar. Gold which might be readily saved by amalgamation after grinding in a mortar, might prove difficult to save on plates after stamping in a mill, for the possible reason that the gold may be coated with a thin film of iron oxide, silica or some other substance which prevents direct contact of the mercury and the gold. The grinding in the iron mortar removes this coating, rendering the gold bright and easily subject to amalgamation. The remedy is suggested by the experiment. A grinding mill would probably prove more satisfactory in such a case than a stamp mill. An arrastra should answer admirably, because of the grinding performed by the mullers, but the capacity of an arrastra is too limited for low-grade ore. If the gold cannot be saved by a grinding mill, the cyanide process should be tried and it might be found a valuable accessory to amalgamation, and often to concentration. Experiments must be made to determine the details of cyanide treatment, if the gravel is found amenable to that process at all.

THE fouling action of copper upon the extracting efficiency of cyanide solution is very marked with 0.3% present, even alone, and would be more so in practice where the accumulation of such an amount would be accompanied by the accumulation of other metals. On the other hand, copper salts in the absence of free cyanide to some extent act as solvents for gold and silver, but cupro-potassium cyanide is not so active in this respect as the corresponding zinc salt. In practice it is found that copper is precipitated from weak solutions of cyanide, such as 0.05% to 0.08%, upon the zinc shavings, which then become less active in precipitating gold and silver. This can be remedied by making the solution stronger with cyanide before entering the zinc boxes, wherehy the precipitation of the copper is prevented. But, then, the copper accumulates in the solution, and the increase renders the solution less effective in extracting gold from the ore. The difficulty has been met in some cases by precipitating the copper with a lead-zinc couple after the precipitation of the bulk of the gold. At the plant at Minas Prietas, Mexico, the solution from the zinc launders, containing from 3 to 4 pounds of copper per ton, is run over zinc shavings which have been steeped in lead-acetate solution, hy which the quantity is reduced to about 1.25 pound per ton, and any gold which has escaped previous precipitation also recovered. The product so obtained runs about $2 per pound in gold and silver and 25% of copper.

Raw Copper Plates.

Written for the MINING AND SCIENTIFIC PRESS.

There are those who still believe that raw copper plates, without the electro-silver plating, are superior to the silver-covered plates for amalgamation of gold ores. The bane of the mill man, whether he uses raw or plated plates, is the formation of discolored spots on the plates. These are caused by the collection of oxides and insoluble salts. The remedies for the removal and prevention of this discoloration are numerous, some of which are good, others are bad. It has long since been proven that the long continued use of a solution of cyanide of potassium—one of the principal remedies—is injurious to the plate. Still, in some cases its use is almost unavoidable.

Undoubtedly silvered-copper plates are much easier to keep in good condition than raw plates; but, as previously stated, some mill men cling to the idea that raw plates are superior, for the reason that they can select better sheets of metal, and that, when once having been gotten into good condition, the raw plate will do more satisfactory work than silvered plates. In selecting copper sheets for mill plates, care must be taken to get suitable metal. The purest, softest metal is by far the best for the purpose. It may appear discolored in spots and be of undulating surface, etc.; but a soft plate of pure copper showing these inequalities of surface, due to handling and transportation, will be found better adapted to the purposes of amalgamation than a fine-appearing, shining hard plate that has been rolled until it has a polished surface. Such a plate as the latter will be found too dense and will not readily absorb either mercury or gold. The plate selected should be free from rough spots or holes; the dents caused by handling may be readily removed by use of a block of soft wood laid on the plate and pounded with a wooden mallet. The plate should not be pounded with the mallet, as it will injure the plate; but the intervening block will serve to make the sheet of copper flat and smooth.

An alloy of copper and zinc has been tried for mill plates; but, although a plate made of this alloy is found an excellent amalgamator, it is not enduring, for the reason that the mercury combines with the zinc, forming an amalgam, and the plate disintegrates and breaks up. They are also expensive in first cost.

Raw copper plates should weigh no less than three pounds per square foot, and a heavier plate is still better. For inside battery plates, copper of double this weight is not too heavy, for, if made of light metal, the plates will be quickly worn through and torn from their fastenings.

All raw plates should be annealed after the last rolling at the mills, as the rolling process has a tendency to render the plates hard and impervious to quicksilver. If the plates have not been annealed, they may be softened by placing them over a slow fire of coals, heating them until dry sawdust sprinkled on the upper side of the plate will ignite. A higher heat is useless and may even do damage by causing the plate to "buckle up." The annealing should be done as evenly as possible. This process renders the plate porous and it will readily absorb a surprisingly large amount of mercury. Plates which have become hard in the mill by use of too much cyanide solution may be softened in this manner, when they will again be in good condition to amalgamate ores.

When the plate has been carefully and evenly annealed, it should be placed on the table in front of the mortar where it is to be used, smoothed out and then made as nearly flat as possible by means of the wooden block and mallet, as previously suggested. The plate is then fastened to the table by means of iron screws or copper nails, the latter long enough to be clinched on the under side of the table. Some mill men prefer to turn up the upper end and the side edges of the plate to prevent the escape of any amalgam in those directions; but if a strip of carefully planed wood be nailed along the edges of the plate, having a strip of cloth between the plate and the wood, very little gold will escape at the sides of the plate.

Having secured the plate in position, the mill man now proceeds to get his plate in shape for amalgamating. To do this every square inch of its surface must be carefully scoured, so that the bright metal shows. No spots or discolorations of any sort can be permitted.

Next scour the plate with wood ashes and fine sand or tailings, using a scrubbing brush or coarse rag. Bad spots may be scoured with the ashes and sand and the end of a small block of wood. Continue the scouring until the coating of oxide is entirely removed and the bright, metallic copper exposed. Caustic soda, the concentrated lye of the shops, or sal soda, may be used instead of ashes, the object being to remove all traces of oil or grease by action of alkalies. After washing with clean water, apply with a soft brush, or swab, a solution of cyanide of potassium, say one-half ounce of cyanide to a pint of water. The plate may be readily amalgamated by the use of the following mixture: Fine sand or tailings, powdered sal ammoniac, equal parts, and containing a small quantity of quicksilver sprinkled therein. With the scrubbing brush and this mixture continue the scrubbing until all parts of the plate are amalgamated. During the operation sprinkle on the plate as much quicksilver as the plate will absorb, and water enough to make a thick mud of the mixture. Lime may be used with this mixture, but it cannot be said that the addition is of any special benefit. It is unpleasant, to say the least, as ammonia is set free in great quantity. Allow this mixture to remain on the plate for an hour or so, and then wash it off with clean water and the brush. Follow with the soft brush and cyanide solution, adding quicksilver, if the plate will hold it. By continuing this treatment for three or four rounds the plate will be found to have taken up or absorbed as much quicksilver as ordinarily after many weeks' running. If fine gold amalgam can be spared, it is well at this stage to rub some upon the plate, using a cloth rubber wetted with a solution of sal ammoniac, in the proportion of four ounces to the pint of water. If the amalgam be heated and rubbed in a wedgewood mortar, so as to insure the solution or minute diffusion of the gold, it will be the more readily attached to the plate. Silver amalgam in the place of gold amalgam gives excellent results. Silver amalgam can be made as follows: Dissolve a piece of silver—coin will answer—in the smallest possible quantity of dilute nitric acid. Heat will hasten the solution. Dissolve the resulting crystals of nitrate of silver in water, and pour into the vessel enough quicksilver to reduce and amalgamate the silver in the solution. This reaction will be completed in a few hours. Wash the amalgam with clean water, to remove all traces of nitrate of mercury, and strain to remove the surplus quicksilver, leaving in the cloth a pasty amalgam of very pure and finely divided silver. Use this as directed for the gold amalgam.

The first scouring removes oxides and grease, and exposes the pure, bright metal, which by the annealing has been rendered capable of holding a comparatively large quantity of quicksilver and amalgam, by virtue of its porosity. The sal ammoniac, by reason of its property of dissolving oxides, assists the amalgamation by keeping a bright metallic surface, allowing the quicksilver and amalgam to penetrate the copper, filling the minute interstices, and combine in atomic proportions, so as to form an alloy of copper, gold and quicksilver. Thus air, water and various salts are kept from acting directly upon the copper, preventing the formation of oxide and carbonate of copper to coat the plate. This is accomplished in a longer or shorter period, depending upon the mode of preparation and upon the richness of the ore and the ease with which the gold in the ore may be amalgamated. It is probable that the galvanic current due to the contact of two dissimilar metals plays an important part in influencing the chemical reactions and assisting the amalgamation of gold; but as its exact action is not defined, it is needless to discuss the point in this article.

The point aimed at in this plan of preparation is to hasten the union of a sufficient amount of gold and quicksilver with the copper. If allowed to take place slowly, the unavoidable loss of gold makes the expense much greater than if forwarded by the use of the needful amount of amalgam, before running any ore over the plate. If an old, well-used plate be cut or broken the amalgam will be found to have penetrated perhaps half, and in some cases completely, through the copper.

Corrosive sublimate, nitrate of mercury, sulphuric acid, and common salt, muriatic acid, sodium amalgam, cyanide of potassium and other acids and salts, have been used in amalgamating copper; but though the amalgamation may be accomplished in some cases quite easily, the plate cannot be brought to a good working condition so soon, if at all, as in the way described.

The subsequent treatment of plates, amalgamated as described, should be varied to suit the circumstances of kind and quality of ore and purity of water. Water containing carbonic acid discolors plates readily, forming an insoluble coating of carbonate of copper. Though an infinitely thin film, it is sufficient to prevent the contact and adhesion of gold and amalgam, unless in particles sufficiently large to break the coating. The worst form of discoloration of plates proceeds from the action of sulphates of iron and copper present in many ores from the natural decomposition of the pyrites. The addition of lime to the water introduced to the battery, as much as will dissolve therein, will neutralize the carbonic acid and decompose the sulphates. It may be necessary to add lime to the ore to furnish enough to react on all the sulphates.

When the mill is in operation the plates should be "dressed" every six hours, or oftener, should they become discolored. After stopping the mill and washing the plates with a stream of clear water, apply with a soft brush (a whitewash brush is handy) some of the solution of sal ammoniac. Allow the sal ammoniac to remain on the plate a few minutes, wash with clear water and apply with the brush enough of the solution of cyanide of potassium to brighten the plate. The plate should have upon it as much quicksilver as it will hold without gathering in drops or running off. Experience in this matter will teach the niceties of manipulation to the mill man.

It is essential to use quicksilver entirely free from "base metals," such as lead, zinc, tin, copper, etc. The presence of gold and silver is, of course, desirable. The base metals, when combined with quicksilver, oxidize very readily, especially when the amalgam is finely divided, exposing a large surface to the action of water, air and other oxidizing agents. Thus, with impure quicksilver the coating on plates may arise from the amalgam instead of the copper itself.

To test the purity of quicksilver, put a small quantity on a sheet of paper while dry; if, when moved upon the paper, by inclining it in various directions, a film adhering to the paper is left on the track, the quicksilver is impure. Another test: Put half an ounce or so in an ordinary iron "gold pan," and by a quick up and down jerk separate the mercury into small globules; if, on inclining the pan, they do not readily run together, the sample is impure. To purify, first retort the quicksilver, and add to it after retorting a few ounces of dilute nitric acid (acid one part, water three parts). An ordinary acid bottle is a handy vessel to hold mercury and acid, as it may occasionally be agitated to hasten the purification by bringing the acid in contact with the impurities. The acid, by reason of its greater affinity or the base metals, removes them by forming nitrates. Some days may elapse before the quicksilver becomes purified. Samples may be tested from time to time by the plans here mentioned. Before using the quicksilver it should be repeatedly washed with water to remove all traces of nitrates. It is a good plan to keep a supply of quicksilver under treatment, putting all which has been used into the bottle, and drawing from it such an amount of purified metal as may be required.

A stock of needful chemicals should be kept at the mill. The following list comprises those necessary for the preparation and treatment of plates and quicksilver: Cyanide of potassium (fused), sal ammoniac (powdered), caustic or unslacked lime, caustic soda or "concentrated lye," and nitric acid (commercial acid is sufficiently pure). Cyanide of sodium may be substituted for cyanide of potassium; common salt for sal ammoniac; wood ashes, or the lye therefrom, or sal soda, for the lime and soda, and sulphuric acid and saltpeter for nitric acid. These substitutes are but "makeshifts" at best, and consequently should not be used when the others are at hand or can be procured. It is well to keep ready prepared the solutions of sal ammoniac and cyanide of potassium in well-stoppered bottles. The cyanide solution, being especially liable to decomposition, should not be prepared in large quantities at a time. It should also be carefully kept and labeled as poison, to avoid accidents.

In the almagamating of gold ores in the stamp batteries there is always a greater or less loss of mercury, and this feature of amalgamation will be treated of in a following paper.

The American Mining Congress.

The session of the American Mining Congress which was held last week at Deadwood and Lead City, S. Dak., was successful. The attendance was large and the papers read were of interest. Those in attendance had an opportunity to inspect the great mines and mills of the Homestake Co., a privilege for many years denied the general public, and this was taken advantage of by a large number of members. The Golden Reward and other mines and mills were visited, and the greatly diversified character of mines and metallurgical works of the Black Hills made these excursions particularly interesting and instructive to non-resident members. On Saturday, the 12th inst., the general election was held, at which the following were elected for the ensuing year:

Directors, J. H. Richardson, Boise, Idaho; T. Ewing, Los Angeles; R. C Patterson, Omaha; J. T. Grayson, Portland, Or.; E. F. Brown, Aspen, Colo.; J. Dern, Salt Lake; J. Holmes, Raleigh, N. C.; J. Lynch, Butte, Mont.; J. Gray, Terraville, S. D.; president, J. H. Richards, Boise; first vice-president, T. Ewing, Los Angeles; second vice-president, R. C. Patterson, Omaha; third vice-president, J. T. Grayson, Portland, Or.; treasurer, T. K. Mair, Portland, Or.; secretary, I. Mahon, Carlisle, Pa.

Among resolutions adopted was one to recommend to the legislatures of the several States and Territories the enactment of laws to afford better protection to life and limb of persons employed in and about mines.

It was decided that President Richards should appoint a committee of fifteen members of the Congress whose duty it should be to induce as many members of the Mining Congress as possible to visit the St. Louis Exposition in a body. The committee, with T. Ewing of Los Angeles, Cal., as chairman, was selected.

Before adjournment E. W. Martin, on behalf of the Black Hills Mining Association, presented to President Richards a badge of membership in the American Mining Congress, made of Black Hills gold, as a token of appreciation for the manner in which he had given his services during the past year in the

furtherance of the interests of the American mining industry.

Portland, Or., was selected as the place of holding the next meeting in 1904.

The close of the sixth annual session showed 548 accredited and appointed delegates to the Congress and 241 permanent members, making a total of 789 legally entitled to participate in the proceedings.

Some Structural Features of the California Gold Belt.

NUMBER V.

Written for the MINING AND SCIENTIFIC PRESS by W. H. STORMS.

The ore deposits of the Baliol mine may be referred to as a series of fahlbands accompanying a fissured zone. These fissures were evidently first filled with quartz, and the mineralization, extending outward from these small fissures, gradually impregnated the intermediate masses of schist. That this mineralization was not contemporaneous with the formation of the tuffs is plainly evident. It is also a fact that the small quartz fissures are generally payable along their edges only, it being rare to find good values in the center of a quartz vein in this mine. In this particular quartz veins must not he mistaken for silicified schist, the latter being generally gold-hearing when containing pyrite. The quartz veins were undoubtedly formed first, and afforded channels for the passage of gold-hearing siliceous solutions, which subsequently penetrated and enriched the masses of schist lying between the several veins; hut the writer can offer no explanation for the sudden stoppage of this impregnation of the schist on certain jointing planes, unless it he that a thin selvage of clay or other impervious material formed in the space forming the jointing crack, and this, acting as a dam, brought about a discontinuance of the mineralization at that place. It is noticed, however, that the occurrence of one of these floors did not result in entirely stopping mineralization, for at higher and lower levels in the same zone mineralization again occurs, and the several ore shoots are essentially similar throughout the mine in the several zones of mineralization.

Lying to the eastward of the Baliol ore shoots, the rocks are amphiholite schist and black slate, with numerous quartz veins; hut gold values in these, as far as known, are low, with the exception of a fissure which cuts the formation. In this pyrite and mispickle occur, and also good values in gold; but, as the vein was small, little development has been done on it.

In the vicinity of some of the aforementioned crossheads the ground is heavy and treacherous, hut can he easily held, if promptly and properly timbered.

The probability, as determined in the development of the mine, is that there are still large ore bodies as yet undiscovered in this property.

Lying somewhat to the westward of what has been considered the main zone of mineralization, is a zone of somewhat different character, consisting of a siliceous chloritic schist (distinguished from the "grindstone" of the main ore bodies), and this also contains payahle ore, though the gold is mostly in the iron sulphide, there being comparatively little free gold. In this schistose zone occurs a series of lenses of extremely hard, dense quartz, in which the laminations of the original schist are still preserved, though all the magnesian minerals have been displaced by the quartz. The gold values in the lenses of schist, which are 10 to 20 feet long and 4 to 6 feet wide, are greatly variable, some of the ore being high grade and some of it worthless. All that containing 1½% to 2% sulphide is pay rock; that poor in iron sulphide is also poor in gold.

In the main ore zone at one place on the 500 level was found a quartz vein, about 6 inches in thickness, dipping eastward at 15°. This vein contained a little gold and some pyrite, but was low grade; but for several feet above and below this vein the greenstone was partly silicified and impregnated with pyrite, and, although physically a most unpromising looking material, it was found to contain $8 to $10 gold per ton.

There are many structural peculiarities in this mine of local character; hut a complete description of the Baliol mine, like many other mines, would fill a good-sized volume. Sufficient has been said to indicate the peculiar character of the vein structure and its relation to the surrounding rocks. The mineralization is always pronounced, and when it stops the line of demarkation is usually plain, though in some instances it is not so, the pyrite scattering and finally disappearing almost entirely. The silicification of the schist acts in much the same manner. The small quartz veins which occur throughout the larger ore bodies are generally persistent for long distances in strike and in depth and are numerous, forming a series of essentially parallel quartz veins, with many small ramifying and often connecting branches.

(TO BE CONTINUED.)

Gold Fields of the Atlantic Slope.*

Written by C. L. DIGNOWITY.

Gold was discovered in Virginia in 1782 and in North Carolina in 1793. Prior to 1848 the gold production of this country all came from the East, principally from North Carolina, that State alone producing all our gold up to 1827.

The rush for the newly discovered gold fields of California and the West in 1848–49 shows us that human nature has not changed, as the distant fields still seem greener and more enchanting. Miners and mining talent flocked from the Eastern fields. Investors and money followed. Some succeeded, others failed and were unable to get back. History repeats itself. We know to-day how good fields are abandoned to follow a rumor and to begin the mad chase of the will-o'-the-wisp. So the South became a neglected field by the restless miner, and was soon absorbed by the planter. Slave labor and a virgin soil made tobacco, cotton and other products yield such handsome profits to the planter that the gold treasury vaults were soon plowed over and neglected. The South offered no inducement to the prospector.

We know the prospector and his shyness of ready cash. Unless "grubstaked" by the more prosperous investor, his vocation is a hard one. The Southern fields now passed into rich plantations—it took too much money to acquire land.

Quite different was it in the West. The public domain was opened to those seeking to civilize and develop it, and also gave most liberal inducements to the prospector. Surveyors, geologists and scientific men were put to work; maps and other data were compiled at government expense and all given to the gold seeker free of cost, and soon the West was ablaze with prosperity.

To-day money is flowing southward as never before and is building up every kind of industry. So it now behooves the mining man to follow the van and bring forth the hidden gold from those mineral zones and reefs.

THE GEOLOGICAL BELT.—The eastern formation of the Appalachian range of mountains exhibit one continual belt, from Virginia to Alabama, of red, brown and yellow slates and schists—argillaceous, talcose and micaceous.

This belt consists of low, rolling hills, quite soft and decomposed above the water lines.

The oxidized ores in that country can be worked to-day under our advanced methods at a good profit, with gold values as low as $3 per ton.

If the same character of ores and values can be made to yield large profits at the Homestake mine, and kindred institutions, why not in those Eastern fields, under far more favorable conditions? I find upon inspection of these Black Hills slates that they are almost identical with those of the Appalachian range, as well as similar in their gold deposition.

The old mint records from the South show that gold in abundance was produced under the most primitive methods by the old Spanish drag mills, or arrastra, hand rocker, Chilean mills (round rock rollers), succeeded by the stamp mill and placer washing.

No shaft mine could be profitably worked in those days that did not produce a gold value above $15 per ton, and this ore had to be oxidized or of a loose and free nature. Nothing but shallow workings were undertaken.

Deep mining for the sulphurets of a much higher gold value per ton could not be undertaken, owing to the refractory nature of the metals and expensive and at that time unobtainable machinery for pumping and hoisting.

Now it is different. No mining is too deep, or ores too refractory, to profitably manage under up-to-date methods.

THE GOLD MINERALIZATION.—The mineralized veins within this vast slate belt consist principally of stringers and lenses of quartz, from ¼ inch to 1 foot in thickness, following the cleavage of the slates and schists, as well as across the formation of the ore zones, that are from 20 to 500 feet in width, all of which is easily mined above the water level.

The gold of these veins occurs in finely disseminated or leaf gold.

Taking this formation as a whole, it will in many instances average from $3 to $6 per ton in gold, and as this formation makes but little slimes the precious values are readily recovered by the cyanide process.

These mineral slates are from 10 to 50 miles wide, with an easterly-westerly course, dipping southwestwardly.

There are evidences of much mining having been done in early days along this mineral zone, hut not to any great depth. The miners confined their work to the veins containing free gold, which they saved by their hand rockers and drag mills, and these primitive mill methods are still found in numerous localities, gone to decay.

Placer mining was popular, and much gold is still obtained by the farmers after rains or during the flood period.

I saw a quart of medium-sized gold nuggets, purchased in one locality last May, that were picked up by farmers during the spring rain, as well as many beautiful crystallized gold specimens which had their source in the granite formation west of these slates.

The oxidized portion of this gold belt is from 100 to 200 feet in depth, to water line. Below the water line are found the sulphurets and bluish quartz, with grains of gold. The veins are more concentrated and often very rich.

Recent geological researches tell us that the Southern slate and schist formation is not less than 2000 feet deep, and within this mass of rock must exist precious metals, which cannot be exhausted for ages, and it is one of the most important gold-hearing regions on this continent.

Could one-half of the idle mills of the West be transported to the Southern field, along that broad gold belt, there would be a transformation in gold productions of the South.

There are no custom mills or samplers to treat or purchase these Southern ores, which naturally retards the mining industry in that country. There is abundance of capital in the Eastern and Middle States waiting and willing to go into active mining propositions.

The low-grade ores of the Southern mineral zone, especially in North Carolina, have an area of over 20,000 square miles, and there the cyanide method has already made its advent, and is to-day producing the yellow metal with large profits to the investor.

Take, for example, the Colossus mill, located near Waxhaw, N. C. According to the mint records of North Carolina, this mine produced over $700,000 up to the beginning of the civil war. (Bulletin No. 10 of the North Carolina Geological Survey, as compiled by the United States Mint, shows no less than $21,830,528 in gold and silver bullion credited to North Carolina alone.) This is conclusive testimony that gold in abundance exists in that State.

The Colossus mill has a capacity of 100 tons per day and is constructed for straight cyaniding by percolation.

The gold solution is forced upwards from the bottom of steel tanks of 50 tons capacity. One and one-fourth pounds of cyanide per ton of ore is used and from seventy to seventy-two hours is required for leaching tailings before the gold solution is passed over the zinc shavings, upon which it precipitates, and from 90% to 92% of their gold values are recovered.

This mill was built to treat a deposit of tailings containing 40,000 tons, which came from this property prior to the war.

These tailings receive a slight roasting in order to free them from organic matter. They average about $6 per ton in gold, and after treatment leave but 40 cents of their values to the ton in the residue.

The gold product, or auro-cyanide, after two weeks' run, showed close to $30,000 per ton in gold. The mill had been in commission about one month when these results were attained, and it had not got down to its best work, as is the case with all new plants. This property consists of 1700 acres of highly improved farm land, through which passes northeast–southwest a gold reef, or zone, for 5000 feet, which averages about 400 feet wide, and 60 feet above the level plain.

This reef consists of a gray and reddish micaceous schist, which is decomposed and easy to mine, and dips westerly about 55°, which, when sampled by crosscuts from end to end, gave a value of $4.86 in gold and two ounces silver per ton, and is adapted to cyanide treatment. Mill tests gave 88% extraction with a seventy-hour leaching with 1¾ pound of cyanide per ton of ore.

The Colossus G. M. & M. Co., a Philadelphia concern, is arranging to erect at an early date a 500-ton plant to treat this ore, and will use the present 100-ton mill to work up the tailings deposits.

During my various investigations of this Eastern gold field many similar propositions presented themselves, principally in Virginia and North Carolina, any of which can be secured at a reasonable price and upon favorable terms.

The Southern lands can be bought at $10 to $30 per acre. The titles in most instances are perfect, conveying in fee simple all minerals and everything they contain. The timber and agricultural values alone are worth the price, not taking into consideration the minerals.

Choice pine lumber, cut to dimensions, is delivered at $7 to $12 per 1000 feet, hardwoods at $1 to $1.50 per cord, coal $2 to $3 per ton, delivered. The climate is delightful; seasons are open the year round; temperature ranges from 80° to 90° in summer and 45° to 60° in winter.

Commodities of every kind are raised here, making living very cheap. Being in the center of civilization, near the sea and railroad transportation, reasonable rates are obtained, and the markets are convenient.

Water for milling and domestic uses is plentiful and pure. Competent labor, white or black, is obtainable at $1 and $1.25 per day of ten hours, without board. The laborers are farmers, with fixed homes, who do not drift and are not organized into labor unions.

*Condensed from Transactions Am. Min. Congress, Deadwood, S. D., Sept. 10, 1903.

Copper Matting Pyritic Smelting.*

A blast furnace best adapted for copper matting of sulphide ores is precisely adapted for pyritic smelting, which latter is a copper matting process, no more and no less, and the difference between the two methods lies in the quantity and character of fuel employed, the manner of employing it and the variations in reactions involved by reason of its character.

If blast pressure is comparatively high through tuyeres relatively small, carrying no air in excess of that used for combustion at the tuyere zone, then there occurs a localization of combustion and consequent heat, and all material within that zone is quickly melted down with little change in grouping of constituents, while such carbon monoxide evolved as may escape oxidation there absorbs oxygen from the oxides in the hot zone above and thus reducing to metal results. With large volume of air blast at lower pressure, the oxidation of fuel is more gradual; the action at the tuyere zone is less intense, and, while a melting temperature must be maintained at that point, a surplus of heated air must pass on to the next layer or cross-section above, where, by thorough exposure for sufficient length of time and in the presence of adequate heat, oxidation takes place more or less rapidly, depending on character of material operated upon, and the equable proportioning of the conditions named above. Copper matting is essentially an oxidizing process as to the ores being treated, and every pound of carbonaceous fuel that it is necessary to use in the process for the purpose of producing heat whereby the necessary reactions may take place, is a direct obstacle to the realization of best results in tenor of matte, because in burning such fuel much carbon is produced which burns at once in the presence of the necessary heat, robbing FeO or SO_2 of air, or all of them of oxygen, sending the iron of the first to the matte to encumber that, instead of allowing it to combine with silica to form slag, forming sulphur from the second and sending the sulphur to the matte again to encumber that, reducing its tenor instead of allowing the sulphur to go off as sulphurous acid gas, and the third, the air, robbing that of oxygen that is needed to combine with the iron and the sulphur of the ore to dispose of them, the one for the slag as a necessary constituent, the other to the chimney and out of the way. There are none of the reactions involved in copper matting of pyriteous ores in which carbon is necessary or a desirable factor. Its sole office in that class of smelting is the production of heat necessary to the operation. It follows that the loss of carbonaceous fuel that can be burned in the furnace for the production of heat necessary, and the more the sulphur of the ore that can be utilized for heat production, the higher grade the matte product will be, other conditions being parallel. The utilization of sulphur as fuel involves furnace conditions not vitally necessary to smelting with carbonaceous fuel, in that the caloric value in heat units in the former is much lower than in the latter. The ultimate value in heat units is as equivalents of oxygen involved in the reaction of burning. Therefore, using the British thermal unit (B. T. U.) as the unit of measurement, and carbon equivalents as a basis of comparison, its value being 14,500 B. T. U., the thermal value of sulphur becomes 5437 B. T. U., or 37.5% that of carbon, pound for pound, to-wit: One equivalent of C = 12, 2 equivalents of O = 32 and 32 ÷ 12 = 2.667, the number of pounds of O involved in the oxidation of one pound of carbon to CO_2 producing 14,500 B. T. U., while the sulphur being 32 ÷ 2 of oxygen, or 32, = 1; that is, a pound of oxygen combines with a pound of sulphur to produce SO_2. Then 2.667 pounds of oxygen combining with one pound of carbon and producing 14,500 B. T. U., one pound of O combining with one pound of S producing 14,500 ÷ 2.667 = 5437 B. T. U. Again, by like comparisons, one pound of FeS evolves 3107 B. T. U. in the burning to FeO. Iron pyrites consist of about 53% of S and 47% Fe. When charged raw into a furnace, one equivalent of sulphur is expelled at a comparatively low temperature, and is therefore not available as a producer of heat, for it never reaches the smelting zones of the furnace. There is left, then, for heat production of one pound of pyrites .47 pound of Fe, having a caloric value of 1460 B. T. U. and .265 of a pound of S, value = 1441 B. T. U., or a total 2901 B. T. U. is the available heat producing value of one pound of iron pyrites, equal to 20% that of carbon. As the specific heat of air is about .24, this pound of iron pyrites would, in burning, develop sufficient heat to raise the temperature of about 12,100 pounds of air 1° F., or its equivalent, one pound of air 12,100°, or, say, six pounds of air, 2017°. As one pound of iron sulphide combines in burning with, approximately, one pound of oxygen, and as air is composed of, approximately, four parts nitrogen to one of oxygen, it follows that about five pounds of air is involved in burning one pound of iron sulphide.

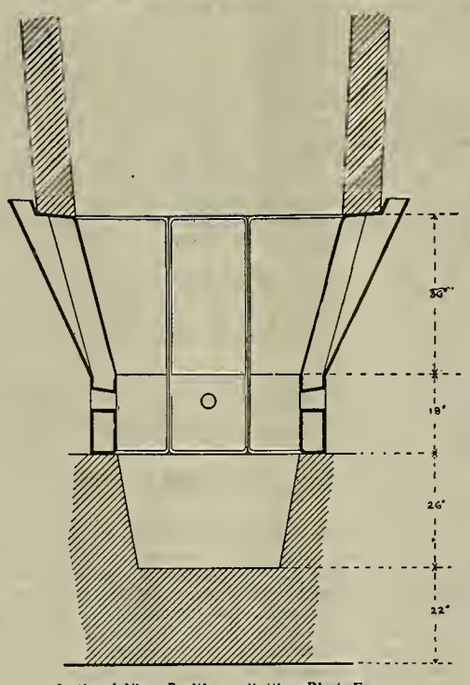
Assuming the ultimate smelting temperature to be 2000° above normal atmosphere, which is its lowest possible limit, then to raise the five pounds of air involved in the combustion of a pound of iron sulphide to the necessary smelting temperature involves the absorbtion of 1681 B. T. U., or $\frac{5}{6}$ of the heat developed, thus leaving but $\frac{1}{6}$ of such developed heat—an amount totally inadequate—for raising the silica and other necessary constituents for forming a fluid slag, to the necessary fusing temperature. The calculations above are approximately correct and fully demonstrate that pyritic smelting with cold air blast is not possible. In the above calculation the heat developed in the upper zones of the furnace by the combustion of the free atom of sulphur in the pyrites has been neglected, because at the comparatively low temperature at which the free atom burns, its effect in heating the stock there is of little value where so great a volume from below is constantly passing. In fact, the tendency of this added heat in the upper zones of the furnace is rather adverse than otherwise, as it contributes to overfiring, or hot-top, so called—a condition always to be avoided.

Carbonaceous fuel is an absolute necessity where cold air is employed, and the method thus becomes copper matting in the common acceptance of the term.

The low relative calorific value of sulphur renders it, when used in the form of pyrites, the more sensitive to disturbing conditions in the furnace, in proportion probably as its lower ultimate caloric value, especially so to that of the cold air blast, introducing as that does an unmanageable retarding and depressing factor into the vital part of the furnace. In direct proportion as the air blast is heated, reducing proportionately the amount of carbonaceous fuel necessary to be used in the furnace for heat production, and reducing the amount of air to be treated at the tuyere zone, and heating to some degree on the outside whatever air is required, the conditions for regular and efficient working are improved, the extreme expansibility of air heat rendering possible a most thorough distribution of the air, without the disturbing factor—cold.

For reasons given above, pyritic smelting—that is to say, that class of smelting requiring no carbonaceous fuel—has not been, nor can it ever be, accomplished with cold blast. There appears to be no doubt that all copper matting may be more efficiently and more economically done with the use of heated air blast than without it.

The accompanying diagram shows the construction of a pyritic or matting blast furnace. It is the water jacketed furnace now in general use. It is rectangular in form, but variable in proportions in the several furnaces, to suit the particular conditions involved.



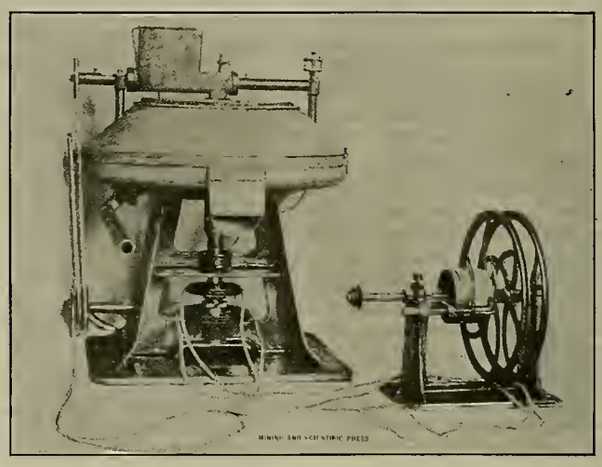
Sectional View Pyritic or Matting Blast Furnace.

*Abstract from pamphlet issued by the Colorado Iron Works Co., Denver, Colo., entitled "Some Details as to Smelting Practice and Equipment."

THE first of the forty-five new mogul engines ordered by the Santa Fe Co. for the Pacific Coast division has arrived. By January 1 the entire forty-five will have been delivered. The new engines are all oil burners. Some of them will be used on the division between Seligman and Winslow, Arizona, and this will mark the installation of oil burners in that Territory. When this division is equipped the Santa Fe will be using oil on its lines for a distance of over 600 miles.

Berrigan Centrifugal Separator.

Experiments are being made at the Homestake mill with the Berrigan centrifugal separator on the slimes as they come from the mill and which have been allowed to waste. The separator, which is herewith illustrated, is intended to recover floating values, and also to force the cyanide out of slimes and other pulp. The machine gives promise of doing a great deal in that direction. It weighs about 700 pounds. The separator has a centrifugal bowl; there is an inside bowl thrown on an eccentric; the liquid forms in the inner bowl in a crescent and the slime is turned in through the center to the rim where it accumulates. This accumulation is removed from the rim by scrapers, conveyed up the incline, the water being forced out below. The dry pulp is thrown out by centrifugal force. It is a continuous operating device, throwing out pulp as fast as it accumulates. It is set just below the concentrators; concentrates and slimes are dried out with 3% of moisture but can be adjusted to leave in more moisture. The device is now operating on the slimes from the Homestake mill which have been sent down the gulch. One of the machines is in the mill of the Colorado Zinc Co., Denver, Colo. The De Laval Separator Co. of New York are manufacturing the machines. J. J. Berrigan, inventor of the separator, has been conducting all of the experiments for the De Laval Co., both at the Homestake and in Denver.



The Berrigan Separator.

Topographic Map of Part of Southern California.

A topographic map of the Tejon quadrangle, in southern California, has just been issued by the United States Geological Survey, the southern part of which lies in the Pine Mountain and Zaca Lake forest reserve and the northern part in Los Angeles and Kern counties. This map, drawn to the scale of 2 miles to 1 inch, covers about 944 square miles of territory, the most of which is extremely mountainous, ranging from 3000 to 6000 feet above sea level. The northern part of the map shows the Tehachapi mountains, the southern end of San Joaquin valley and Antelope valley, a part of the western end of the Mojave desert. The southern half of the map, embracing parts of Los Angeles and Ventura counties, shows a perfect maze of narrow canyons and mountain peaks.

Some fine timber of merchantable value is found on the Tehachapi mountains and in the northern part of the forest reserve, but the southern part of the quadrangle contains little except a dense growth of manzanita and chaparral. At Gold Hill, in Ventura county, are some mining claims, but the larger part of the area is without inhabitants.

Between Antelope valley and San Joaquin valley is shown Tejon pass, with old Fort Tejon, famous in the early history of California.

The map can be obtained for the nominal price of 5 cents by applying to the Director of the United States Geological Survey, Washington, D. C.

IN the case of a severe electric shock, the best immediate assistance would be to produce artificial respiration, enforcing the heart action and diminishing the pressure of blood, the latter being obtained by injecting one to three drops of amyl nitrate. The dangers of electric current will, moreover, vary to a high degree, according to personal predisposition, persons subject to alcoholism, as well as those easily frightened, suffering much more from the effect of electric shock than normal people. The limit of danger is considered as coinciding with 0.1 ampere.

A METRIC KILOGRAM equals 2.2046 avoirdupois pounds. The legal kilogram in the United States is 15,432 grains. In Mexico all weights of gold and silver in ores, mattes, bullion, etc., are expressed in metric terms.

Notes on the Metallurgy of Copper of Montana.*

NUMBER VIII.

Written by H. O. HOFMAN.

CONVERTING COPPER MATTE. — The converting of copper matte has undergone many changes in the form of apparatus and the mode of working since 1884, when the first converter was put into operation.

The original Parrot converter, swinging in a vertical plane, was 8½ feet high and 5 feet in diameter, outside dimensions. The matte was melted down in a cupola and tapped into the converter through a launder. In 1896, the original method of working in separate stages was changed, and 50% matte was brought forward to coarse copper in one operation. As the initial charge was 2500 pounds of matte, increasing to a maximum of 9000 pounds, the siliceous lining being eaten and worn away, the amount of coarse copper produced in a blow was relatively small. The largest upright converter in Montana is 14 feet 2½ inches in height and 7 feet in diameter, outside dimensions. It works with an average charge of five tons and a final charge of eleven tons of 50% copper matte, receiving it as direct matte from the forehearth of the blast furnace or from the reverberatory furnace. Working direct matte was planned in 1890–91 by the late C. O. Parsons, and carried out by F. Klepetko in 1892; matte was transferred from reverberatory and blast furnaces by means of ladle and electric crane to the converter. At two plants a medium-sized converter was lifted by means of an overhead traveling crane from its trunnion supports and brought to the blast or reverberatory matting furnace to receive its liquid charge; this method has become obsolete, but it has its advantages.

At present, the Parsons-Klepetko method is generally employed. A converter charge is tapped from the blast furnace forehearth, or the reverberatory matting furnace, into a steel ladle managed by an electric traveling crane and poured into the converter. Ladles vary in size; a common form has a diameter of 5 feet and a height of 3 feet 10 inches. The lining, ordinary loam, is plastered on by hand, dried by an air current and then by a fire (wood, coke); converter slag, to the thickness of 3 inches, is then poured in. Matte ladles are used, also, as slag ladles. A lining is good for nine and one-half tons of copper.

When the 50% matte has been blown to white metal, the slag is skimmed and the converter very often recharged with 50% matte and blown through the slagging stage, but, more commonly, the original charge of matte is blown to coarse copper after skimming, without addition of fresh matte. Doubling charges is a common procedure on matte running less than 50% copper. After skimming the slag, the white metal is brought forward to coarse copper. By these double charges considerable amount of copper is produced in one blow, to be poured into the form of shipping ingots, 200 to 250 pounds, or anodes, or into a refining furnace, to be refined before casting into anodes.

The upright converter has been replaced in the new plants by the David-Manhes, or barrel or trough converter swinging in a horizontal plane. Here we find two sizes; the smaller, in more general use, is 7 feet in diameter and 10 feet 6 inches long; it receives an initial double charge of five tons and a final double charge of twelve tons 50% matte; the larger one is 8 feet in diameter and 12 feet 5 inches long, the initial double charge is ten tons, and the final double charge is twenty tons. The main reason for replacing the upright by the horizontal converter is the low blast pressure required by the latter type, ten versus fifteen pounds, although this advantage suffers greatly by the difficulty of making the lining firm—a thing relatively easily accomplished in the vertical converter. Converting matte in a bottom-blown upright vessel has been tried. This was 13 feet high and 7 feet in diameter, had sixteen ¾-inch tuyeres placed in a manner similar to that which obtains in making steel by the Bessemer process. The experiments were successful so far as the process proper was concerned, i. e., 50% matte was satisfactorily brought forward to coarse copper, which remained sufficiently fluid to be poured satisfactorily. They appear to show that the failure of Manhes to use a bottom-blast converter in his first experiments was probably due to his operating with too small a vessel from which matte and slag were blown out, and with too little matte, which furnished only a small amount of copper quickly chilled by the blast. The Montana experiments have not been followed up for the present, as the life of the bottom was too short, parts of it floating up during a blow. The experience gained so far tends to show that the bottom-blown converter works more quickly than the side-blown, that the wear of the lining is more even, and that the critical points are less easily discovered and have to be watched with great care. When the question of lining the bottom will have been settled satisfactorily, it is believed that blowing from the side will be given up, at least with a large converter having an initial charge of five tons 50% matte. A gyratory motion of the charge, obtained by placing the bottom tuyeres inclined, may lengthen the life of a converter lining.

*Trans. Am. Inst. Min. Engs. (Condensed).

ANALYSES OF CONVERTER LININGS.

	SiO_2.	Fe.	Al_2O_3.	CaO.	MgO.	Loss on Ignition.	S.	Cu.	Oz. Ag.	As and Sb.	H_2O.
Greenish, granular sandstone, Great Falls	64.4	5.9	16.5	1.1	1.8	4.7	.....	....	.....	....	....
Crushed quartzite, with 5% clay	88 6	2.2	4.0	1.6	....	....	.....	....	.....	....	....
Sandstone, slimes and second-class ore	68.0	5.9	17.3	1.5	1.3	4.1	2.1	1.0	.....	....	11.0
Quartzite and slimes	85.0	2.5	4.0	....	....	....	3.0	4.0	12.0	....	....
Sandstone	64.4	5.9	16.5	1.1	1.8	4.7	.....	....	.....	....	....
Slimes	60.0	2.2	19.9	....	....	....	6.8	6.05	.....	0.75	....
Second-class ore	57.0	9.6	10 4	....	....	....	15.95	5.95	2.0	....	....
Quartzite	90-91	2.7	3–2	....	....	....	.....	....	10–20	....	....
Slimes	60.0	4–5	15	....	....	....	9 0	5.7	.....	....	....

MONTANA CONVERTERS.

Converter.	Grade of Matte.	Hor. Section at Tuyeres.	*Lining Material per Converter.	Lining per Ton Copper Resulting.	Copper per Converter.	Tuyeres.		Maximum Pressure.
	p.c Cu.	Sq. Ft.	Tons.	Tons	Tons.	No.	Diam	Lbs.
Upright vessel, 7 feet x 14 feet 7 inches	51.1	7.07	7.63	.53	14.8	8	¾	18
Medium barrel, 7 feet x 10 feet 6 inches	51.7	6.66	8.40	.32	26.2	14	¾	12
Large barrel, 8 feet x 12 feet 6 inches	45	17.79	16.60	.80	20	18	1¼	15

* These data do not show the amount of lining material required to line a new converter, but only the average weight put in after a lining is worn down to the point where further charges would endanger the iron shell.

In all plants the converters are placed in a single row, forming a straight line. Back of them is the main flue (vacuum 0.1 inch water), with projecting hoods, into which the converters discharge their gases, vapors and finely divided particles of charge (called flue dust). The main flue ends in a dust chamber (temperature, 370° C.), connected with a stack. At some works the matte is poured into a converter at the front from a suspended ladle, at others it arrives at the back (above the main flue) in a ladle, and is poured into a launder, which delivers it at the front. One stall is served by two to two and one-half converters and one and one-half to two ladles. The lining of converters, both of body and of caps, is still causing trouble, as in the most favorable case the body has to be removed after twenty-eight tons of matte have been treated; the cap has a longer life. The material is, of course, siliceous. A greenish granular sandstone (SiO_2, 64.4; FeO, 7.6; Al_2O_3, 16.5; CaO, 1.1; MgO, 1.8; ignition loss, 4.7), which readily crumbles when exposed to the air, is used without any admixture of a bond. A crushed quartzite, pugged with 5% clay, gives a satisfactory mixture (SiO_2, 88.6; Fe_2O_3, 3.1; Al_2O_3, 4.0; CaO, 1.6); lining sand has been mixed with slimes from the ore-dressing works (insoluble, 75.3; SiO_2, 60.0; Fe, 2.2; Al_2O_3, 19.9; S, 6 8; As and Sb, 0.75; Cu, 6 05) and with second-class ore (insoluble, 68 9; SiO_2, 57.0; Fe, 9.6; Al_2O_3, 10.4; S, 15.95; Cu, 5.95; Ag, 2 oz.), giving the following material:

Insoluble, 82 2, SiO_2, 63.0; Fe, 5.9; Al_2O_3, 17.3; CaO, 1.5; MgO, 1.3; S, 2.1; Cu, 1.0; H_2O, 11.0; ignition loss, 4.1.

Another mixture for the body of the converters consists of quartzite (SiO_2, 90 to 91; Al_2O_3, 2.0; FeO, 3.0; Ag, 10 to 20 oz.) and slimes (SiO_2, 60; Fe, 4 to 5; Al_2O_3, 15; S, 9; Cu, 5 to 7), to form a lining (SiO_2, 85; Fe, 3.3; Al_2O_3, 4; S, 3; Cu, 4; Ag, 12 oz.).

In some instances siliceous gold ores have been worked in as a lining material. The material for the cap has to be more plastic than is necessary for that of the body. The lining usually consists of body lining material, and 5% to 10% of clay, and is mixed with more water than the body material. If the lining of the body were eaten away solely by the scorifying action of the iron, its life would be much longer than it is. The chemical action in some instances plays even a subordinate part to the mechanical wear, by the swash of the liquid charge which causes part of the lining to break off. This is especially observable in the barrel converter. The chemical wear takes place mainly near the tuyeres, the mechanical wear at the opposite side near the top of the body. In an upright converter, 14 feet 2 inches high and 7 feet in diameter, the bottom lining will be 22 inches thick, the side lining at the tuyeres will be 30 inches thick, and on the opposite only 18 inches, while at the top of the body the lining on the tuyere side will be 17¾ and opposite 27¾ inches thick.

In a horizontal converter, 10 feet 6 inches long and 7 feet in diameter, the bottom will be 18 inches thick, consisting of a 4-inch segmental layer of mixture tamped onto the steel shell, followed by a slightly curved 4½-inch course of brick and by a 10-inch layer of mixture. The sides are lined with a course of 4½-inch firebrick, special brick 6½ by 6½ by 4 inches being used at the tuyere level. A cross-section through the tuyere level will show the sand lining to be 30 inches at the tuyeres and 16 inches opposite; at the top of the body, the corresponding dimensions will be 20 and 20 inches. The longitudinal section will show the side lining to be 16 inches at top of the bottom lining and 34 inches at the top of the body. The ends are not lined with brick. Sometimes the lining is still rammed in by hand, an air drill adapted for the purpose or the flask tamper of the foundryman is more common.

The ramming is done by contract, a premium being paid if the converter makes more than the standard amount of copper on a lining and deductions made if it falls below it. If the lining is to be patched, the vessel is first emptied and then cooled with water from the outside, then lining material is rammed in or a few scoopfuls of infusible odds-and-ends are thrown in, tamped down and slag thrown over the patch. Occasionally, matte is run into the empty converter and allowed to solidify. Experiments in lengthening the life of the converter, by pouring siliceous blast furnace slag into the converters with the hope that the excess of silica over that of the normal converter slag would combine with the oxidized iron from the matte, have been only partially successful.

The difficulty and expense of handling converter slag has been overcome in one plant by the use of slag casting machines.

The average time to complete a charge with a five-ton upright converter is two hours fifty-five minutes; this figure is reduced to two hours twenty minutes if the time taken up by pouring and waiting is excluded. The blowing of a single charge takes forty-seven minutes, a double charge takes eighty-two minutes. In pouring the slag a rabble is pushed in and out of the stream of slag. The appearance of bright sizzling specks is a sign that white metal is coming over. A few partial analyses of the products obtained in converting are subjoined:

	Cu	SiO_2.	FeO	Al_2O_3.	CaO.	Ag. Au. Ozs.	S.	As. and Sb.
Slag	2.0	30.0	55.2	9.5	1.0	....	....	....
"	1.6	29.8	57.8	10.0	1.0	0.8	....	....
"	5–6	31–32	54	....	.....	....	....	....
Dust	37.8	1.5	7.4	1.9	None	....	14.3	4.8
"	63.4	3.8	12.8	....	.....	53.8	16.0	....
"	65	.....	....	....	.....	....	....	....
Pig copper	99.0	.....	....	....	.....	9–40	....	....

The labor required per shift for a single converter is made up of one skimmer, one puncher, one helper and one sampler.

With three large horizontal converters running as steadily as possible the number is one skimmer, two punchers, two helpers and two samplers.

In the following table part of the data given previously have been summarized, and some additional facts have been added.

It will be seen that the medium barrel uses much less lining per ton of resulting copper than the upright vessel, although the grade of the matte differs only slightly. This may be explained by the more siliceous character of the lining used, as, except for the mechanical effect of making the material plastic, alumina would be of no service in scorifying; furthermore, the lining of the upright vessel runs higher in iron.

The lining of the large barrel is of about the same quality as that used with the medium barrel, but as the matte of the former is of a lower grade, the quantity of lining used per ton of resulting copper is naturally higher.

Converter Lining.	SiO_2.	Fe_2O_3.	Al_2O_3.	CaO.	MgO.
Medium barrel	91.	3.	3.8	1.6	...
Upright vessel	64.4	8.4	16.5	1.1	1.8

In the upright vessel, the amount of free air used

per ton of copper converted is about 200,000 cubic feet, not allowing for "leakage" in the blowing engines.

YIELD OF METAL.—The general yield of metal in roasting, smelting and converting, in treating an ore assaying 10% to 12% copper and about four ounces silver per ton, is copper 92+% and silver 95+%.

(TO BE CONTINUED.)

Cyanide Treatment of Sands on the Rand.*

Written by H. S. DENNY.

As a general statement, it may be said that the cyanide process upon the Witwatersrand is principally confined to the treatment of what is designated as "sands," after classification always from "slimes," and in a few isolated cases from sulphurets. The average percentage of sands so classified is in the neighborhood of 70%, the balance consisting of slimes and, where concentration is employed, of slimes and sulphurets.

Leaving the question of concentration out of consideration for the moment, the general practice is to pass the ore, after being crushed to about a 600 mesh (per square inch), over amalgamated copper plates. The pulp is then lifted, ordinarily by means of a tailings wheel, to a point where it is introduced into one or a series of spitzkasten, the overflow from which carries off the bulk of the water and 30% of the crushed ore, consisting of slimes. This overflow is then either passed through a slimes plant, or, as in the majority of cases, simply led into settling pits, where the slime is allowed to accumulate and the overflow water is returned to the mill reservoir.

The bottom discharge from the spitzkasten is so arranged that its product may be conveyed into one of several vats, where it is settled either by means of an automatic distributor or a hand hose arrangement. In some cases fresh water is supplied at the point of discharge at the bottom of the spitzkasten, in order to avoid the possibility of slimes going through with the sands, but this is not generally considered necessary.

One form of automatic distributor, well known as the "Butters" distributor, is used. Most mining men, however, prefer the hand-hose distributor, which is generally operated by a native, who carries the hose to different points in the vat, and regulates the overflow discharge in each vat, so that it leaves at the furthest possible point from where he has deposited the sands. With the Butters distributor the vat is in some cases first filled with water, and a series of pipes automatically rotated by the force of the incoming pulp divides the stream into several channels and deposits it at various annular distances from the center. One objection to this latter method is that if for any reason the incoming flow is stopped, there is a settlement of slime with the sands, which prejudicially affects the subsequent leaching operations. Where a side discharge is adopted it is claimed that this objection is overcome. A good settlement is one which leaves a deposit of clean sand entirely free of slime, and which loses no sand in the operation. The settling tanks are supplied with filter beds, by means of which the sands are thoroughly drained.

From the settling vats—which in some cases are superimposed above the treatment vats, whilst in others they are placed on the same level—the sands are removed through the discharge doors by hand labor and put into the treatment tanks. The treatment vats are supplied with filter beds, beneath which are two or three outlets connecting with mains running to the extractor boxes. Through these mains the strong, medium and weak solutions, or strong and weak solutions if only two mains are used, are conducted to the zinc separator boxes, where there is provision for conducting the solution coming from any one main to any extractor box desired. The connections between the outlets from the vats and the mains are so arranged that the flow of solution from any one vat may be regulated to the various boxes at will. The solution mains are provided with meters by which the amount of solution passing through any main may be estimated, and drip samples are taken from the top of each extractor box, in order to check the amount of gold entering any one box.

The usual practice on the Witwatersrand is to give each charge of sands a six days treatment, and the washes used are somewhat as follows:

1. Strong solution (.25% cyanide of potassium), regulated to drain in twenty-four hours, the weight of solution being about 20% of that of the ore. The charge is then allowed to stand for twelve hours.
2. This operation is repeated.
3. Washes of .1% solution, drained dry each time and occupying two days, the proportion of solution to ore being in the ratio of 4—5.
4. Washes of 0.2 solution in the ratio of 1—10.
5. Water wash in the ratio of 1—10.

It has come before my notice in the past few years that after the installation of new filter beds the value of the residues after treatment reaches its minimum point, and as the filter beds become older the residues increase in value. Careful attention to the condition of the beds and proper cleaning will obviate any material loss in this direction, but there is no doubt that a limit is reached when it pays far better to incur the expenditure entailed in putting in new filter beds rather than continue with the old ones.

The strength of the solution used and the time of treatment given will vary slightly with different ore, but the general practice is the same in all cases. The clean-up of the gold slimes from the extractor boxes is on some mines conducted monthly, whilst in others a light clean-up is made in the first half of the month, and, personally, I favor the latter procedure, as it increases the efficiency of the boxes and enables one to estimate more accurately what the output is likely to be.

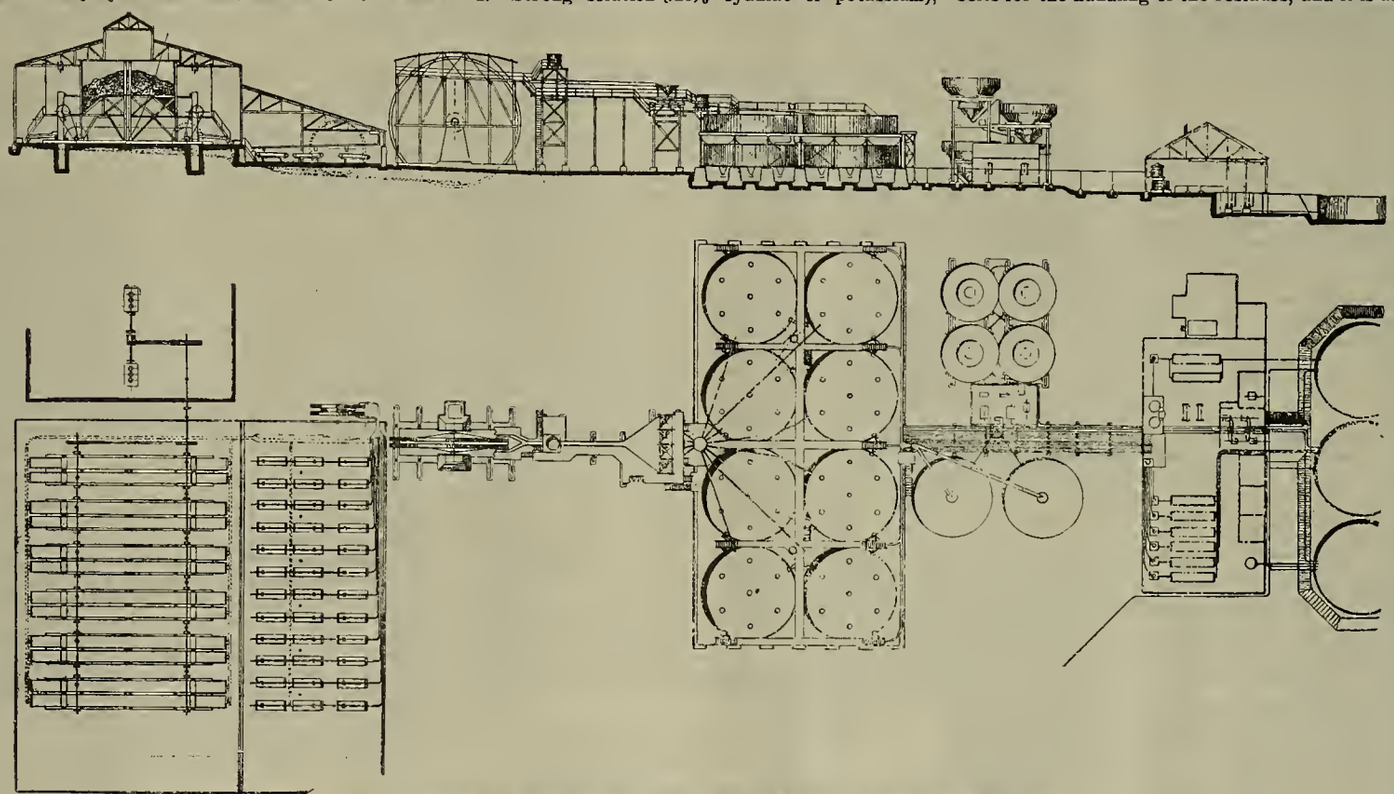
The treatment of zinc slimes is simple, the first operation being to treat it with sulphuric acid and get rid of the bulk of the zinc, the second to calcine it, and, finally, to melt it with suitable fluxes in clay-lined plumbago furnaces of the reverberatory type.

A new process has been introduced lately by Mr. Taverner, cyanide manager of the Bonanza mine, by which the acid treatment may or may not be used, but the subsequent operation consists of smelting with lead and final cupellation, and it is claimed that a considerable saving is effected by it. There is no doubt that the presence of zinc in smelting gold always brings with it a tendency to carry off a portion of the gold, and whatever the subsequent operations may be, i. e., whether cupellation or direct smelting, I think the operation is benefited by a preliminary acid treatment if it can be done economically.

The main points to be observed in cyanide practice are, firstly, to study the consumption of cyanide, and by neutralizing any free acid that may be contained, to keep that consumption at its lowest point; secondly, to have a leachable product free from slimes, and, thirdly, to secure a high extraction and a low residue.

The details of handling both the slimes and sands depend entirely upon the arrangement of the plant, and it is generally agreed that the superimposed settling tanks enable the operator to work more economically than in any other design.

The attached diagram shows the general arrangement of reduction plant New Goch, shortly to be erected on the New Goch mine. There are many little improvements introduced, all of which will tend to facilitate the various operations comprising the treatment of sands. The most conspicuous feature of the cyanide plant is the installation of conveyor belts for the handling of the residues, and it is anticipated that in this section of work a considerable saving will be effected as against the methods of trucking in vogue to-day. It is more than probable that conveyor belts will play a very important part in all of our handling work in the near future, and even to-day there is plenty of evidence to show that their utility will not be confined to dealing with residues or even the handling of rock on surface.



General Arrangement of Reduction Plant at New Goch Gold Mines, Witwatersrand, South Africa.

I confidently look forward to the time when the huge plants, necessitated by the prolonged percolation methods in vogue to-day, will give way to something very much more simple and effective both in design and operation, and although, as elsewhere shown, our experiments on the short treatment of sands have not thus far resulted in a success that would justify too much optimism, I cannot but feel that on an ore offering to the metallurgist so few difficulties as that of the Witwatersrand, that the time is not far distant when the present difficulties will be overcome.

SLIMES TREATMENT.—Following up the experiments in the rapid treatment of slimes which show such highly satisfactory results, it may not be out of place to describe a plant which is now erected and being experimented with at the Van Ryn gold mines estate. The plant is designed to take the whole of the slimes overflowing from the spitzkasten, where the separation of sands and slimes is effected, and its arrangement is such that the flow is taken continuously at the top of the plant, and the treated slimes discharged continuously at the bottom, the whole process between these two points being continuous and regulated by the adjustment of a few valves. I admit that no authoritative statement as to the results the working of the plant can be made till it has be

*Abstract from Jour. Chem. Metal. & Min. Soc., S. A.

in operation for some months, and I prefer in these notes to simply describe the operations without going into details as to the figures of cost and extraction being obtained from it.

The first duty of the plant is to separate almost the whole of the water from the slimes in one continuous operation, and in such a manner that the water may be immediately returned to the mill reservoirs available for use again.

On the majority of our mines to-day the overflow from the spitzkasten above the cyanide vats is allowed to flow either through launders or open cuttings to the slime setting pits, and in many cases the length of such conduit is very considerable, and consequently the loss of water, firstly, by absorption, and, secondly, by evaporation, is correspondingly heavy.

Then, again, it is the custom to provide a series of pits in which the slime is settled, and the maintenance charges for the upkeep of banks and for cleaning out these pits represents a very appreciable figure per month.

Finally, there is further loss of water by absorption and evaporation in the pits themselves, and when the whole of these items are combined they constitute quite a heavy charge on the working costs per ton treated.

On this score alone, therefore, it may be fairly claimed that the plant fulfills an important function, and one that from a financial point of view is quite sufficient to justify the expenditure which its erection has entailed. This statement would not apply to the same degree on a mine possessing a supply of water so liberal that the loss of a fairly large quantity per day could be permitted without danger, but it is a notorious fact that most of the mines on the Witwatersrand have only their bare requirement, whilst many pay something like 2s 6d per 1000 gallons for the commodity, and in each case the saving of water becomes an exceedingly important consideration.

It is generally estimated that with every ton of ore crushed on the Witwatersrand we use from seven to ten tons of water, and although the latter figure is probably above the average, in the absence of more accurate data I have adopted it wherever this question has been touched upon.

The average loss of water is estimated at 20% of the total used per day.

On a basis of 100 stamps crushing 500 tons of ore and using 5000 tons of water, we thus have a loss of 1000 tons of water, or 200,000 gallons per day, which at say only 1s per 1000 gallons amounts to £10 per day, or £300 per month, whilst for companies paying 2s 6d per 1000 gallons it represents £750 per month.

In the plant under consideration the overflow water from the first three tanks flows continuously to the return water tanks, situated near at hand, and from this point is pumped either direct to the mill reservoir or to the service tanks.

Even supposing, therefore, that the loss of water is reduced by only 50% as compared with the slime pit settlement, the advantages gained are obviously important quite apart from the upkeep of conduits and slime pits involved in the latter system.

Another feature that may be mentioned is that to-day our slime settling pits are in many cases considerably removed from the mill water reservoir, and the whole of the return water has to be pumped over long distances, and often through a comparatively high lift, necessitating large pumping equipment and heavy cost.

The results of our work thus far indicate that on the score of water separation we may be quite satisfied that the plant will realize all our expectations.

In order to more clearly follow the operation of slime separation, gold solution and residue washing performed by the plant under consideration, the following description has been based upon a day's treatment of the current slimes produced by 160 stamps.

Assume that five tons of ore are crushed per stamp per day, and that ten tons of water are required for every ton of ore crushed, thus:

160x5 = 800 tons of ore crushed per day by 160 stamps.

800x10 = 8000 tons of water required per day.

800 + 8000 = 8800 tons of pulp discharged by battery per day.

Slimes average, say, 25% of total rock crushed.

Then: $\frac{800x25}{100}$ = 200 tons of slimes produced per day.

$\frac{800x75}{100}$ = 600 tons of tailings produced per day.

The tailings retain 10% of water, equal to sixty tons, therefore the tailings and retained water account for 660 tons out of the original 8800 tons of pulp discharged.

8800 — 660 = 8140 tons, which is the quantity sent to the slimes plant per day.

The launder is so arranged that the flow of incoming slimes is divided in such a manner that each vat receives an equal proportion of it. That is to say, on the proportion upon which we are figuring each vat receives $\frac{8140}{2}$ = 4070 tons of slime pulp per day. In these vats a separation of the whole of the slimes is automatically effected, the separated slimes continuously falling to the bottom of the vat, and continuously discharging through a suitable pipe to a second separator vat. The proportion of dry slimes in the discharge is one of slimes and four of water. The separated water overflows from the tops of the vats and returns direct to the mill reservoir.

We have seen that the total slimes produced per day is 200 tons, equivalent to, approximately, 0.14 tons per minute.

The flow of water into the slimes plant—less amount received by the tailings—is 1103 gallons per minute; 0.14 tons of slime—calculating it to be 1½ times as heavy as water—would therefore amount to 18 5 gallons per minute. The total quantity of slimes and water is, therefore, say, 1120 gallons per minute.

The vat B receives the whole of the separated slimes from the vat A, together with four times the quantity of water. It receives, therefore, per minute the equivalent of 19 gallons of dry slime and 111 gallons of water, or 130 gallons per minute in all. The quantity of water clarified and returned to the mill reservoirs from the vat A is; therefore, 1103 — 130 = 973 gallons per minute.

A similar separation to that effected in A takes place in B; that is to say, the slimes settle at the bottom and the water constantly rises and discharges over the top of the vat. As the rate of intake into B is only 130 gallons per minute, as compared with 450 gallons per minute in vat A, the one vat is sufficient to handle the whole of the incoming pulp from the vat A. The separated slimes in the vat B are discharged as a thick pulp in the proportion of one part by weight of dry slime to one part by weight of water to the solution chamber. Here the pulp is brought into contact with cyanide solution, and the whole is brought into a state of agitation by means of compressed air introduced through pipes lining the chamber and by arms revolving in the chamber. The quantity of water and slimes discharged per minute into the solution chamber is, therefore, 19 gallons of dry slimes and 28 gallons of water, equal to 47 gallons of pulp.

The quantity of clarified water overflowing from top of vat B is, therefore, 130 — 47 = 83 gallons of clear water per minute returned to the mill reservoir. The total quantity of water returned to the mill reservoir is, therefore, 973 gallons per minute from the vat A, plus 83 gallons per minute returned from vat B, a total of 1056 gallons out of the total 1103 supplied with the slimes.

In the solution chamber a quantity of cyanide solution—proportioned as 3 of solution to 1 of pulp—is added. At the rate of flow of pulp, shown above, into this chamber, viz.: 47 gallons per minute, the quantity of cyanide solution to be added is 141 gallons per minute. The inflow and outflow to and from the solution chamber may be regulated according to the will of the operator. The thoroughly mixed and aerated pulp and cyanide solution now discharges into the separator vat C, the flow being at the rate of 188 gallons per minute. Here a similar separation to that effected in B takes place, the slime sinking to the bottom of the vat and the solution rising to the top and overflowing. The important difference in the overflow from vats A and B, in contradistinction to vat C, is that, whereas in the first case the overflow was water, in the case of C the liquid is cyanide solution, in which is contained the gold dissolved from the pulp in solution chamber. The overflow passes directly to the precipitating boxes, the rate of flow being the total quantity less the proportion discharged from the bottom of the vat C. This quantity is precisely the same as that flowing from the vat B, therefore the rate of flow of the cyanide solution to the precipitating boxes is 141 gallons per minute. (This quantity, it will be observed, is that required for admixture with the pulp in each solution chamber, so that there can be no accumulation of cyanide solution.) The discharging pulp from C, at the rate of 47 gallons per minute, passes into the solution chamber, where it meets an incoming stream of cyanide solution, flowing at the rate of 141 gallons per minute. In this chamber the mixture is again thoroughly agitated by air, finally discharging into a slimes sump, in which is placed a pump, which latter raises the slimes to vat D. Here, similarly to C, a separation of slimes and solution is effected, the settled slimes discharging to the solution chamber, and the overflowing cyanide solution passing to the making-up tank, where, after being raised to the standard strength, it passes to the solution chamber, beginning the cycle de novo.

The pulp passing into the solution chamber meets a stream of solution which has passed through the precipitating boxes to the sump, and is continually pumped from thence to this chamber at the same rate as it flows through the precipitating boxes, viz., 168 gallons per minute. In this chamber the pulp is agitated by air similarly to the process in b and c, discharging into the separator vat E. Here a separation of slimes is effected from the cyanide solution in every way similar to that described in connection with the other separator vats, A, B, C and D, the overflow of the cyanide solution passing into the solution chamber, and the slimes discharging at the bottom of the vat, being depleted of their gold to the greatest possible degree, are pumped to a slimes residue dump. The quantity of solution lost in the whole process is the weak washing solution which is discharged from the vat E. This loss is less than that from the ordinary slimes plant, inasmuch as it is difficult to settle slimes by the ordinary process to a constituency of more than 40% dry slimes in the pulp, whereas in the case under review the discharge is from 50% to 60%.

In Western Australia to-day several authorities state that they obtain a product carrying 60% dry slimes from a series of ordinary spitzkasten.

Ore Deposits of the Northern Black Hills.*

NUMBER II.

Written by J. D. IRVING.

There are at present, besides these sedimentary rocks, eruptive rocks of several varieties. The most abundant of these are rhyolite, either fine-grained and white, as in the vicinity of the Homestake mine, or coarse-grained and darker-colored, as in other localities; syenite porphyries, which occur chiefly in the vicinity of Deadwood and Two Bit gulch, and phonolite. The latter is generally of a dark greenish or bluish rock, sometimes quite coarse, but usually exceedingly dense and fine-grained. Other intermediate varieties of eruptive rock are also present in different places. The eruptive rocks, when found in the schist series, are usually either in dikes which are parallel to the lamination of the schists, or in large and more irregular masses which have no definite form. When in the Cambrian rocks, they are generally sills or sheets which have spread out laterally to great distances along the planes of sedimentation; when found in the Carboniferous, are of more irregular form, sometimes occurring in short, thick sheets, again in dikes, and still more frequently in very irregular masses.

THE ORE DEPOSITS.—If the placer workings, which are distributed widely over the entire hills, be excluded, the productive mining region of the northern Black Hills comprises a limited area of about 100 square miles. It extends from the town of Perry, on Elk creek, where the Clover Leaf mine is situated, northwestward to the town of Carbonate, east of Spearfish canyon, while its widest, as well as most productive portion, lies between Terry Peak on the southwest and Garden City on the northeast.

Within this rather restricted region are closely grouped together as many as nine distinct types of ore deposits. They occur in each case in a particular geological series, and are, with one exception, not found in the rocks belonging to any other formation. Considering them in accordance with the rocks in which they are found, we may distinguish the following five divisions:

(1) Ore deposits in Algonkian rocks; (2) ore deposits in Cambrian rocks; (3) ore deposits in Carboniferous rocks; (4) ore deposits in eruptive rocks; (5) ore deposits in rocks of recent formation.

In the crystalline schists and metamorphic rocks of the Algonkian age are found the free-milling gold ores, some small deposits of tin and a few prospects of copper which have not yet assumed great importance. In addition to these, there are certain deposits of graphite which have lately attracted some interest.

In the Cambrian rocks there are gold-bearing gravels which lie at the base of the formation; the refractory siliceous ores which have of late years become of great importance, the lead-silver ores of Galena and vicinity, and some deposits of wolframite, which have from time to time produced considerable quantities of this mineral.

In the heavy, gray limestones of the Carboniferous there have been found in the vicinity of Ragged Top mountain high-grade siliceous ores, and at the town of Carbonate the same rocks have yielded lead-silver ores closely resembling those of Leadville, Colo. A few deposits also occur in eruptive rocks. In the latest rocks of all—the gravels which fill the beds of modern streams—have been found the placer deposits, and while they are chiefly of historic interest as representing the earlier development of mining in the hills, they have in past years produced heavily.

ORE DEPOSITS IN METAMORPHIC ALGONKIAN SCHISTS.—Since the attention of miners has been transferred from the gold-bearing gravels, which are always the first producers of a mining region, the free-milling lodes which occur in the Algonkian schists have assumed a greater and greater importance in the production of this region, until now they are the heaviest producers and constitute by far the most prominent factor in the gold production of the region.

There are in general two areas where ores of this character have been discovered. The first is the Homestake belt; the second, the Clover Leaf, or Uncle Sam mine, at some distance to the southeast.

The Homestake belt is a term which has been applied to a series of mines operated on a great gold-bearing zone in the metamorphic schists, which is located in the vicinity of Lead City. It comprises a

*Trans. Amer. Min. Congress, Deadwood, S. D., Sept. 9, 1903; (condensed).

group of mines which are known severally as the Homestake, Deadwood-Terra, Father De Smet and Caledonia; but as the Homestake Co. has exercised an increasingly important influence in the management, the name has become gradually applied to the entire belt. The surface workings or open cuts from which the ore was first extracted in the early days of the history of this belt, indicate in a broad, general way the location and trend of the ore body. The Caledonia ore body is distinct from that operated in the other mines and lies to the east of it. The Homestake ore body is not a true fissure vein, but is a broad impregnated zone in the schists, which strikes approximately north 34° west, and is slightly at variance with the general direction of the lamination of the schists. There seems to be a rough dip to the east, but the ore is so irregularly related to the rocks in which it occurs that the general inclination can not be given with any degree of accuracy. The ore body pitches noticeably towards the south, so that at the southernmost portion yet opened up it is much more deeply buried than in a northerly direction. Alternating with the lenses of ore, and almost to the eastern side of them, are many dikes of white, fine-grained rhyolite, which have passed upward between the lamination planes of the schists and spread out in broad flat masses in the remnants of flat-lying Cambrian strata which can the hills to the west, north and east of the ore zone. In places most of the stratified rock in which these porphyry masses have intruded is now eroded, and on the summits of the divides which separates the open cuts little is left but the thick sheets of rhyolite. As these porphyry bodies were followed downward, they became gradually smaller and fewer in number, the eruptive rock having apparently spread out as it came nearer to the surface and formed branching masses of a lenticular form. The first ore which was mined in the early days formed irregular lenticular masses, included almost wholly within these dikes of porphyry; but, as it was followed downward, it seemed to diverge from the porphyry bodies, and in the deeper levels of the mine is seemingly independent of them. It is, however, an interesting fact that in the lower levels a mass of phonolite of a dark greenish color has been found closely associated with the wider portions of the ore zone. No exact foot wall or hanging wall to the ore can be detected, because it is in many cases difficult to distinguish the mineralized material from the barren country rock.

It seems probable that the Homestake lode was a harder and more resistant ledge than the surrounding schists of the Algonkian, and that for this reason it constituted a reef in the old Cambrian seas before the sedimentary rocks above were deposited. That it was then mineralized and gold-bearing is proved by the presence of gold in the lowest rocks of the sedimentary series which lie in the isolated patches about the outcrop of the ore body.

The ores of the Homestake belt can not be said to present any constant features which serve to distinguish them from the characteristic but barren rocks of the Algonkian series. Pyrite is by far the most invariable indication of mineralization; but it is notably absent from much of the ore. Quartz also occurs in a great number of cases. Perhaps the most usual type of ore would be that consisting largely of quartz and pyrite. Other minerals are dolomite, calcite and arsenopyrite; these are also of very frequent occurrence, but no decrease in the values of the ore can be noted when they are absent. Again, garnet and tremolite appear in some portions of the ore in such abundance as to constitute the larger part of the gangue minerals; but the ore here found shows no variation in value from that having a wholly different appearance. When the ordinary type of schist is mineralized, the ore closely resembles a schist; but when the amphibolite is mineralized it more closely resembles an amphibolite. Thus it will appear that, although we find pyrite, quartz, dolomite, calcite, arsenopyrite, tremolite and garnet frequently constituting, either separately or in combination, the gangue of the ore, no one of these minerals can be considered as indication of the presence of gold. In general, however, it may be said that the ores occupy a zone in the Algonkian rocks which present a greater number of secondary minerals, a more constant occurrence of sulphides, quartz, dolomite, calcite and arsenopyrite, and finally a more advanced degree of distortion and irregularity of structure than do the barren areas of the same formation.

From a careful study of the ores and general structure of the Homestake belt, it appears that, first, there have been several different periods of mineralization, one at least of which has preceded the deposition of the Cambrian rocks. This is distinctly shown by the presence of placer gold in the lowermost gravel beds of the Cambrian. Second, there have been periods of mineralization which followed the entire deposition of the sedimentary rocks later than the intrusion of the dikes and bodies of rhyolite. It is probable that this belt has been the seat of many fracturings and dynamic movements from the earliest geologic time until the present, and has constituted a line of weakness along which mineralizing waters were permitted to circulate more freely than elsewhere. Impregnation of the country rock at successive periods with vein minerals and small amounts of gold has thus given rise to a workable zone of gold-bearing rock.

In the earlier days of the mine the ore was more completely free-milling and of higher grade than that now mined. It was highly oxidized and contained little or no sulphurets. As the workings penetrated deeper beneath the surface, oxidized material gave place gradually to sulphides, and more and more of the values in the ores failed to yield to amalgamation. For a time the concentrates from the mine were sold to smelting companies, but experimentation on their treatment led to the construction of a cyanide plant with a view to treating the more refractory portions of the ore.

CLOVER LEAF MINE.—The other mine which has been operated on Algonkian ores is known as the Clover Leaf mine (formerly the Uncle Sam), not far from the station of Perry, on the Black Hills & Ft. Pierre Railroad. Compared with the Homestake belt its production is comparatively small, but it is of singular geological interest. The ore body is a large, saddle-shaped mass of quartz, enclosed in the metamorphic schists, with its apex striking north 64° west and pitching to the southeast at an angle of 40°. The horizontal section of the quartz body as exposed on the 250-foot level has the appearance of the letter U with slightly flaring arms. The northern arm strikes north 40° west and the southern 75° west. This quartz body is thickest at the crest, and the lamination of the enclosing schist is parallel to its surface, curving around it so as to give to the mass the appearance of a folded lens at the crest of a southeastwardly pitching anticlinal fold in the Algonkian schist. Both of the arms of this quartz mass when followed out from the apex become narrower than the main body. The northwesterly has an average width of 20 feet, the southwesterly of about 10 to 12 feet. The gold is contained chiefly in the quartz, in which it often appears free and generally associated with small particles of galena. The quartz and the encompassing schist are heavily impregnated with pyrite which at the surface is completely oxidized. The ore is treated in a stamp mill and amalgamates readily.

Besides these gold-bearing lodes, there occur also in rocks of Algonkian age deposits of tin, notably in the southern portion of the hills and in the region to the west of Spearfish canyon, known as Nigger Hill. The country rock in which these deposits occur is a coarse muscovite granite, and the cassiterite is scattered through this rock in irregular patches, increasing and decreasing in amount with little or no regularity. The cassiterite occurs also in placers as stream gravels, which have been derived from the disintegration of the country rock containing the tin. The cassiterite in these gravels is but little rounded and differs in its black color from the usual reddish-brown type of stream tin so commonly found in the vicinity of the tin-bearing lodes.

Prospects of copper have also been found at different places in the schist areas of the Northern Hills, but they have not yet been of sufficient size or regularity to attract attention.

(TO BE CONTINUED.)

Pyritic Smelting.*

NUMBER II.—CONCLUDED.

Written by FRANKLIN R. CARPENTER, Ph.D.

It will be observed that the smelting proper at Mount Lyell is accomplished in two steps. A low-grade matte is made in the first smelting, which is enriched by a second smelting to a grade high enough for the converter. This in a differently constructed charge may not be necessary, depending upon the per cent of copper, degree of concentration and the proportion of iron to silica. A charge can be made of Montana ores which will not require the second, or concentration smelting; but the second smelting, being relatively small compared with the first, is never a serious matter and adds but little to the cost.

I have now sketched the two outside cases of pyritic smelting, both of which are eminently successful in their respective fields. There are many cases, however, which lie between these extremes, as at Butte, Mont.; in Gilpin county, Colo.; British Columbia and elsewhere, where the sulphide ores carry a large percentage of silica, and are treated by water concentration before smelting. This presupposes concentration mills of enormous capacity and roasting furnaces for the concentrates so obtained, both of which cost great sums of money, and which are at best very wasteful. By the further application of the principles already developed and the utilization of the cheap fuel now wasted, it is barely possible that the process might be modified.

Modern copper smelting methods have received their greatest development at Butte, and I will let no one go beyond me in admiration of the great work done there and sincere respect for those who have accomplished it. Their mills are models of mechanical ingenuity never surpassed, and their reverberatory furnace work is not elsewhere equalled. I do not lose sight of the fact that these last furnaces, which a few years ago, when first introduced from Swansea, had a hearth capacity of but 9 by 14 feet, and a smelting capacity often as low as ten tons per day, requiring to be clayed up every twenty-four hours, have now been developed into furnaces having hearths 20 by 50 feet and smelting more than 100 tons each in twenty-four hours, and which require claying not more than once in twelve days; also that they save more than 50% of the fuel used in the old furnaces. It is, therefore, with the greatest diffidence that I suggest that any change is possible in the methods of a camp which is to-day without a peer in the world for the excellency of its work — but let us not forget history: "The old order changeth, giving place to new."

Seemingly small things in metallurgy have often accomplished the greatest results.

A few years ago there was still running in Savoy a small iron blast furnace blown by a trompe, or box, in which falling water compressed air by entangling it in its fall—a blower which we may readily imagine neither heated the air nor dried it, yet the addition of this blowing machine, crude as it was, made the instrument which put out of blast all the Catalan direct furnaces in every part of the world. Without the trompe the blast furnace for iron would probably not have existed, and without pig iron all that is known to us now as the "age of steel" could not have existed.

Already three-fourths of the beautiful ancient Welsh copper process, with its roastings and resmeltings, to which the reverberatory furnace belonged, has gone by never to return, the one operation of converting having replaced them all.

I believe that when Hollway undertook to smelt the Rio Tinto copper ores without fuel other than what they themselves contained, he laid down a principle which will ultimately make every copper roasting heap and roasting furnace as useless as the Catalan forge, and the time is near at hand when one would no sooner waste his good iron sulphide fuel than he would his good coke. Already more ore is smelted raw at Butte than formerly. The first-class copper ore and the coarse concentrates go into the blast furnace raw, a trifle, as far as it goes, to pyritic smelting. But if the principles here maintained are correct, the large concentrating mills and roasting furnaces will gradually be replaced by a process that is all one of fire, and that fire largely derived from the oxidation of the now wasted pyrite.

I have done what I could to secure the actual composition and cost of treating an average ton of Butte ore, as it is broken at the mines, that I might make a comparison between the all-fire raw method here advocated and the combination water concentration smelting method now employed.

The following may not be absolutely correct, but it will do for comparison. The ores of this district, according to a recent paper, are mined in two classes. The first are said to average from 10% to 15% copper, and to constitute 10% of the ores raised. The second class comprises the remaining 90%, and yields from 3% to 6% copper. If all were broken down together we may take 5% as the average, and 30% to 40% silica, with the alumina, alkalies, sulphur and iron to balance.

I have arrived at the present cost per ton of ore from the testimony of Frank Klepetko in March, 1898:

Dressing (or water concentration), per ton of ore	$0.82
Roasting concentrates derived from a ton of ore	0.38
Smelting calcines derived from a ton of ore	1.20
Total per ton of original ore	$2.40
In the water concentration he stated the loss to be	18.0%
In the roasting	2.6%
In the smelting	4.2%
Total	24.8%

With copper at 14 cents per pound this is worth $3.47, making the total cost, including losses, $5.87 per ton of original ore.

If this ore were smelted direct as it comes from the mines, without concentrating or roasting, by the addition of limestone and coke and the application of hot blast, it would cost fully as much per ton of ore, perhaps more; but I am sure that $3 per ton will cover it. This is more per ton, but I estimate a greater saving. According to the above statement, there was lost, in the concentrating, roasting and smelting, 24.8% of the original contents of the ore by the time the copper was raised to a grade sufficiently high for the converters—against which I figure but 9% in direct smelting, leaving a difference of $3.47 minus $1.26, equal to $2.21 gain per ton. As this gain is wholly in the copper, it adds a proportional length of life to the mines. If, however, the one smelting cannot be done for the cost of concentrating, roasting and smelting, this gain would be reduced by the difference. If the first smelting cost $3, which I am sure is ample, we should still have a gain of $1.60 in favor of raw smelting, always supposing these figures to be correct.

In our prejudice for the established methods, it will be well to remember a story told by a traveler from the Sahara desert. He came across a party of Arabs making iron, doubtless after a manner dating from the days of Abraham. The furnace consisted of a hole in the ground, around which were three blowing engines, each consisting of an Arab with a long tube, one end of which was in his mouth and the other

*Trans. Amer. Min. Congress, Deadwood, S.D., Sept. 9, 1903.

in the furnace. After blowing, from six to eight pounds of iron per shift was obtained.

Our traveler was much impressed, but inquired of the boss metallurgist: "Why do you use this method of making iron?" He received a look of withering scorn and the reply, "What other method can there be? Neither our fathers nor ourselves ever heard of any other."

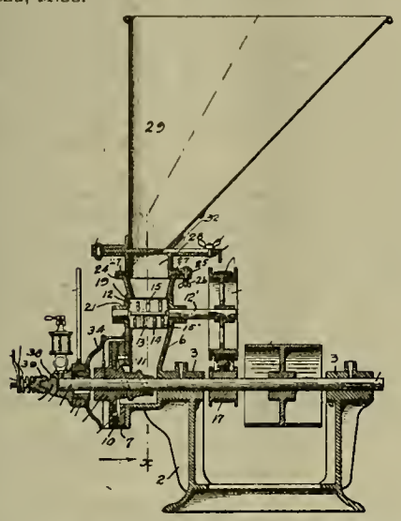
Because our fathers and ourselves have always burned our iron and sulphur outside of the furnace is no good reason for continuing it.

Mining and Metallurgical Patents.

PATENTS ISSUED SEPTEMBER 8, 1903

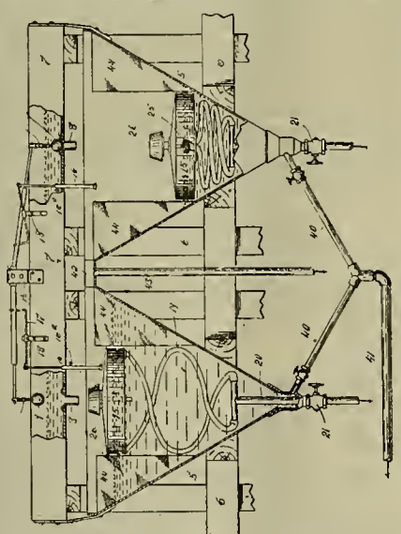
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

GRINDING MILL.—No. 737 953; C N. McLaughlin, Winona, Minn.



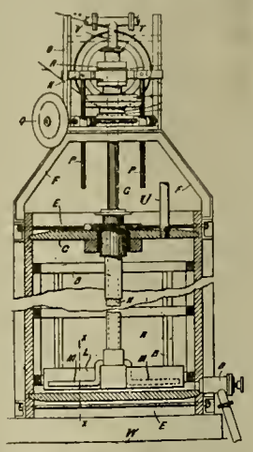
In grinding mill, combination, with lower hopper section 21 having flange 24, of hopper base having lateral flange resting upon flange 24 and downwardly projecting flange fitting within hopper section 21, and movable lugs or ears mounted on flange 24 and adapted to overlap lateral flange and prevent vertical movement of hopper base while permitting rotation or ready detachment.

ORE SIZER OR CLASSIFIER.—No. 738,743; W. B. Gilmore, Idaho Springs, Colo.



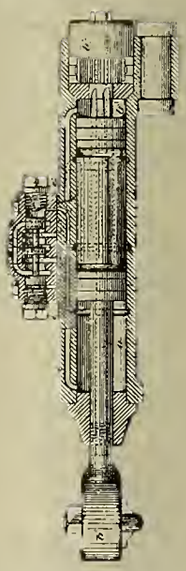
In sizing or settling apparatus, combination of two conical tanks, each having outlet for discharge of solid particles and distinct outlet for discharge of liquid, float located in each tank, flexible conduit connected with float at one extremity and with liquid outlet at opposite extremity, extremity of flexible conduit connected with float, being provided with collapsible hood, vertically movable spring-supported receptacle mounted on each float, lever connecting said receptacle with hood whereby latter is raised or lowered to bring hood above or below liquid level, receptacle having outlet to tank, pulp supply tank mounted above settling tanks and provided with outlets adapted to discharge pulp into receptacles 26 faster than it escapes from outlets of receptacles, tubular lever fulcrumed on supply tank and containing mercury, valve connected with each extremity of lever, auxiliary lever also fulcrumed on supply tank and connected with each arm of tubular lever at one extremity, depending rod connected with each auxiliary lever at opposite extremity, said rod lying in path of float of settling tank when latter has reached predetermined elevation, arrangement being such that as either float engages rod valve above tank containing actuating float will be closed to cut off supply of pulp to that tank, the other valve opened to permit pulp to pass to opposite tank.

APPARATUS FOR EXTRACTION OF PRECIOUS METALS FROM THEIR ORES.—No. 738,148; J. B. de Alzugaray and W. A. Mercer, London, England.



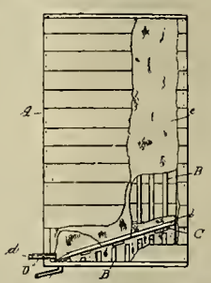
Apparatus for treating ores, consisting of closed containing vessel provided with fixed internal blades, rotating hollow spindle provided with ball bearings having hollow blades or beaters set at angle, means for raising and lowering spindle in vat, gearing for rotating spindle, and means connected with vat for supporting gearing and steadying spindle.

VALVE MECHANISM FOR ROCK DRILLS.—No 738,229; T. Officer, Claremont, N. H.



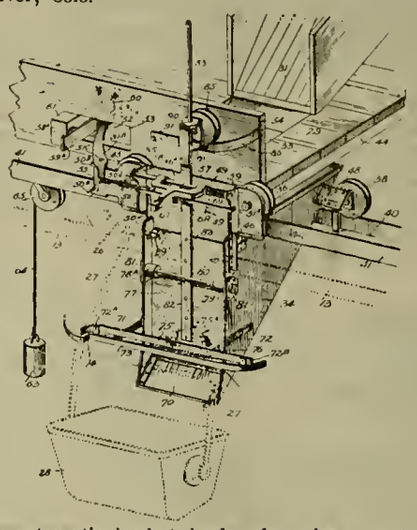
Valve mechanism containing pressure-actuated valve, chamber for each end thereof, means to admit actuating pressure to chambers from cylinder to reverse valve, means to admit locking pressure also to chambers from source independent of cylinder, and means to vent both chambers with valve in each of its extreme positions.

DEVICE FOR TREATING SLIMES.—No. 738,329; W. E. Holderman, Marysvale, Utah.



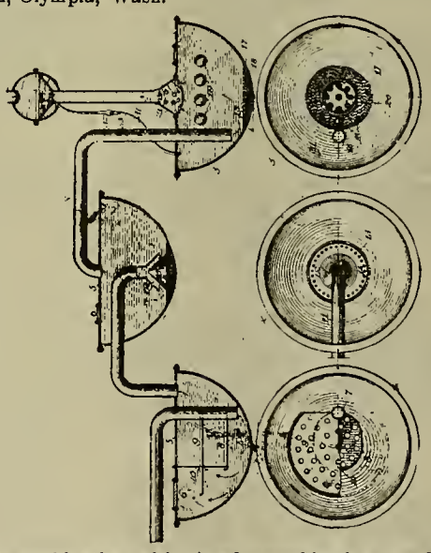
In device for treating slimes having liquid tight case, discharge pipe provided with valve in bottom, inclined floor in case, spaced bars on floor and sides of case, filtering fabric covering bars and overlapping upper edge of tank, molding to hold fabric in operative position and pipes provided with stoppers leading from filter out through case, tanks arranged in stair-like co-operative relation, pipes leading from bottom of each tank, conduit E to receive discharge from pipes, reservoir into which conduit discharges, and pipes in each tank provided with stoppers discharging from filters through outer case into tank next below it, pipes from lowest tank discharging into waste trough.

AUTOMATIC BUCKET LOADER FOR AERIAL WIRE ROPE TRAMWAYS.—No. 738,309; C. T. Finlayson, Denver, Colo.



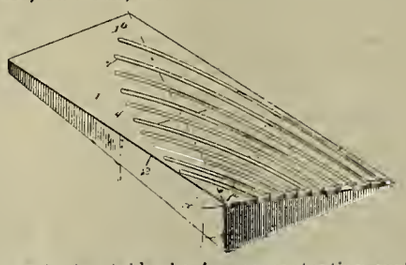
In automatic bucket loader for wire rope tramways, combination with terminals and continuously running pendant buckets of operative tramway, of loading station, bucket loading hopper mounted on tracks at station, arm slidably mounted on hopper, spring between arm and hopper and projection on pendant of bucket adapted to strike arm and to move hopper through medium of spring, predetermined distance on tracks, means for returning hopper to loading station and means for discharging contents of hopper into bucket.

GOLD SAVING DEVICE.—No. 738,291; P. H. Carlyon, Olympia, Wash.



In combination with closed vessel having rounded bottom, inlet pipe extending into vessel and discharging against bottom to one side of center thereof, screens horizontally suspended within vessel and stopping short of sides thereof; and exit pipe extending from cover of vessel at point therein where material passing through vessel is relatively quiescent.

CONCENTRATOR TABLE.—No. 738,493; R. Schraubstadter, St. Louis, Mo.



Concentrator table, having concentrating surface in form of hyperbolic paraboloid, provided with riffles which have form of parabolas, and means for reciprocating table.

Mining Summary.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

The yearly report of the output of gold and silver, being prepared in the office of the director of the mint at Washington, shows a slight decrease in the amount of gold mined during the past year and a falling off in silver. Alaska increased her yield last year by $2,000,000.

The figures for the eight leading States and Territories are as follows:

	Gold.	*Silver.
Colorado	$28,468,700	$ 8.308.280
California	16 792.100	477,424
Montana	4.373.600	7.019 214
Utah	3,594 500	5,740,891
Alaska	8 345 800	48.760
South Dakota	6.965.400	180,306
Nevada	2,895,300	1,985,486
Idaho	1,475,000	3,103,044
United States	80,000,000	29,415,000

*Commercial value.

	Silver, by Ounces.
Colorado	15,676.000
California	900,800
Montana	13,243 800
Utah	10,831.700
Alaska	92.000
South Dakota	340 200
Nevada	3.746 200
Idaho	5,854,800
United States	55,500,000

In the above table the total value of production for all the States and Territories outside of those individually mentioned are shown under the caption of United States.

ALASKA.

R. T. Lamb, president of the Helvetia M. Co, operating at Windham Bay, says he is preparing to put in an air compressor and other machinery. The company expects to work during the winter.

A 1-foot ledge, carrying free gold, is reported located in Yankee Basin section, near Juneau, by F. Bach, P. Early, M. Kelly, T. Smith and R. R. Shepard.

The discovery of placer gold on Lowe river, 20 miles from Valdez, is confirmed, says the Valdez Prospector. So far as the work has gone, the gravel shows yield of 75 cents per cubic yard, being mostly coarse gold. There are 950 acres, with gravel from 4 to 30 feet deep.

The Alaska Juneau mines, in Silverhow Basin, near Juneau, were closed down on the 2nd inst. for want of water.

Nome reports say: A beach strike has been made on Kadiak island. Three men in ten days took out $1300. The gold bearing beach sands are said to cover a considerable stretch of coast, but the best diggings have been found near the mouth of Red river and near Cape Karluk.

ARIZONA.

GILA COUNTY.

At the Old Dominion C. Co. works at Globe, the work of putting in the converter and other machinery is progressing. No. 1 and No. 3 furnaces are in operation, and No. 2 is being repaired. Arrivals of coke continue. Construction of the concentrator building has begun. The electric light system is proving satisfactory, says Superintendent F. W. Hoar.

GRAHAM COUNTY.

In the east drift from the Sapphire shaft of the Coronado mine, near Clifton, 30 feet of sulphide ore is reported struck. Bucket samples from the face show 11.5% copper.

MARICOPA COUNTY.

(Special Correspondence) —The Arizona M. & Dev. Co. has bought the Ryland mine in Vulture district, 3 miles west of Morristown. They will put men to work next week on this property, which has been a producer in the past.

R. E. Humphhries is working men on his properties near Morristown.——G. Carguile expects to start development work on his claims in Cave Creek district next week.

Wickenburg, Sept. 15.

The smelter at Wickenburg started last week.——F. X. O'Brien has thirty men at work on his mine near Wickenburg.

MOHAVE COUNTY.

(Special Correspondence) —The Mohave G. M. Co. of Arizona has a tunnel property, developed by five tunnels, giving in all 600 feet of backs. The average thickness of vein is 10 feet. Stoping operations are in progress. Ore is being stored at the mine ready for shipment to the mill as soon as the railroad connecting the mine and mill is completed. There is a 40-stamp mill recently completed 10 miles from the mine, so placed because of the necessity of obtaining sufficient water. It will require several weeks to finish the railroad and ore will then be milled. The railroad has already been extended to the river at Needles, 7 miles beyond the mill.

Needles, Sept. 8.

The Hilty group, the Ben Harrison and Tom Reed claims, have been bonded to D. McFarland and work will be started next week. The mines are in San Francisco district, near Kingman, and have been opened by shaft.

It is reported the Earl mine at Stockton Hill, near Cerbat, will be started up.

Work on two shafts of the Mother Lode mine, near Chloride, has been begun by the P. & A. Co. One of the shafts is being sunk by contract from the 70-foot to the 100-foot level, while the company is driving the other. W. Miller is superintendent.

PIMA COUNTY.

The Twin Buttes M. & S. Co. has been incorporated by J. C. Baxter, J. Ellis and M. Irish at Tucson, to operate the Twin Buttes group, 35 miles south of Tucson, in the Sierritas mountains. The group comprises nineteen claims.

YAVAPAI COUNTY.

(Special Correspondence).—Superintendent J. Gray, of the Poland Extension mine, in Big Bug district, 12 miles east of Prescott, has been doing some prospecting, following a fissure which faulted the main vein and has struck a body of manganese ore running 160 ounces silver. A few men are returning to work, and indications are that the strike will soon be a thing of the past. Mr. Pickerell is working the Rockefeller and President claims in this district and has high-grade ore in the bottom of the Rockefeller shaft, down 780 feet. J. Lawler has struck a large body of sulphide ore in winzes sunk below the lowest level of the Hillside mine, 50 miles west of Prescott.

Prescott, Sept. 15.

It is reported J. Hanlon of Des Moines, Iowa, has bonded the Weaver & Henderson group of six gold claims in the Hillside section for $20,000. Development work will start next week.

Manager Monroe, of the Verde Chief C. Co., near Jerome, says development work will be resumed this week and sinking a winze from the long tunnel started.

E. S. Campbell of Prescott reports having bought the Hidden Treasure mine, in Black Canyon district, near Prescott, for $16,000, for Canton and Massillon, Ohio, men. Campbell has started preparations to build a mill.

The steam stamp of the Ideal M. Co.'s mill at Groom creek was put in operation last week. The main shaft on this property is down 195 feet, says Foreman P. Fitzgerald.

ARKANSAS.

BOONE COUNTY.

After a short lay-off, during which the company has rounded up its expenditure, including the mill, of $15,000, work has been resumed at the Dyson mine, at Harrison.

MARION COUNTY.

(Special Correspondence) —The McIntosh Co. is preparing to start its mill.——The White Eagle mill is shut down temporarily, owing to an accident to the engine.——Workmen are quarrying at the Silver Hollow mine for location of the mill. The development work shows good zinc values.——The Buffalo & Yellville Railway—a Mo. Pac.-Iron Mt. branch—has filed the survey of its proposed line which will run from Buffalo to a connection of the White River division of the Iron Mt. Railway, near Yellville. This road will give the Rush and Clabber Creek and Buffalo River districts convenient railroad facilities.

The Morning Star mill is in operation, turning out from five to seven tons of concentrates on a ten-hour run. Arrangements are under way to increase the capacity from a 50-ton to a 125-ton plant and work a double shift. Engineers have been on the ground investigating a water-power proposition in this county along the Buffalo river. At their prospective location it will necessitate the cutting of a 2000-foot tunnel which will give a head of 46 feet. It is thought an electric plant will be installed which would be able to furnish power cheaply to the mines.

Yellville, Sept. 13.

Forty-eight feet of zinc ore is reported shown by diamond drill boring on Jimmies creek, near Yellville.

CALIFORNIA.

AMADOR COUNTY.

(Special Correspondence).—A new shoot of ore is reported on the 2100 level of the Oneida mine, near Jackson, in a crosscut run east from the shaft. The vein has been drifted a distance of 70 feet and is 8 feet wide, running $10 per ton. The Oneida is worked through a vertical shaft, sunk at the surface in the hanging wall country rock. The vein, which dips easterly, passes through the shaft at the 1900-foot level and is now east of the shaft.

Jackson, Cal., Sept. 15.

Some work is being done at the Shenandoah mine, near Plymouth, and it is reported sinking will be resumed, says the Dispatch.

C. Lessley has a bond for two years on the Madrone mine, near Pioneer. He is making a test crushing of rock.

At the Kennedy mine, at Jackson, the hoist is expected to be in operation next week. The addition of twenty stamps to the mill is going ahead, which will make sixty stamps at the new mill and forty stamps at the old works. The cement foundations are finished and the mortars are on the ground.

CALAVERAS COUNTY.

(Special Correspondence) —The Sheep Ranch mine and mill at Sheep Ranch, 8 miles north of Murphys, are closed down and only a watchman and pumpman are at work. It is expected the shut down will only be temporary, says Superintendent Anderson.

W. H. Clarey is developing a gold-bearing quartz property near Murphys.

Murphys, Sept. 16.

There are 100 men at work at the Campo Seco copper mine at Campo Seco, says the Citizen, and operations are progressing. The ore carries 6% copper, which is smelted up to 60% matte. The new working shaft is down 210 feet.

Progress is reported from the Bluejay mine, 2½ miles southeast of Mokelumne Hill, and the tunnel is in 645 feet.

At the Jones gravel mine at Railroad Flat, being operated by Seeman Bros., the tunnel has reached a depth of 75 feet, and is in 3 feet of gravel, the bottom of the channel having been reached, says the Calaveras Chronicle. Driving the tunnel ahead and breasting are in progress. The gravel is worked by sluicing.——The Boire gravel mine, on same channel, reports operations satisfactory. The gravel in this mine is cemented and requires milling.——The Miller gravel mine has men at work tunneling, retimbering and getting ready, and otherwise fixing up the property to increase operations.

F. O. Cortmarsh, manager of the Blue Jay mine, near Mokelumne Hill, reports steady progress at the mine, with the tunnel in 625 feet.

The Crystal mine at Angels, under Superintendent W. Morehead, is being prepared for mining operations. The work in the shaft and at the stations is progressing, says the Echo.

DEL NORTE COUNTY.

R. Wensch, in the French Hill section near Crescent City, says he is opening up a ledge of zinc ore 120 feet wide. The shaft is 60 feet deep. A crosscut is being run, and in a distance of 75 feet, 25 feet has been cut through the ledge. Assays show a workable percentage of zinc.

FRESNO COUNTY.

The Maine State Oil Co. at Coalinga has drilling under way on its No. 6 well. They expect to drill several other wells on the east side of its lease.

The well of the New San Francisco Crude Oil Co. that was brought in last month and reported to be pumping 150 barrels per day has been packed, which caused the well to flow at the rate of 300 barrels per day.

KERN COUNTY.

The Johannesburg Gold Mines Co. state: "Had it not been for the unforeseen interruption to our business, doubtless the energetic work we planned would have resulted in getting the property on a dividend basis this fall. The installation of our mill and our entire investment is at a standstill solely on account of existing labor troubles. We are surprised at any suggestion of dividends by this company from stock sales. Our business has not been conducted in a manner to warrant any such insinuation."

The Pyramid mine is being developed by the Verification & Development Co., 4 miles south of Randsburg.

The strike situation at Randsburg remains quiet, and Superintendent Barton of the Yellow Aster M. Co. says he has seventy men at work.

MARIPOSA COUNTY.

T. B. Stribbling and M. Marten report striking ore at Granite Springs, near Mariposa. The body of ore assays $25 in free gold. At one time there were two quartz mills in that section.

MONO COUNTY.

Near Lundy, the mill being built in Wasson canyon by Brown & Co. is about finished and crushing will begin on the Price ore next week, says the Bridgeport Union.

Aggler & Carmichael are taking out ore at the Wolverine mine, near Lundy.

NEVADA COUNTY.

(Special Correspondence) —J. Bryson of San Francisco, Cal., has bonded the Yuba mine, 6 miles from Washington on the Yuba river, and has gone to the mine to make a survey for an aerial tramway from the mill to the mine.

Nevada City, Sept. 17.

The Champion mines at Nevada City suspended operations this week and 100 men are out. It is stated the closedown is only temporary. In the meantime the pumps will keep the mine clear of water and the drifts and stopes will be kept open.

At Canada Hill, near Nevada City, Superintendent A. Charranat of the Banner Hill G. M. Co. of San Francisco says work is progressing on the tunnel to tap the gravel channel that comes down from Quaker Hill and has its outlet near Canada Hill. It is in 400 feet through soft blasting ground, and is expected to reach the channel within 200 feet more. The company controls all of the channel from the breakout to Quaker Hill, giving it an area of 1400 acres.

At the Murchie mine, near Nevada City, work will start this week on building a mill, says Manager Maltman. It will have nine stamps.

The South Idaho D. Co., near Grass Valley, has bought the Gambler (formerly the Stewart Parnell) claim, says Superintendent Carter. It adjoins the South Idaho.

The mill of the New York-Grass Valley mine, near Grass Valley, was put in operation last week, says Manager G. W. Root.

The Houston Hill works, owned by the Orleans M. Co., near Grass Valley, has been drained and development work will be resumed.

The New Eureka G. M. Co. has been incorporated at Nevada City, with J. Roberts, F. Tredinnick, J Foss, A. Martin and J. Rosewall, all of whom reside in Nevada City, as directors. They will work a group at Canada Hill.

C. L. Ellingwood of the Western Exploration Co. says they propose to reopen the Red Cross mine at Washington, near Omega, by means of a new tunnel that will start at the river.

T. F. McAvoy of San Francisco is arranging to reopen the Standard mine, adjoining the Jenny Lind mine, near Grass Valley.

A. L. & G. A. Biglow of North Columbia have started work at the Uncle Sam mine at Badger Hill and will build a mill on it.

PLACER COUNTY.

(Special Correspondence).—The Zuber bond on the Mike Cochran claim on Long canyon, southeast of Michigan Bluff, having expired on Sept. 1, Cochran is making preparation to work same himself. This is a gravel claim. —— The Ralston Divide Co, owned by French capital, is idle. A great deal of money has been spent there.

Auburn, Sept. 16.

The Haskell (Gaylord) gravel mine, near Auburn, resumed last week, and has thirty-five men at work, says E. C. Gaylord, superintendent.

The Bald Mountain Gravel M. Co. has started a tunnel from the bottom of Deep canyon, 200 feet lower than the present tunnel and using machine drills. Superintendent F. Veizke has fifteen men at work.

The California M. Co. has put in a 10-stamp mill at the ledge, on their property at Shady Run. The main tunnel is in 1400 feet, and a number of crosscuts have been made, opening up the ore body. This ledge is within the holdings of the Cedar Creek gravel mine, owned and operated by the same company.

PLUMAS COUNTY.

F., W. and C. Droege of Covington, Ky., have taken over the Johnny Bull group of mines in North canyon, near Greenville, which they have been working under bond, for $25,000. They have bought also the interest of F. W. Day, who retains the cyanide plant half a mile below the mine. Day proposes using it in connection with another property in that section. The Droege Bros. will increase development work on the group, and it is expected a milling plant will be built next spring.

SAN BERNARDINO COUNTY.

Manager Belcher, at Empire Flats, near Needles, says he has started work on his Bolivia mine, adjoining the Empire group, reports the Needles Eye.

The Providence Gold Syndicate, under Superintendent Northup, started dropping the stamps in their mill last week.

SAN DIEGO COUNTY.

The Cleveland and Pittsburg mines, near Escondido and half a mile from the Oro Fino mine, are being developed by an Eastern company, and work has been started to sink a shaft on the Cleveland to depth of 500 feet.

Work is reported progressing in the copper mine, near Olivenhain, and it is the intention of the company to build a

railroad from the mine to Encinitas station, a distance of 7 miles.

The Chula Vista Oil Co., near Chula Vista, are making arrangements to drill a 1500-foot well on one of their claims, says the Julian Miner.

The Oro Blanco M. Co. at Banner will resume work on the Oro Blanco tunnel which is to tap the Kentuck S. and Cincinnati Belle mines, says L. N. Baily, president of the Oro Blanco M. Co.

SHASTA COUNTY.

At the Balaklala mine on Squaw creek, near Kennet, development work is progressing and seventy-five men are at work. Five machine drills are running in the lower levels, drifts and raises are being run and the ore is being blocked out in blocks of 100 feet square.

An air compressor and a 5-stamp quartz mill are on the ground for the Shasta May Blossom M. Co., near De Lamar, says Manager M. Lindley; also a horizontal steam engine.

SIERRA COUNTY.

Twenty men are at work reopening the Keystone mine at Sierra City. Drifting for the shoot is in progress.

Meiklejohn & Stevens have ten men at work on their cyanide plant, working the tailings from the Young America mine, near Sierra City.——At the Cleveland mine, above Sierra City, an ore shoot is being opened up and a raise driven. Five men are at work and the 10-stamp mill will be started.

The Poker Flat M. Co. at its annual meeting last week decided to increase the plant to 100 tons daily capacity and to build a 50-ton reduction works. J. B. Lassiat is manager and superintendent.

The Forest City M. Co. reports work progressing at the Mabel Mextz mine, near Downieville, and the tunnel will be extended. Superintendent H. B. McCormick has six men at work.

TRINITY COUNTY.

M. Manley has an option of purchase on the Gold Dollar group of mines on Canyon Creek, 6 miles above Junction City. The group contains 190 acres of auriferous gravel. The working of the mine has been hampered by insufficient supply of water.

TUOLUMNE COUNTY.

The California Consols, Ltd., a Scotch company, has bought the Park and Mason quartz claims, near Carters; also the Leviathan quartz claim, an extension of the Louisiana mine, the owners excepting from the sale the standing timber and farming land.

At the Don Pedro mine, soutn of Chinese, the buildings are all up, roads have been built and water led to the site. Grading for the hoist is completed and the machinery is being set up. Six men are doing development work. The Don Pedro has 1500 feet of underground development work, and the ore shoot is said to be 400 feet in length and two stopes are 12 feet wide. There is also a shaft, showing in the bottom a body of ore 5 feet wide, says the Banner.

At the Mohican mine, near Groveland, the underground hoist is ready to start up as soon as the compressor plant is finished. The works and mine are to be lighted by electricity, says Superintendent F. Chappelet.

A one-third interest in the Defiance quartz claim, south of Carters and adjoining the Hunter mine on the north, has been sold to C. A. Holland, of Sonora.

A number of the mother lode mines expect to be compelled to shut down next week on account of the water shortage. Last month the supply going through the ditches was cut down 500 inches.

COLORADO.

The probabilities of a general strike in the Colorado coal fields seems imminent. The Colorado Fuel & Iron Co. refused to meet a committee of labor that assembled at Denver last week. The company said it would not meet with representatives of the United Mine Workers of America, but would meet a committee of its own employes.

BOULDER COUNTY.

The property of the Colorado Northern G. M. Co., at Copperrock, was sold at sheriff's sale at Boulder last week for $16,000 to A. W. Thompson of Allentown, Pa. Manager R. S. Spearhead says he is arranging to reopen the group.

CLEAR CREEK COUNTY.

Manager Robeson has let a contract to drive the Burleigh tunnel, near Georgetown, to the Seven-Thirty vein, the distance being 700 feet. Work is under way with two machine drills. After a point is reached directly beneath the Seven-Thirty shaft the bottom of which will be 250 feet above the tunnel, a raise will be driven and a diamond drill hole put through to tap the shaft and drain it of the 700 feet of water which fills it, says the Courier.

The Charter Oak mine, between Cascade and Ute creeks, near Idaho Springs, will resume under the management of Maxton Bros., it being owned by the Charter Oak-Chancellor M. & M. Co. It has been idle for several months. Owing to a lease and bond, the option on which has expired, the work will be resumed by the original owners. The shaft is 300 feet deep and drifting in the third and fourth levels to further open up the ore body will be done.

The Mason Con. M. Co. shareholders, at Idaho Springs, last week changed the name of the company to the Forty States M. Co. Their holdings consist of forty-two claims (210 acres) between Dumont and Freeland. It is opened for 140 feet on the Freeland side by the Lucy tunnel, but work is being confined at present to the Startle tunnel, driving in from the Dumont side, near Clear creek. The Startle tunnel is in 260 feet. The officers are F. G. Walther, D F Mason and S. S. Crooks. Development will be increased.

The Matte mill, near Idaho Springs, has been shut down to give the full capacity of the compressor plant of the mine for sinking the shaft. The flume will be repaired, which will give the company ample power for both the mill and mining purooses. The milling ore is being saved and the smelting ore is being shipped.

The Corry M. Co., C. S. Desch, manager, has started shipment of concentrating ore from the Diamond tunnel dump at Silver Plume to the mill.

The contractors on the Central tunnel, near Idaho Springs, drove 156 feet during August, in twenty-four shifts, an average of 6½ feet per working day. The tunnel is in 2068 feet and by October 1st they expect to cut the Edgar vein.

Operations will resume next week at the mill of the Elkins M. Co. at the mouth of the Union tunnel of the Terrible property, near Georgetown. Machinery has been placed, including the water receiver and water wheels, which will supply power for the mill. Water power will run the air compressor which is now driven by steam. One water wheel will be used for running the compressor and the other for driving the concentrating machinery of the mill, each being independent of the other.

Manager W. S. Marshall says he has closed down the plant of machinery on the Torpedo mine, near Idaho Springs, as there is not enough water in Spring gulch to furnish steam for the boiler and compressor. The work is being done by hand for the present, and they may haul water for the power later, as was done during a portion of last year. Every year Spring gulch—so named because of the number of springs originally found in it—carries less water. The Stanley mine drained a portion of it, and with the workings of other mines it would seem only a question of time when the stream will be entirely dry, says Marshall.

CUSTER COUNTY.

The Custer M. & R. Co., sinking the shaft on the Dolomite mine, near Custer (Rosita P. O), report work progressing. They are working on a vein 4 feet wide and a streak of pyrite and galena shows in the bottom of the shaft. A steam hoist will be put in. The ore is a telluride, carrying gold, silver, lead and copper.

Superintendent R. Southgate has started work on the Burnett lode, east from the Bassick mine, near Silver Cliff, owned by the Rito Alto C. Co. of Boston, Mass.

In the Bassick mine, near Silver Cliff, there are 125 miners at work, and it is reported that from the 200-foot to the 1600-foot level the crosscuts run recently have cut into the lost ore shoots showing telluride values. Ore is being sacked.

EL PASO COUNTY.

The eighty men employed at the Pikeview M. Co.'s coal mines, north of Colorado Springs, are out on a strike, and thirty men working the Danville mine are also out. Although the contributing causes for the strike are of various kinds, the direct cause for the walkout is said to be a small sum, a matter of only $4, says the Gazette. It is expected the trouble will be spread to include all the miners of the district.

FREMONT COUNTY.

The Union mills of the United States R. & R. Co., at Florence, that were forced to close down because of an insufficient ore supply due to the strike in Crippie Creek, are again in operation.

The Ocean Wave coal mine at Williamsburg, owned by the Rocky Mountain Fuel Co. of Denver, will have additional equipment of machinery and the roadways in the mine will be improved. The Bear Gulch coal mine of the Colorado Fuel & Iron Co. is undergoing repair. Electrical mining machinery is being placed in the mine and an electric power house will be built near the main entrance. The coal mine of the Colorado F. & I. Co., west of Florence, is idle, the machinery being out of repair.

The United Oil Co., near Florence, has had surveys made locating four more oil wells that the company will drill this summer.

The Lone Star M. M. & T. Co. has been incorporated to operate in Millersberg mining district, where it owns a group of four claims. P. A. Glascoe, A. F. Cherry, J. and W. Bregenzer, B. B. Brown, F. Fusey and C. Miller are directors. The main office will be in Pueblo.

GILPIN COUNTY.

A number of leasers are at work at the Robert Emmet mine on Maryland mountain, near Central City, and are taking out lead and copper ores, which run up to $100 per ton for first class. Some development work is also being done. Denver and Eastern parties are owners.

A body of telluride ore is reported opened up ½ mile from Rollinsville by R. Duncan and J. Taylor of Moon gulch, on the Last Lode claim, at depth of 150 feet. The vein is 1½ foot wide and was cut in the Phone tunnel.

Manager A. M. Willard says operations are being resumed on the group of the Travis Gulch M. & M. Co , near Central City. Three shifts will be put to work and the main shaft sunk. New York parties are interested.

GUNNISON COUNTY.

The Lillie Dell mine, in Gold Brick district, near Pitkin, has been leased and bonded for a year to J. H. Robinson of Denver, for $6000.

At White Pine, J. Landrigan & Co. have taken a lease and bond on the Glim group, says the Pitkin Miner.

T. R. Henahen and C. McCullough of Denver have bought the Boss group of seven claims, the Dandy, Daisy Hughes and Sunday ledges on Wealthy mountain, near the Independent mine, near Bowerman. A shaft will be started and a plant of machinery set up. The property shows gold values.

The Raymond Con. M. Co. has been incorporated by I. Carrier, W. Maher, and E. M. Lamont of Pitkin, with principal office at Canon City. The company will exploit, through a shaft and drainage tunnel, the Goldsmith, Midnight, Monte Carloand Raymond mines. The company owns and controls under bond and lease 310 acres in Gold Brick district. A plant of machinery is being put in place. The opening of the tunnel is on Ohio creek and has been driven 320 feet. Five hundred feet farther will cut the Goldsmith vein at vertical depth of 800 feet, and 1700 feet farther the Monte Carlo and Midnight veins, reaching the Raymond vein at vertical depth of 1264 feet. This will drain all properties on these veins, for which the company can secure royalty for drainage under the State laws, says the Pitkin Miner. Continuing the course of the tunnel, it will cut the Little Chief at depth of 2430 feet.

G. Russ has started operations on his Irwin group, near Crested Butte, adjoining the Ruby Chief group. A new shaft will be sunk and drifts to the ore shoot extended from the same. The ore carries ruby silver.

LAKE COUNTY.

The water situation in Leadville camp is at present under good control, says the Carbonate Chronicle. There are four basins which control the water situation, all of them more or less closely connected. They are the Leadville basin, Carbonate hill, East Fryer hill and Breece hill. The Leadville basin water level has been lowered 400 feet, and mining operations can be conducted to a depth of 700 feet. The handling of the water in the Coronado and Penrose mines is reduced to a minimum. The A. M. W. pumps control the situation on Carbonate hill, but the flow is not likely to be very heavy unless sinking operations commence. On Fryer hill the El Paso and Price shaft pumps have the heaviest work in the district. The completion of the Yak tunnel to No. 4 Ibex mine shaft has solved the water problem on Breece hill. The tunnel struck into the hill 200 feet below the deepest workings, and this means that operations can be carried to a depth of 1400 feet from the surface. In some of the outlying sections future operators will have to face the water problem, but in the main mineralized area the expense of mining has been greatly reduced by reason of the lowering of the water level.

At the Banker mine, near Leadville, it has been decided to do considerable diamond drill prospecting on the lower levels. Over 4000 feet of drifting has been done.

SAN JUAN COUNTY.

Three thousand feet of flume will be constructed for the Gold Prince M. Co. at Animas Forks, near Silverton; 1000 feet of the 3000 will be placed on each of the forks—the Animas and California gulch tributaries—and 1000 feet will extend from the forks to where the proposed mill for the new company is to be built.

SAN MIGUEL COUNTY.

At Telluride, the shut down in the mines and mills continues. The doors and windows of the Liberty Bell and Nellie mills have been boarded up.

In Marshall and Savage basins, near Telluride, mining is at a standstill because of the strike, except at the Tomboy mine, where twenty-five men are at work on development in the Argentine. Several small properties are doing development work, including the Mayflower in Gray basin, tributary to Bridal Veil basin. Besides the Mayflower mine, there are three others under development and exploitation, and it is expected work on these will be continued all winter. At the Double Eagle group a tunnel has been driven on one of the veins, opening up an ore body, and a small mill will be built this fall.——Adams, Hilgenhaus and L. White are operating a group of fifteen claims near the Dnuble Eagle, and near them the Blue Lake M. Co. has four men running a tunnel on the principal vein of the group.——In the Prospect Creek basin several properties, employing from five to fifteen men each, are under development.

TELLER COUNTY.

T. C. Johnson, having a lease on a block of the Burns claim of the Acacia M. Co. at Cripple Creek, says there is a considerable area of material near the surface that he will ship. Assays show value of $30 in gold. Johnson is prospecting in the area covered by the fire at Altman last spring, and reports satisfactory results.

In all nearly 1000 men are now at work in properties in Cripple Creek district which have resumed since the strike was called. The La Belle power house was temporarily shut down last week by the engineers going out, but has resumed with non-union men, and is supplying air to the Golden Cycle, Vindicator, Findley and Teresa mines. Stratton's Independence is breaking ore. The Rio Grande sampler at Victor is operating. The Mine Owners' Association has sent a committee to Joplin, Mo., to get miners. With the advent of the soldiers into the district quite a number of lessees and small operators ceased work. Most of them say they will not resume until the present trouble has been settled. Most of the lessees were experiencing difficulty in shipping out their ores.

IDAHO.

BOISE COUNTY.

The M. E. Hopkins Summit Flats placer mines of 640 acres in Boise basin, near Idaho City, have been sold to J B. Adams of Denver, Colo., for $50,000. Adams will start development by Oct. 1.

IDAHO COUNTY.

A tunnel has been started to tap the lead on the Massic mine, near Hump. This claim is 8700 feet above sea level and is on the side of Buffalo Hump mountain. Two leads have been found, one 18 inches and the other 4½ feet wide, showing gold values. The Prudential M. Co. owns the claim.

OWYHEE COUNTY.

C. W. Sanders, of New York, part owner of the Mammoth group of mines at the head of Blue gulch, near Silver City, has started operations. A few men are at work cleaning out the tunnel and more men will be added.

SHOSHONE COUNTY.

It is reported that another union of Cœur d'Alene mines is being negotiated. The American S. & R. Co. is forming an alliance with the Bunker Hill & Sullivan at Wardner, the Morning Star mine at Mullan and the Hercules mine, near Burke.——At the Hercules mine it is proposed to build an electric railroad from the mine to Burke, to connect with the Northern Pacific and O. R. & N. The track will be 1½ mile long, with a 2% grade.

All the miners at the Frisco mine at Gem are reported to have walked out last week and the mine closed, as the men were afraid to work in the mine on account of explosions and earthquake shocks, for which they cannot give a cause. The trouble seems to be between the 1800-foot and 2000-foot levels.

Suit has been brought by the Empire State-Idaho M. Co. against the Bunker Hill & Sullivan M. Co. to recover $75,000 for ore which, it is alleged, was unlawfully extracted from plaintiff's ground. The Empire State owns the San Carlos, the Likely and the Cuba Fraction claims, which join one another. The complaint recites that between September 1, 1900, and October 1, 1902, the defendant unlawfully entered the ledge having its apex within the San Carlos and Likely claims and into the Cuba fraction lode mining claim and extracted ores and mineral amounting to $75,000.

The Advance M. Co., organized at Wallace by J. Kammerer, P. Roddy, L. J. Columbus, H. P. Ward and W. J. Brack-

ing, is making arrangements to begin development of the copper property west of the Snowstorm mine, near Mullan. So far development work consists of 400 feet of tunnel, and it is thought the ledge will be cut in the tunnel at 100 feet farther.

MICHIGAN.

The total production of copper by the Lake Superior copper mines during August amounted to 16,155,000 pounds, as compared with 16,490,000 in July and with 17,155,000 pounds during June. Comparisons in detail follow:

	August.	July.	Jan.–June. (Inclusive.)
Calumet	6,500,000	6,800,000	40,800,000
Quincy	1,475,000	1,450,000	9,100,000
Tamarack	1,000,000	1,000,000	7,240,000
Osceola	1,425,000	1,400,000	7,050,000
Champion	1,000,000	950,000	5,675,000
Baltic	950,000	900,000	5,540,000
Franklin	440,000	500,000	3,000,000
Mohawk	475,000	550,000	3,475,000
Atlantic	400,000	425,000	2,700,000
Trimountain	850,000	900,000	5,895,000
Wolverine	755,000	750,000	4,985,000
Mass	275,000	250,000	1,385,000
Adventure	250,000	225,000	1,960,000
Isle Royale	315,000	300,000	1,215,000
Winona	45,000	90,000	655,000
Miscellaneous	.....	.....	180,000
Total	16,155,000	16,490,000	100,855,000

HOUGHTON COUNTY.

The Franklin, Jr., mine, near Hancock, in the crosscut west from the fourth level of No. 1 shaft on the Pewabic lode, last week cut the amygdaloid 975 feet west of the Pewabic. It is thought to lie close to the conglomerate lode opened formerly on the Franklin. Drifts south from No. 2 shaft have reached the strike line of No. 3 shaft on the Franklin, Jr., on the conglomerate lode at the seventh and fourteenth levels. The eleventh, twelfth, thirteenth, fifteenth, sixteenth and seventeenth levels are also being extended south to the strike line of No. 3, which has entered the ledge from the surface. Raising will start from the seventh and fourteenth levels and from the fourth and ninth as soon as they cut the shaft line.

On the basis of 13§ cents the August product of the Lake mines was worth $2,685,767.75.

Only two of the six compartments of the Red Jacket shaft of the Calumet & Hecla were operating last week on account of a change in the hoisting system, says the News. The double cages are being replaced by an automatic dumping skip. By means of these skips the rock will be dumped over the grizzlies to the floor immediately in front of the crushers. They have a capacity of 7½ tons and will take rock from nine pockets at as many levels.

No. 2 shaft of the Osceola mine at Opechee, northeast of Calumet, has been dismantled. The second skip has been put in use at the No. 1 shaft, making the full complement, of which four are at the North Kearsarge lode. The third skip will be in operation at the South Kearsarge. The No. 2 shaft is down to the 24th level and will continue to be used as a pump shaft for most of the levels.

KEWEENAW COUNTY.

The Mishawabik mine, near Allouez, reports having struck heavy copper in its shaft which has been started on the Kearsarge lode.

The Allouez mine, near Allouez, has put in power drills at its new shaft on the Kearsarge lode. The ledge had been entered 5 feet by hand drilling. The shaft lining through 50 feet of overburden has been made permanent. The shaft is making considerable water and four pumps are running to keep it free. The survey has been completed for the extension of the Mineral Range tracks to this shaft, but construction will not be started till spring.

At the Ahmeek mine, near Allouez, development work is progressing. Ground has been broken and a derrick put up at its southerly shaft (No. 1), and excavation started for shafthouse. Work of clearing site for No. 2 shaft is also under way, 1500 feet northeast of No. 1. The latter is 200 feet southwest and to the hanging wall side of the vertical exploratory shaft through which the chute in the Kearsarge lode was first located by the Ahmeek. The shaft will have a dip of 37°. Underground development on the Kearsarge lode on the Ahmeek is in 35 feet. Values are reported to hold up well. Two drills are working, one on the south drift, the other on the north. At No. 2, a vertical shaft will be put down to examine the lode and then a permanent shaft located as at No. 1. The lode is said to show a bend from the strike line of the Mohawk shafts and this would throw it 1300 feet nearer the eastern sandstone on the Ahmeek.

MINNESOTA.

The State of Minnesota has started granting leases for mining purposes under the lake beds, the Attorney General of the State having passed on the legality of such. An application was made last month to lease the beds of seventeen of the Minnesota lakes for prospecting purposes, and the problem involved the rights of riparian owners and those of the United States Government as well. In none of these cases were there any State lands located on the shores of the lakes. The privilege granted to the applicants is the "one-year prospecting lease," and for this the fee of $25 per quarter section is collected. Should the prospecting yield indications of ore the regular mineral leases will be applied for, and in case of mining operations the State will collect the regular royalty of 25 cents a ton besides taxes on the property. The lease granted to McClintock & Co is for the bed of Longyear lake, in St. Louis county, near Tower, and the terms of the lease expressly preclude any effort on the part of the lessees to reach the bed of the lake by draining off the water. Since filing the original seventeen applications McClintock presented eight more. In several cases mineral deposits are reported to have been found on the land in the iron ranges bordering on the lakes, with indications that the veins extend under the lakes.

MISSOURI.

The total value of $6,724,125 for the first eight months of 1903 for the southwestern Missouri zinc and lead district shows an increase of $350,660 over the same period of 1902, despite a smaller tonnage of both ores. A year ago zinc was selling at $39 50 top and lead at $49. Lead ore for the week ending Sept. 5th closed at $54 per ton and zinc at top price of $40, the assay basis quotable from $35 to $37 per ton of 60% zinc.

BARTON COUNTY.

In the new oil district near Golden City, J. W. Layne & Co. have a drill going down which is already in the oil sand, and report showing favorable indications. J. H. Cook & Co. are also at work.

JASPER COUNTY.

The Barrister M. Co., composed of F. L. Foriow, T. Stepp, J. Dahbs and B. Lyon report striking a jack prospect on its lease on the Guinn land, north of Webb City. They have forty acres in their lease and have cut into the ore body 50 feet, says the Joplin News-Herald.

Four more mills are being built, southeast of Webb City, and near each other. These mills are on the Aylor, being a second mill on the Holy Smoke lease, a third mill on the Patton & Dodge ground, a second mill on the Lucky Budge ground; also on the Connor land, adjoining, G. Taylor, T. Hill, W. B. Kane and J. A. Daugherty have started to build.

The Kibeka, or South Carthage lease, south of Carthage, output for month of August was: With five band jigs working, produced 286,000 pounds of ore. Of this, six carloads have been shipped and three carloads are in the bins on the ground. The output has been made by three companies, all only possessing hand jig plants, being M. Hall & Co., J Kirkendall and Brooking & Hodges. Three new prospects have been developed on the ground and are ready to put in their machinery to begin production.

At Duenweg, the Obert M. Co. is running steadily and turning out 6 tons of zinc ore per shift, says Superintendent E. Anderson. The Obert Co has a lease on sixty-eight acres of mining land, the ore being found at depth of 120 feet.

At Carthage, the Wire Stretchers M. Co. has quit sinking at 38 feet on the John Henkel land, southwest of Carthage, and will put down a drill hole ——C. E. Bryan, of Carthage, has secured a lease on the forty acres of land north of the Clary & Shults land, at Cave Springs, and work with a drilling outfit has started.

STONE COUNTY.

J. E. Putnam, of Joplin has bought several mining leases and options near Baxter, on which operations will be started this month, says the Baxter Springs News.

The Gaines, Brewster & Co. lease on the Felix Dardenne land, near the Quapaw mission, near Baxter, has been sold to F. Nicholson, of Joplin, for $7000, being a first lease on eighty acres.——A lease on forty acres of the Crawfish land has been given to J. O. Goodwin & Co., for $1500. This prospect shows values at depth of 126 to 172 feet. A test hole sunk 6 feet from this drill hole showed ore at 126 to 198 feet, being 72 feet of an indicated ore body. Development work will be increased. Goodwin & Co. have also bought three other leases, covering a total of 480 acres.——T. H Goodwin has leased from the Iowa & Oklahoma D. Co. ten acres, including the Tom Clark lead shaft.

The Galena Co-operative M. Co. report starting operations under Superintendent O. Miller. They will sink on the Cox land, 2 miles northeast of Galena, near the Helen Hunt mine. The ground is southeast of the Badger diggings, south of Bellville. Should the company make a strike the ground will be leased to miners on a 20% royalty basis.

MONTANA.

FLATHEAD COUNTY.

J. T. Vaughan of Vaughan & Greenwell, operating near Libby, says he shipped out last week the first clean-up of gold to be made on the Libby placers this season, and operations continue satisfactory.

B. Downey of Troy, part owner of the Banner & Bangle group near Troy, being operated by Larson & Greenough, says they are working fifteen men, and in No. 5 tunnel the vein is 16 feet between walls, being in two sections—one carries lead ore the other zinc. From these it is intended to ship 100 tons of each kind of ore to a smelter for making a thorough test. The ore to be shipped will run about 50% in lead and 50% in zinc.

G. W. Walker, part owner of the Copper Reward claim in the Cabinet range of mountains, near Libby, says they have opened up a body of ore at the face of the 350-foot tunnel and 100 feet below the surface. The mine is on Cherry creek on the opposite side of the mountain from the Snowshoe mine, and the tunnel is 900 feet lower than the main working tunnel on the Snowshoe.

GRANITE COUNTY.

Work on the Southern Cross (Fisher Jack) mine on lower Rock creek, near Phillipsburg, has been temporarily suspended on account of bad air. Air pipes will be put in and a blower. The Fisher Jack claims and the claims of the Union M. & Dev. Co. are under bond to Butte parties and G. W. Wilson of Phillipsburg, who is superintendent. Most of the work done has been in tunneling. On the Southern Cross a shaft was sunk in the tunnel to depth of 30 feet and a drift run from there.

Work has been resumed at the Albion M. Co.'s properties near Royal, says President Clark. It is proposed to build a mill. M. Brent and G. Wagner of Princeton are part owners.

The Milwaukee G. Extraction Co., operating the Hannah group of mines in Red Lion district, near Phillipsburg, are preparing to build a cyanide mill of 200-ton daily capacity, says G. H. Savage, manager. A sawmill is being set up to cut lumber for the mill and other buildings. Development work in the mine continues, the principal work being in the lower tunnel, driving to tap the lead at depth of 400 feet. Two tunnels have crosscut the lead.

A. Schroller and V. Page are working the Lucky Boy, a gold claim east of Granite, owned by them and F. Carr, of Butte. They have two shafts going down, both being sunk on the lead. The claim is near Track lake and adjoins the Dorothy M. Co.

F. Houle, part owner in a gold-bearing group on Harvey creek, above Quigley, is arranging to put in a cyanide plant. Work will be started next week.

MADISON COUNTY.

C. A. Plummer reports striking a body of coking coal near Monida. The coal is 23 inches wide and has been traced for some distance on the surface.

MISSOULA COUNTY.

The Buffalo M. Co. is developing a group of eight claims in the Bitter Root mountains, between Saltese and DeBorgia and 6 miles from the Northern Pacific tracks. Surface assays show values in lead and silver. At the bottom of a 30-foot shaft a sample along the vein for 10 feet gave 28% lead and thirty ounces of silver. A tunnel has been run 150 feet and is being extended 350 feet to crosscut the ledge. The company also owns claims on a ledge of copper ore 15 feet wide which parallels the above lead. More men are being put on and the company will build a wagon road to the property, when ore will be shipped.

The Monitor copper mine, near Saltese, has reverted to the original owners and they have resumed development work with eighteen men in charge of A. McCulium of Wallace, Idaho. Sinking the shaft has been started. It is owned by the Montana Con. M. Co. and was bonded by the Bitter Root C. M. Co.

POWELL COUNTY.

The Ophir placer mines have been consolidated, all placer ground on Ophir gulch and Carpenter's Bar, near Ophir, being turned over to a Minneapolis company, with W. R. Bourne of Shell Lake, Wis., president and T. Cooney manager. The company is making preparations to work the ground next spring.

SHOSHONE COUNTY.

The extension of the Beartop wagon road was completed last week and the Beartop M. Co., near Murray, have begun construction of a cable-bucket tramway, says Manager Groesbeck. The company expects to have all its outdoor work done by Oct. 1st., when the ore body of the discovery claim of the district will be developed. The new road is of value to the entire Beartop section, being convenient to the farthest claims. With a lower tunnel the Orofino owners can drop their ore into a bin above the road.

The Highland Chief M. & M. Co. has been incorporated with principal place of business at St. Paul, Minn., by B. L. Grant, Hudson, Wis.; C. C. Whitney, Marshall, Minn., and A. M. Phillips, C. W. Stanton and J. E. King of St. Paul, Minn., directors. The Highland Chief is on Pine Creek, west of Wardner.

WASHINGTON COUNTY.

The Idaho C. M. Co., owning the Alaska group and Arkansas claims in the Seven Devils district, near Landore, reports starting work on its properties. H. C. Breeden of Portland, Or., is president.

NEVADA.

DOUGLAS COUNTY.

The Nevada Placer G. M. Co. will test the Carson river gravel beds, near Gardnerville, says the Gardnerville Courier. They are putting in machinery.

ESMERALDA COUNTY.

C. Smith has taken a working bond on the A. Weber group of mines on Cat creek. These mines are 8 miles from Hawthorne and are surrounded by timber. Water sufficient for milling purposes can be obtained. Smith says the Nevada claim shows a 3 foot ledge of $10 ore, the Golden Nugget 2½ feet of $12 ore and the Lakeview also pay ore.

LINCOLN COUNTY.

Some of the superintendents at Searchlight last week offered to take the men back at the former scale, but the union refused. The following scale of wages has been adopted by the Mine Operators of Searchlight:

Miners	$3 00
Trammers and muckers	3.00
Miners, shaft work	3 50
Miners, wet ground	3.50
Engineers, 9 hours	3.50
Blacksmiths, 9 hours	4.00
Tool sharpeners, 9 hours	3.50
Timber framers, 9 hours	3.50
All other top men, 9 hours	3.00

Eight-hour men working under ground to be lowered and hoisted on their own time.

Last week in Los Angeles, Cal., the Searchlight M. & M. C. was incorporated to develop the Peerless group, near Searchlight, with G. I. Meyers of Mobile, Ala., as president, and O. B. Landon, H. E. Carter, A. B. Day and G. W. Morgan, directors. The property consists of six claims, the Julia, North Star, Henrietta, Diamond, Peerless and Dabu, south of the Blossom group of the Southern Nevada M. Co. Some work has been done on these claims, and prospecting shafts have been sunk in several places, showing ledges on the North Star and Dahu 5 feet in width and assaying $10 in gold. It is intended to open up and develop the property, and as soon as the showing justifies to build a mill.

NYE COUNTY.

At Lone mountain, near Tonopah, the Eureka M. Syndicate has been formed by T. G. Elgie, W. J. Stoneham and W. S. Williams to develop the Eureka claim, a western extension of the General Thomas mine. Work has begun.

At Hannapah, east of Tonopah, Superintendent Work reports during month of August 143 feet of work was done on the Newhouse group, besides putting in 100 cords of wood. In the north crosscut on the 250-foot level, at a point 40 feet from the vein, stringers of quartz were struck showing ruby silver. In the west drift, 100 feet from the crosscut, ore is showing in the face. The pumps are raising 30,000 gallons of water a day. Most of the water comes from the north crosscut. The company operating the Newhouse properties is the Hannapah M. & S. Co.

STOREY COUNTY.

P. Rauhach and G. J. Roote of San Francisco, Cal., have bought the Keyes mine in Sevenmile canyon, near Virginia City, and have put men to work cleaning up and getting the plant in readiness to pump out the water, which stands 200 feet deep in the shaft. M. Cullen is superintendent. Development work will be

started, and later a plant to work the mine will be put in.

WASHOE COUNTY.

High-grade sulphide ore is reported struck last week in the shaft of the Desert King mine in Wedekind district, near Reno. J. Sparks, S. H. Wheeler, R. J. Sanders and J. L. Herron of Reno are principal owners.

WHITE PINE COUNTY.

P. L. Keogh, president of the Sapho M. Co. of Ely, says their properties have been sold to Hurd. Shafner et al. of Philadelphia, Pa, for $100,000.

NEW MEXICO.

GRANT COUNTY.

The Santa Rita C. M. & S. Co. propose to resume work on the Pinos Altos mines near Pinos Altos, formerly owned by the Hearst estate.

GUADALUPE COUNTY.

At Dalhart, Texas, the Onervo M. Co. has been incorporated by C. S. Ross, A. S. Long. C. Rayburn and R. A. Stewart et al. to operate a group of claims 12 miles west of Conant on the Rock Island Railroad, and a shaft has been sunk by Superintendent R. A. Stewart to depth of 20 feet, showing ore carrying copper and silver values. It is intended to sink to 200 feet.

SANTA FE COUNTY.

R. B. Thomas of Cerrillos says at the smelter the shut down occasioned by burning out the water-jacket will end next week, having lasted thirty days. The delay in the resumption of the work has been due to the trouble experienced in securing material for repairs. In the smelter there are eighty men at work. The mines are running full capacity and have 300 men on the payrolls. The concentrating plant at Hanover is giving seventy-five men employment and is shipping copper concentrates to the smelter.

SIERRA COUNTY.

The Silver Monument mine at Fairview has closed down temporarily. —— Trails and roads have been broken to the Confidence mine at Fairview and several buildings have been erected. A machine drill will be used.

OREGON.

The Oregon State Mining Association was organized last week at Portland with the following officers: J. F. Wickham of Galice, president; J. H. Fisk of Portland, vice-president; L. Keizur of Baker City, second vice-president; A. L. Morris of Portland, secretary; J. F. Watson of Portland, treasurer. The purposes of the organization are to afford the mining men of Oregon an opportunity to consult with each other and exchange views on matters pertaining generally to mining interests in this section, says the Telegram. It is considered there is much to be done in the matter of legislation in the State of Oregon with regard to the mining interests, and aside from this there are other phases of the industry that will profit by consultation among representative mining men in the various districts, which will be followed by co-operative action in the lines decided upon. The question of forest reserves, and also the collection of a mineral exhibit for the Lewis & Clarke Fair, will be taken up.

BAKER COUNTY.

The Highland G. M. Co. propose to put up a 30 ton mill at its group, near Sumpter, says Superintendent Jackson, to handle the rock taken out in development.

J. H. Huhbard, R. B. Knapp and A. Swick, owners of the Dewey mine, near the Potosi mine, in the Greenhorns, near Sumpter, have started work.

The capacity of the California mine's reduction plant, near Sumpter, will be increased from its present capacity of 50 tons a day to 120 tons, says J. Michaels of Minneapolis, Minn., president of the Turnagain Arm Co., operating the California. The additional machinery will consist of a reverberatory roaster, leaching and cyaniding equipment and additional vanners.

CROOK COUNTY.

Ore carrying values in silver and gold is reported opened up in the lower levels of the Oregon King mine on Trout creek. C. M. Cartwright of Portland, and J. G. Edwards of Hay creek are part owners.

DOUGLAS COUNTY.

Gold and copper hearing ore is reported found on Section creek, 1 mile southwest of Glendale, by C. Stuerhoff.

JACKSON COUNTY.

The Gold Hill dam across the Rogue river, near Gold Hill, built to conserve the water for power purposes, has exposed a gravel har carrying placer gold in the hed of the stream which is believed when worked will more than repay the cost of building the harrier which caused its discovery, says the Telegram. A. Orme, foreman of dam construction, panned out $100 in two and one-half hours, and the Condon Power Co, to whom the dam belongs, are making preparations to work the property. The bed of Rogue river adjacent to the dam is being thoroughly prospected.

JOSEPHINE COUNTY.

The St. Helens M. Co and the Galice Hydraulic M. Co., on Galice creek, near Grant's Pass, have been consolidated as the Galice Con. M. Co., which has been incorporated at Portland by A. B. Cousin, E. E. Cable, H. Wiedler, G. B. Hengen, G. W. Kirkley, G. E. Waggoner and W. P. Wagy. A. B. Cousin of Portland is manager. The placer ground bought in the consolidation contains 600 acres, and well covered with timber. Water power of sufficient capacity to furnish electricity for their purposes is near by. The work thus far done is 10 miles of ditches, 1½ miles of pipe lines, derricks, sawmill, blacksmith shop and other buildings. The improvements to be added will be an 8 foot flume, which will be capable of running six giants and will have taps along its entire distance, where connections can be made. Manager Cousin has twenty-five men at work.

LANE COUNTY.

A 300-ton quicksilver plant is going up on the Black Butte mines, near Cottage Grove, says G. B. Dennis of Spokane, part owner. Four years of development work has opened up a good body of cinnabar. The Black Butte quicksilver mines are 18 miles from Cottage Grove. W. B. Dennis is superintendent. During the four years 12,000 feet of work have been done, which includes a vertical shaft to the 1000-foot level. At each 100-fnot station a drift running on the footwall has been driven either side of the shaft for 227 feet, and at each level the ledge has been crosscut for 80 feet. The average of the ore is 1% in mercury. A contract has been let for an additional tunnel 3000 feet long, which will give a vertical depth of 1700 feet, and will be the main working tunnel of the mine. The forty-ton distilling plant is being enlarged to 300 tons capacity, and the mine equipped with water power electrical plant, furnishing power and light.

MALHEUR COUNTY.

J. E. Gilman and J. Wright, of Chicago, Ill., part owners of the Singer group of mining claims on Snake river, 20 miles from Ontario, have arranged to open up the group and increase developments, says Superintendent C. B. Lyon.

WALLOWA COUNTY.

Work is reported progressing in development and construction at the Imnaha properties The steamer Imnaha is taking in machinery and supplies from Lewiston, Idaho, via the Snake river. It is expected it will be more available for freight purposes after finishing improvements on Wild Goose rapids. The main workings of the Eureka M. Co. on the Mountain Chief are nearly through, the divide separating the mouth of the Imnaha from the Snake river, near Imnaha, and are said to have opened a good ore body. Electric drills are being used. The Eureka Co. has its sawmill in operation, turning out lumber for the smelting plant. The masonry foundations are completed. At the Fargo mine, near the Eureka, and across the Imnaha river, work is in progress driving tunnels on the vein system. The Fargo Co. is using an electric power drill.

SOUTH DAKOTA.

CUSTER COUNTY.

After a shutdown of several months during which time new ore bodies have been opened up, the North Star 10-stamp mill, 8 miles northwest of Custer City, began dropping its stamps again last week, says Superintendent G. Salmon. The ore shoots have been uncovered in a series of shafts on the strike of the vein. The main shaft is down 360 feet.

The Extreme M. Co., owning the Minnie May mine near Custer, will build a 10-stamp mill. They have put up a sawmill to cut lumber for the mill and mine timbers. On the dumps at the mine are 10,000 tons of ore that averages $10 per ton, the values being in free gold and sulphides, says Superintendent I. Downing.

LAWRENCE COUNTY.

(Special Correspondence).—The Southern Cross M. & M. Co. will put in a hoisting plant and other machinery. This company came into possession of their property about two months ago. They have their shaft down 100 feet and 200 feet of drift at the bottom. Ore runs $20 per ton. J. F. Menzel is superintendent and E. R. Stewart manager.

Lead, Sept. 14.

(Special Correspondence).—J. L. Malm of Marysville, Mont., has bought a large tailings dump near Deadwood and will install machinery for treating the same.

Deadwood, Sept. 13.

The Aurizone M. Co. has been organized to develop a group in Bear Butte district. 7 miles from Deadwood, west of the Gilt Edge-Maid mine, above Galena The ground owned by the company covers 200 acres, and development work amounts to 1200 feet, in open cuts, tunnels and shafts. The directors are H. R. Luther, W. F. Hanley, N. H. Conger, A. T. Feay, C. Von Wœhrmann, J. B. Safford, W. F. Towner, S. McBratney and R. T. Perli. H. R. Luther of Chicago, Ill., is president.

A bond has been taken on a tract of mining property in Ida Grey district by H. J. Mayham, of Denver, Colo., and W. Sauntry, of Stillwater, Minn., including the Golden Wedge group of claims, and the Harrison, Ella No. 1 and Henniger lode claims, between the Penobscott group and Kicking Horse and Golden Gate group, 5 miles from Deadwood. Development work will be started this month.

PENNINGTON COUNTY.

The Sunbeam M. Co. has fifty men at work on Friday gulch, near Hill City, in development work on the mine and the construction of a 20-stamp mill. At present but ten stamps will be set up, though the building and the power plant will accommodate twenty stamps.

UTAH.

IRON COUNTY.

The cyanide plant of the mill at the Johnny mine at Stateline will be enlarged. A compressor plant has been set up and machine drills will be put to work underground. W. J. Halloran, D. Clift, F. Wilson et al, of Salt Lake City, are owners.

JUAB COUNTY.

The stamps at the Queen of Sheba mill in the Deep Creek country, near Ihapah, are reported to have been indefinitely hung up. No reason is given out by Manager Lawler. It is said the Midas mill will not be started up till next spring when the company will put in a pipe line to provide it with a permanent supply of water. Meanwhile work under ground will be continued.

PIUTE COUNTY.

On the Holland group of claims, owned by W. F. Snyder et al. of Salt Lake City, work will be resumed. The property is on Gold mountain, near Marysvale. The tunnel, started some years ago for the main ore channel, is in 1300 feet and will be driven 600 feet farther.

SALT LAKE COUNTY.

J. J. McDonald, local manager of the Utah C. Co. (Wall-De Lamar) mines, at Bingham, says a double-track tunnel will be driven into west ridge of main canyon above the Copper Belt crossing, starting in D. Macintosh or C. Read ground. As the ore (mineralized porphyry) is to be quarried at but a short distance from the surface, an opening capable of yielding 500 tons a day can readily be made.

The Native Copper claims at Alta have been leased for two years and bonded for $50,000 to A. O. Jacobson, manager of the Columbus M. Co. The property includes three full claims a quarter of a mile southwest of the Columbus mine. It has produced some copper, silver and gold, and 1500 feet of development work has been done. The entrance to the mine is through a tunnel, from which drifts, raises and winzes extend. The best values are in a lime-quartzite contact, says the Tribune. Jacobson has men to work in stoping and developing. He has secured options on some of the adjoining claims.

The bucket tramway of the United States C. Co. at Bingham was "hung up" last week, due to breaking of a coupling on main carrying cable. It has been respliced and necessary repairs made. The line transports an average of 400 tons of ore daily.

A machine shop is being built at the Utah C. Co. concentrator near Bingham and will be equipped with lathes, drills and other tools.

To operate the Frida and Papea claims, on East ridge, near Bingham, the Little Eddie G. & C. M. Co. has been incorporated by E. McCarrick, A. H. Page, J. McCarrick, C. J. McNitt and H. Lowe.

SUMMIT COUNTY.

President Treweek says they will resume sinking at the Wabash mine at Park City. The shaft is to be continued to the 1000-foot level from the 600-foot point.

TOOELE COUNTY.

The report of Superintendent Raddatz, of the Honorine mine, at Stockton, for the month of August shows 1100 feet of ground penetrated, the greater portion being that through which the tunnel is driving. On the 300 ton concentrator work is progressing, and the plant is expected to be ready for operations in November.

WASHINGTON.

CHELAN COUNTY.

A. J. Campbell of Sausalito, Cal., for Butte, Mont., parties is reported to have bonded the Grand View copper claims, near Wenatchee. The bond is for $20,000 for two years.

FERRY COUNTY.

Operations were started this week at the First Thought mine, near Orient, says the Northport News, arrangements having been made with the Northport smelter for treating the ore. The manager of the First Thought says fifty tons of ore a day will be shipped at the start, and gradually increased. The ore averages $25 in gold per ton. P. Burns is principal owner.

C. Hornsberg of Seattle, president of the Blue Bell mine on Sophie mountain, near Northport, reports closing a deal for six adjoining claims. The group is on the summit of the mountain, along the international boundary line, and the Velvet mine adjoins the boundary line on the Canadian side, opposite this group.

OKANOGAN COUNTY.

The Prize M. Co. of Seattle, owning a group of twenty-two claims on southeast side of Mount Elemeham, 9 miles north of Loomis and ½ mile north of Palmer lake, has arranged to build an electrical chlorination mill, having secured a water right and 233 acres of land on the lake shore for a millsite. The mill will have a capacity of twenty tons per day. The principal ore showings on the Prize group are on the Mollie Gibson, the Lakeview and the Contact claims, and carry gold, silver and copper. The mine is opened by two tunnels, a shaft, raises and winzes, but no connections have been made between the leads. All of the openings are in ore. H. E. Dunham is manager.

STEVENS COUNTY.

Near Ryan, machinery from the Examiner mine is being transferred to the Minorca plant, says Manager L L. Tower of the Minorca mine, including pump, engine, hoist, boiler and all attachments. He will get out ore for shipment.

Operations at the American Onyx & Marble Co.'s property, near Ryan, are under way, with the channeler at work, says H. P. Scheel of Spokane, manager. H. H. Martin is superintendent.

WYOMING.

LARAMIE COUNTY.

O. E. Tisch and D. D. Wallace report finding placer ground within a mile of the irrigation tunnel of the Wyoming Development Co., near Wheatland, and that it is their intention to take water from the Laramie river above the discovery to wash out the gold by hydraulicking.

SWEETWATER COUNTY.

An 18-inch seam of anthracite has been developed in the coal body near Thayer, owned by the Union Pacific, says the News. The Union Pacific is preparing to lay a line to the field and will open up at least one mine.

FOREIGN.

AFRICA.

ORANGE RIVER COLONY.

The Koffyfontein diamond mines report 1930 carats recovered during month of August.

WEST AFRICA.

Manager Wileman of the Con. Goldfields of the Ivory Coast at Grand Bassam reports a new reef 350 yards from Amangara, the outcrop showing 6 feet wide, and carrying gold values.

AUSTRALIA.

NEW SOUTH WALES.

Cootamundra reports state that W. Little, who has been prospecting for tin on Cucumbla station, near Cootamundra, has found silver.

Water trains are being run from Adelaide to Broken Hill. An agreement has been entered into between the Governments of New South Wales and South Australia whereby the latter is to supply 800,000 gallons of water per week. This will enable the mines to keep three-quarters of their ordinary average force at work. The South Australian Government has agreed to provide the specified quantity weekly at 12s 6d per truck of 1200 gallons, which is equal to 10s per 1000 gallons delivered at Cockburn, where the Silverton Tramway Co. undertakes its further transportation.

The Mining Warden at Walgett reports to the Department of Mines a discovery of precious opal near Walgett. There are fifty miners at work mining for opal; the deepest shaft is down 35 feet. The opal occurs in the desert sandstone formation, as at White Cliffs. The extent of the find has not yet been ascertained. A number of companies are being organ

ized in New England district and in Sydney to send prospectors to the field.

At Stanwell Park, a diamond hore put down on the South Coast coai fieid has struck the Bulli seam and shows it to be 6 feet thick and the coal of good quality. The company owning the ground will arrange to open up a coiiiery.

At Broken Hill mining and metallurgical operations have been partially restricted by the iack of water this season, hut a heavy rainfall on August 31st is reported to have replenished the Broken Hill Water Supply, Ltd, reservoirs to the extent of 98,000,000 gaiions.

QUEEENSLAND

During the seventeen years that the Mount Morgan M. Co. at Morgan has heen in existence the mine has turned out eighty tons of gold, worth about £10,500,000, and the dividends paid by the company have totalied £6,229,166.

In the centrai mining districts one of the drawbacks to miners and prospectors has heen a lack of locai smeiting works for treatment of refractory ores. The nearest works have been at Aldershot, hut cost of transportation is high. The Mount Morgan G. M. Co. will buiid a smelter at their works, not oniy for their own use, hut for outside mining operations. They have a considerahle amount of metal for the smeiter, hut not enough to keep it in full operation.

SOUTH AUSTRALIA.

The water right and eiectric power plant of the Pioneer-Lynn M. Co. has been sold to the International M & S. Co., owners of the Southern Cross and other quartz properties near Euchre Bar, 7 miies from Towle, for $7500 cash and stock. The sale includes a water right of 3000 inches, dam, flume, power house, 350 H P. turbine wheel, electric piant with complete equipment.

VICTORIA

The New Chum Raiiway mine at Bendigo has what appears to he the west leg of an Inverted saddie formation in the hottom of the shaft at 3866 feet, says the Journai. The ore is 9 inches wide. They intend to sink further in the hope that as they go down the ore hody wiii enlarge.

WESTERN AUSTRALIA.

At Menzies, in North Kaigoorlie, the directors of the Queensland Menzies mine have decided to replace the oid ten head of stamps hy a new set. Each stamp will weigh 1250 pounds. The additions to the plant are expected to be ready for operation hy December 1st. A contract has heen let to sink the Queensiand Menzies shaft a farther distance of 80 feet, making a total vertical depth of 526 feet.

The Great Boulder mine at Kalgoorlie is making preparations to put in a new hoisting piant at the main shaft, capable of hauling ore from a vertical depth of 3000 feet. It is also proposed to instaii a heavier haulage gear at Edward's shaft and huiid an electric power piant.

BRITISH COLUMBIA.

BOUNDARY DISTRICT.

The Granhy M. Co.'s smelter at Grand Forks, which was closed down for a week to permit of the hlowers being connected with the new furnaces, resumed operations on the 9th inst., when two furnaces were hlown in.

A company with W. T. Hunter of Greenwood as manager has hought the Jack Pot fraction adjoining the Athelstan mine, Wellington camp, for $15,000. The same company is operating the Athelstan mine on a bond, and making daily shipments of fifty-five tons of ore that averages $9 per ton.

The amalgamation is reported of the British Columhia C. Co. and the Snowshoe G. & C. Co., operating near Greenwood. A. J. McMillan at Rossiand is managing director of the Snowshoe.

EAST KOOTENAY DISTRICT.

There have been sixty men engaged in placer mining on Wiid Horse creek, near Fort Steeie, this summer, says the Prospector.

The Thompson M. Co., on Wiid Horse creek, near Fort Steele, has hegun cleaning up after the rainy season, and reports a large bed of paying gravel having been worked this summer.

The fear that the Canadian smelters would seek to secure to themseives a share of the hounty on iead granted hy the federal government for the relief of producers in the Kootenays has heen realized in the case of the St. Eugene siiverlead mine at Moyie. Director J. C. Drewry says they cannot at the present time secure a rate of freight and treatment from the smeiting works at Traii within $3 of the figure quoted hy the smelter for St. Eugene ores in March last. Drewry says under these conditions the St. Eugene will never operate.

ROSSLAND DISTRICT.

The O. K mill, near Rossland, started stamping ore from the I. X L. mine on the 2d inst. The I X. L. has been leased by G. Pringle and W. Craven, who wiii miii the tonnage collected on the dump during the early days when higher grade ore only was shipped.

VANCOUVER ISLAND.

After the settlement of the strike, Cumberland is resuming its normal appearance, and a number of men have gone to work on the company's terms, having heen idle since May 2nd, says the Rossland Miner. A few men, principally officers of the Western Federation of Miners, have left town. The miners who have started to work have ali signed a contract hinding them for two years, though they can leave at any time, except for the purpose of causing a strike or similar cessation of work.

The foreign shipments of coal from the Western Fuei Co.'s colliories at Nanaimo for the month of August amounted to a total of 17,996 tons.

It is reported the strike at the Van Anda mines has been settled, the men having returned to work. Manager Vaughan-Rhys agreed to recognize the union, hut reserves the right to engage union or non-unlon men as he sees fit. The union withdrew its demand for a nine-hour day for carpenters and blacksmiths, and there is no increase in pay. ——The men at the Marbie Bay mines on Texada island have resumed work under the former conditions.

KLONDIKE.

The Poverty Bar mining ground near Dawson has been sold to a company of Dawson men. It is claimed $2,000,000 have been taken out since opening up in the summer of 1897.

Official figures from the Territorial comptroller's office at Dawson shows that the gold shipments from Kiondike for the present season are $300,000 less to date than up to same date last season, says the Alaska Dispatch—this, too, showing in view of the fact that the creeks have all been dry and a shortage of water has existed this season. The shipments from Dawson this year are shown to be as follows:

May	$173,781
June	3,324.480
July	2,015,586

The shipments from Whitehorse this year were $246 in May, and $2370 in June; and the shipments from Fortymiie amounted to $1082 In June, with no report for July. Gold shipments made from Dawson last season for the first three months were as follows:

May	$19,890
June	3,550,324
July	2,313,130

The gold shipments from Whitehorse for June of 1902 amounted to $1880, and from Fortymiie $4652.

NEW ZEALAND.

Wellington reports the gold output of New Zealand during month of August amounted to 30,074 ounces, valued at £110,572, as against 35,609 ounces, valued at £137,456, for August, 1902.

MEXICO.

The Treasury Department of Mexico has issued a statement showing the foreign commerce of that country for eleven months, from July to May, for the years 1901–2 and 1902–3, which inciudes the following mineral exports (gold valuation):

	1902-3.	1901–2
Gold*.....	$12 688 453 13	$8,566,712 54
Siiver†.....	72,672.515 79	55,500,035 47
Copper	17.331,873 04	15,555,480 87
Lead.....	5,273,541 05	5,242,175 30
Other minerals.....	997,640 95	408,854 25
Total	$108,964,023 96	$85,273,258 43

*Mexican and foreign coin and bar gold.
†Mexican and foreign coin and bar silver.

CHIHUAHUA.

Nickel is reported found in J. A. Creel's copper mine at Terrazas camp. Between 3% and 4% nickel is found in some of the matte.

The Guggenheim Exploration Co. is developing the Jibosa mine, 3 miles south of Dolores station on the Mexican Central, says C. M. Sewell, superintendent. Regular ore shipments are going out.

The Mexican M. & Ex. Co. bas options on ali the apex properties on the Veta Colorado north of the Los Remedios mine in Parral district, for 4 kiiometers, says the Chihuahua Enterprise.

H. H. Cohen of London, Eng., and Los Angeles, Cai., has secured options on several blocks of mineral-bearing ground in Santa Eulalia camp and will put in diamond drills and other machinery.

There are three diamond drill outfits in Parral camp; one is operating on the Terrenates mine, one on the Esperanza, heionging to Chihuahua men, and the other on the La Luz, an extension of the Palmilla mine. The last mentioned helongs to the Hidalgo M. Co., and is under option to J. F. and C. B. Flynn.

D. White of Chihuahua and J. Duran, Jr., of Parral are working eighteen men on the Donato Guerra and the Aguila mines, in Sierra Ronces Valles section, near Parral. The ores are copper and silver bearing.

The Dithridge-Burr Ex. Co. is developing the Vencedora property, 6 miles south of Santa Barbara. The ore runs one-half kilogram in silver and two ounces gold to the ton. A smaii amount is being shipped, as the company will build a mili on the ground.

COAHUILA.

Manager W. H. Watson of the Caiabasas mine, at Monciova in Cotana district, says additionai machinery will be put in.

DURANGO.

Austin & Knotts are operating the Anita mine and miii at Guanacevi on lease.

JALISCO.

At Ameca, Las Moras M. Co. is preparing to put in a concentrating plant.

LOWER CALIFORNIA.

It is reported a smelter will be huiit at San Quentin. The Pyne Smelter Co. of Alameda, Cal., has bought the Luciana group of claims near Uriana, and the Esmeraida group has heen sold to Burns & Co. of British Columhia. On the gulf side of the peninsula are the Santa Rosalia mines, operated hy the Boleo M. Co , and employing 5000 men

NUEVO LEON.

The San Carios mines at San Jose, E. P. Self, manager, has completed its ore iine hetween the mine and the smelter, says the Enterprise, and the line between Linares and San Jose will he started this month. The entire works of the mines are being overhauled and repaired.

SAN LUIS POTOSI.

The smelter at San Luis Potosi is in fuii operation, producing two cars of lead and copper hullion per week. Several furnaces are undergoing repairs, as they were frozen up during the late strike.

SONORA.

The Yerkes M. Co., J. C. Underwood, manager, has resumed operations on its gold properties at El Cajon de Amarilias, in Altar district, after a temporary shut down.

The Esmeralda mine, 15 miles east of Cos, has been sold to Eastern men, says Manager C. Scott, for $60,000. Development work will be increased.

The Greene Con. C. Co., at Cananea, is preparing to huild another concentrator. It will he built ahove the present mill, and will have a capacity of 1000 tons per day, whereas the old concentrator has a capacity of 800 tons.

At Tahutano, the Sonora M. & M. Co. proposes to put in additional machinery at its mines, to the extent of $100,000.

The Sonora Placer M. Co. is reported to have hought the Maravillas mine for $200,000. A. W. Tennant is manager of the Sonora Placer M. Co. The Maravilias is near the Arizona line, 20 miles from Nogales and 4 miles from Washington camp in the Huacbucas. Development machinery will be put in.

PERSONAL.

H. A. BRADLEY of Denver, Colo., is in San Francisco, Cal.

I. A. CAMMETT of Denver, Colo., has returned there from Lead, S. D.

M. CULLEN is superintendent of the Keyes mine, near Virginia City, Nev.

W. O. MANSON of Denver, Colo., is in San Francisco, Cal., on mining business.

H C. BROUGHER, interested in Tonopah, Nev., mines, is in San Francisco, Cai.

J. F. WILKINSON of Mount Bullion, Mariposa county, Cai., is in San Francisco, Cal.

H. MURRAY, interested in mines near Cisco, Placer county, Cal., is in San Francisco, Cal.

F. RUTHERFORD is in San Francisco, Cal., from Agua Caiiente, Mex., on mining business.

T. SPELLACY, interested in the oil fieids near Bakersfield, Cai , is in San Francisco, Cai.

E. C. VOORHIES, owner of the Sutter Creek, Cal., Reduction Works, is in San Francisco, Cal.

J. H. HUBBARD, of Sumpter, Or., is manager of the Dewey mine in Greenhorn district, Oregon.

F. W. BRADLEY has returned to San Franoisco, Cal., from the Oneida mine, Amador Co., Cal.

N. B KNOX has returned to San Francisco, Cal., from an examination of mines near Carson City, Nev.

AFTER examination in Yavapai county, Arizona, W. E. Defty has gone to Mexico to remain until October.

A. B. COUSIN of Portland, Or., is manager of the Galice Con. M. Co., operating in Josephine county, Or.

H. H. COHEN of Los Angeles, Cal., is at his mines at Santa Eulalia, Chihuahua, Mex., from El Paso, Tex.

A. H. ELFTMAN of Siiverton, Colo., attended the American Mining Congress in Deadwood and Lead, S. D.

R. C. SPECHT, assistant superintendent of the Sheep Ranch mine at Sheep Ranch, Cai., is in San Francisco, Cal.

L. H. CARVER has returned to San Francisco, Cal., from an examination of mines in Siskiyou county, Cal.

V. G. HILLS, M. E , Cripple Creek, Colo., was a visitor to the Black Hills, S. D., during the Mining Congress.

A. D. JONES of Colorado Springs, Colo , is president of the Pharmacist G. M. Co., operating at Cripple Creek, Colo.

C. CHAMBERLAIN is acting manager of the Stratton estate's properties at Cripple Creek, Colo., vice W. G. Rice, deceased.

L. A. HAMMOND of D nver, Colo., manager of the Crocker-Wheeler Co., has returned to Denver from Deadwood, S. D.

J. F. MCCAMBRIDGE, superintendent of the Boston Tonopah mine at Tonopab, Nev., is visiting in Ohio and Pennsyivania.

E. C. ENGLEHARDT has returned to Denver, Colo., after a seven months' professional visit to Arizona and California.

J. M. BURNELL, of Denver, Colo., has returned via San Francisco from examining placer mines in Bolivia, South America.

W. J. RULE, of Sonora, superintendent of the Belle mine, near Tuttletown, Tuolumne county, Cai., is in San Francisco, Cal.

HORACE F. BROWN of San Francisco, Cal , bas gone to Cape Breton, N. S., to examine some coal and iron properties there.

R. F. CARR, vice-president and general manager of the Dearborn Drug and Chemical Co., has returned from Colorado to Chicago.

A. J. MCMILLAN, managing director of the Le Roi C. Co. and the Snowshoe M. Co. of Rossland, B. C., is in New York on business.

S. GREEN of Denver, Colo., representing the American Steel & Wire Co., is in the Black Hiils, S. D., in the interest of his company.

J. L. BRYSON, of San Francisco, has gone to the Yuba mine, near Washington, Nevada county, Cal , to take charge of the property.

A. A. BLOW, consulting engineer of the Australian S. & R. Co., of London, Eng., is in San Francisco, Cal., en route to Sydney, N. S. W.

W. BABCOCK, of Salt Lake City, Utah, manager of the New York Giant M. Co., of Deep Creek district, Utah, is in the East on business.

A. E. DAVIS of Chicago, Ill., interested in cyaniding at the Young America mine at Sierra City, Cal., is in San Francisco, Cal., on business.

F. C. COOLEY, representative of the General Chemical Co., Chicago, Ill., was a delegate to the Mining Congress at Deadwood and Lead, S. D.

C. O. MOLSON, resident representative at Salt Lake City, Utah, of the London Exploration Co., has gone to look over its interests in South Africa.

JOSEPH MACDONALD, general superintendent of the Alaska-Treadwell, Alaska-Mexican et al. mines on Douglas island, Alaska, is in San Francisco, Cal.

ROBERT SIBLEY of Berkeley, Cal., has been appointed professor of mechanical and electrical engineering at the University of Montana at Missoula, Mont.

H. J. DALY, of the Con. Mines Selection Co., Ltd., of London, England, is in Colorado from Kalgoorlie, Western Australia, and will go to London next week.

M. H. MCLEAN of the Detroit Copper Co., Morenci, Ariz , has returned there from the Black Hiils, S. D., after observation of the mining methods employed there.

A. F. HAZELTINE, formerly superintendent of the concentrator at La Cana-

nea, has gone to Sinaloa, Mexico, as superintendent of the Zaragossa mines and mill.

J. A. UNDERWOOD, former superintendent of the Carisa M. Co.'s mines, Tintic district, Utah, is superintendent of the Carey-Coleman gold mines in Choix district, Mexico.

W. A. CLARK, of Butte, Mont., principal owner of the United Verde C. Co, at Jerome, Ariz, is president of the National Irrigation Congress convening this week at Ogden, Utah.

J. M. HUTCHINS, of Chattanooga, Tenn., interested in the Josephine mine in Kern county, Cal., and in Bohemia and St. Helens district mines in Oregon, has removed to Portland, Ore.

W. BAYLEY of Los Angeles, Cal., president of the Copper Belt Railway and a director in the Bingham Con. M. Co. of Bingham, Utah, has returned from a trip East, stopping in Utah en route.

G. A. KOENIG, professor of chemistry and metallurgy of the Michigan College of Mines at Houghton, Mich., returned last week from an extended visit to the Warren district, near Bisbee, Ariz.

J. J. MCDONALD, having resigned as superintendent of the Commercial (Bingham Con) mine, will on October 1st assume local management of the Utah C. Co.'s (Wall-De Lamar) mines at Bingham, Utah.

O. C. ZINNS has resigned as assistant superintendent of the Zubiate M. Co., near La Colorada, Sonora, Mex, and has gone to Greenville, Plumas county, Cal., as mill superintendent of the Plumas G. M. Co.

Obituary.

D. SWEENEY, a pioneer miner of Shasta county, Cal., died at Red Bluff, Cal., on the 10th inst., from a general breaking down due to old age. Deceased was 86 years of age, and a native of Ireland, coming to California from Massachusetts in 1855. He is survived by two sons and two daughters.

W. G. RICE, who has been general manager of the Stratton estate properties at Cripple Creek, Colo., for the past two years, died at Colorado Springs, Colo., Sept. 13, after a protracted illness due to cancer of the stomach. Deceased was a native of Keokuk, Iowa, 50 years of age, and was for a number of years connected with the Denver & Rio Grande Railroad Co. He is survived by a widow, son and daughter.

Commercial Paragraphs.

THE G. W. Price Pump Co. of San Francisco, Cal., will open new offices at 521-523 Market street after Sept. 20, 1903.

THE Burt Mfg. Co., Akron, Ohio, recently shipped two 15 inch and one 12-inch Burt exhaust heads to the American Steel & Wire Co, Worcester, Mass.

FRANCIS SMITH & Co., No. 83 Fremont street, San Francisco, Cal., are rebuilding their shops, destroyed by fire on the 17th inst, and announce that they are still prepared to receive orders for sheet iron and steel pipe for hydraulic, irrigation and power plants, well pipe, etc.

THE New York offices of the sales organization of the Westinghouse Electric & Manufacturing Co., consisting of the New York Sales Department, Department "I," the Export Department and the General Agent's office, have been removed to the new Hanover Bank Building, corner of Nassau and Pine Streets. The mail address of the several departments of the Sales Organization in New York will be No. 11 Pine Street. The telephone number, 6131 Cortlandt, remains unchanged.

Catalogues Received.

Catalogue No. 12 of the Foos Gas Engine Co., Springfield, Ohio, with illuminated cover and full-page engravings, gives good showing of their several makes of gas and gasoline engines.

Catalogue H of the Burger gas and gasoline engines manufactured by the Woolley Foundry & Machine Works, Anderson, Indiana, gives detailed illustrated description of the several parts of the machine and how it is put together.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING SEPTEMBER 8, 1903.

738,595.—MOORING SCOWS—J. Ayers, Portland, Or.
738,394.—WOODEN STAVE PIPE—A. Bannister, Alameda, Cal.
738,517.—FILLING TEETH—R. K. Belden, S. F.
738,400.—LIFE RAFT—B. W. Booker, Berkeley, Cal.
738,520.—TOOL TURRET—O. L. Brainard, Verdi, Nev.
738,403.—ELECTROVIBRATORY APPARATUS—F. H. Brown, Los Angeles, Cal.
738,408.—GRAVEL WASHER—J. G. Camp, Sacramento, Cal.
738,291.—GOLD SAVING DEVICE—P. H. Carlyon, Olympia, Wash.
738,525.—TRANSMITTER—J. P. Conway, Los Angeles, Cal.
738,296.—GANG EDGER—F. W. Cook, Seattle, Wash.
738,416.—DRILLING ENGINE—J. B. Damas, Sonora, Cal.
738,420.—GAS GENERATOR—W. C. Dillon, Los Angeles, Cal.
738,422.—THY SQUARE—A. Duffy, S. F.
738,423.—MOLDING FLASK—E. G. Durant, Pasadena, Cal.
738,671.—HARROW—J. F. Fulkerson, Oxnard, Cal.
738,316.—PHONOGRAPHS—E. Gilbert, Portland, Or.
738,317.—PHONOGRAPHS—E. Gilbert, Portland, Or.
738,611.—PULLEY FASTENING—A. W. Hight, Ballard, Wash.
738,612.—BORING MACHINE—E. Hipolito, Los Angeles, Cal.
738,686.—BOTTLE—W. E. Johnson, Hatton, Wash.
738,455.—BLACKING BRUSH—E. R. King, East Oakland, Cal.
738,615.—SAW SET—P. H. L. Kletto, Bates, Cal.
738,348.—WINCH—J. J. McDonald, Port Madison, Wash.
738,571.—MINER'S CANDLESTICK—R. P. Rasmussen, Integral, Cal.
738,361.—HARROW—G. D. Schlosser Sunnyside, Wash.
738,635.—OIL BURNER—G. W. Sievert, Los Angeles, Cal.
738,579.—GAS EXTINGUISHER—V. A. Strom, Alameda, Cal.
738,503.—PIPE COUPLING—F. R. Waters, Salem, Or.

Notice of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

FOUNTAIN BLACKING BRUSHES.—No. 738,455. Sept. 8, 1903. E. R. King, East Oakland, Cal. This invention consists in the construction of a two-part brush attached to a reservoir having a controlled valve through which the liquid is allowed to flow when the brush is in use and which is closed at other times, in conjunction with this is a cap by which the brush is enclosed when not in use, and the brush may be made with a screw or other like structure adapted to receive a removable handle. This handle may be in the form of a bottle or containing reservoir, in which the blacking or liquid may be placed upon the market for sale, and it has an interlocking connection which when the cork has been removed can be directly connected with the socket of the brush, so that the bottle becomes the handle of the brush.

AUTOMATIC GAS EXTINGUISHER.—No. 738,570 Sept. 8, 1903. V. A. Strom, Alameda, Cal. Three-fourths assigned to C. E. Strom, E. R. Taber and F. H. Farmer, of same place. This invention consists of a disk located in the path of the heat rising from the gas flame when ignited and so contrived that the hot air thus rising will raise the disk. Connections between this disk and a lever which actuates the gas-cock are so disposed that the gas-cock will be retained open while the gas remains lighted and the heat rises, but if by any means the gas should become extinguished the weight of the disk is sufficient, when not acted upon by the heat, to release the gas-cock lever and allow it to be automatically closed by weight or spring.

DETACHABLE LIFE RAFTS FOR SHIPS.—No. 738,400. Sept. 8, 1903. B. W. Booker, Berkeley, Cal. This invention relates to improvements in apparatus for rescuing people from sinking vessels, and has particular reference to a form of ship construction whereby a portion of the vessel above the water-line may be detached from the rest of the hull in case of disaster or wreck at sea and made to serve as an ark of refuge for the survivors. In order that the ark may not be damaged by fire in case of the burning of the ship, it may be covered with a sheathing of metal, asbestos or other suitable fireproof material. Around the top, end and sides of the ark may be disposed a series of air-tight compartments, whereby the ark when afloat will be maintained always in upright position.

WOODEN STAVE PIPES.—No. 738,394. Sept. 8, 1903. A. Bannister, Alameda, Cal. This invention consists of socket pieces interposed between the abutting ends of the strips which form the continuous staves and in the employment of bands or metallic strips underlying the bands by which the staves are held together. With this construction curves can be produced, and a structure results which is more nearly uniform in strength at all points than a similar structure of riveted metal.

DRILLING ENGINES.—No. 738,416. Sept. 8, 1903. J. B. Damas, Sonora, Cal. This invention consists of a cylinder having a double-ended piston reciprocating therein, the rod of said piston connecting at one end with the drill or other striking device, and in conjunction therewith of a valve having ports by which steam is admitted alternately at either end of the cylinder, and a second port and passage connecting with the cylinder at the rear end and serving to act as a cushion to prevent the piston from striking the rear end of the cylinder. In conjunction with this is a tilting or oscillating fulcrumed lever pivoted in a centrally disposed chamber and having its lower separated ends so disposed with relation to the reduced central portion of the piston that the enlarged heads of the piston serve to alternately tilt the lever and move the valve at the instant when the piston arrives at either end of its stroke.

MINERS' CANDLESTICKS.—No. 738,571. Sept. 8, 1903. R. P. Rasmussen, Integral, Cal. This invention relates to devices by which a candle may be supported from any convenient point near the work to be done in underground mines. This invention consists in a spring clamp socket for holding the candle firmly, with a means for opening it and a means for suspending said socket from a handle, so that in whatever position the handle may be placed the candle will always stand vertical and will burn evenly.

Latest Market Reports.

SAN FRANCISCO, September 18, 1903.

METALS.

SILVER.—Per oz., Troy: London 26⅞d (standard ounce, 925 fine); New York, bar silver, 57½c, refined (1000 fine); San Francisco, 57⅛c; Mexican dollars, 46c @47½c; San Francisco, 44⅜c New York.

COPPER.—New York: Standard, $13.75; Lake, 1 to 3 casks, $13.75; Electrolytic, 1 to 3 casks, $13.62½@13.75; Casting, 1 to 3 casks, $13.37½; San Francisco: $15.00. Mill copper plates, $17.00; bars, 18@24c. London: £56 1s spot per ton.

Notwithstanding the fact that most of the new mines are operating nearly up to their full capacity, it is stated that the total output for the year on the Lake is almost certain to be less than 200,000,000 pounds, which is at least 10,000,000 pounds below what was considered a conservative estimate six months ago.

Following are the figures of the German consumption of foreign copper for the months January-July, 1903, compared with the same period of 1902 and 1901, in tons:

	1903.	1902	1901.
Imports	49 263	47,765	38 842
Exports	6,283	5,517	5,449
Cons'ption	42,980	42,248	33,393

Out of the above, the imports from the United States were as follows: In 1903 36,549 tons; 1902, 35,780 tons; 1901. 26,921 tons.

LEAD.—New York, $4.50; Salt Lake City, $3.50; St. Louis, $4.00; San Francisco $4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5½c; pig, $4.75. London: £11 3s 9d per long ton.

SPELTER.—New York, $6.00; St. Louis, $5.00; London, £21 5s per ton; San Francisco, ton lots, 6½c; 100-lb lots, 7c.

TIN.—New York, pig, $27.40; San Francisco, ton lots, 28½c; 500 lbs., 29c; 200 lbs., 29½c; less, 30c; bar tin, per lb, 30c @32c. London, £120 10s spot.

PLATINUM.—San Francisco, crude, $18.00 per oz.; New York, ingot, $19.00 per Troy oz. Platinum ware, 75@80c per gram.

QUICKSILVER.—New York, $47.00@47.50; large lots; London, £8 12s; San Francisco, local, $44.50 per flask of 76½ lbs.; Denver, $49.50. Export, $43.00.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

SOLDER.—Half-and-half, 100-lb. lots, 18 75c; San Francisco, Plumbers', 100-lb. lots, 15 50c.

NICKEL.—New York, 50@60c per lb.; ton lots, 45@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 34c.

ANTIMONY.—New York, Cookson's, 7½c; Hallett's, 6¾c; San Francisco, 1000-lb. lots, 8c; 300 to 500 lbs., 8½c; 100-lb. lots, 10½c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, $17.85 @18.85; gray forge, $15 60; San Francisco, bar, 3c per lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $27 00@29.00; open hearth billets, $28.00 @30 00; San Francisco, bar, 7c to 12c per lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer	$18.00@19.00
Foundry Northern 1	17.50@18.00
Northern 2	17.00@17.50
Northern 3	16.50@17.00
Southern 1	16.35@ ——
Southern 2	15.85@ ——
Southern 3	15.35@ ——
Forge	14.85@ ——
Charcoal	20.50@21.00
Billets, Bessemer	28.00@29.00
Bars, iron	1 55@ ——
Bars, steel	1.75@ 1.80
Rails, standard	28.00@30.00
Rails, light	34.00@40.00
Plates, boiler	1.90@ 2.00
Tank	1.75@ 1.80
Sheets, 26 store	2.90@ 3.00
No. 27	2.90@ 3.00
No. 28	3.00@ 3.10
Angles	1.75@ ——
Beams	1.75@ ——
Tees	1.80@ ——
Zees	1.75@ ——
Channels	1.75@ ——
Steel melting scrap	14.50@15.50
Relaying rails	28.00@30.00
Dealers forge	12.50@13.50
No. 1 railroad wrought	14.50@15.00
No. 1 cast, net ton	14.00@14.50
Iron rails	19.00@20.00
Car wheels	19 00@20.00
Cast borings	5.50@ 6 50
Turnings	11.00@11.50

LUMBER.—(Retail): Pine, ordinary sizes, $24.00@25 00; extra sizes higher: redwood, $28.00@30.00; lath, 4 feet, $4.50 @5.00; pickets, $21.00; shingles, $2.50 for No. 1 and $2.25 for No. 2; shakes, $13.50 for split and $15.00 for sawed; rustic, $28.00 @35.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, $3.35; Cut, $3.55; 10d to 16d, Wire, $3.45; Cut, $3.35; 8d, Wire, $3.50; Cut, $3.50; 6d and 7d, Wire, $3.60; Cut, $3.60; 4d and 5d, Wire, $3.70; Cut, $3.70; 3d, Wire, $3.85; Cut, $3.85; 2d, Wire, $4.10; Cut, $4.10. Special rates for carload lots.

LIME.—Santa Cruz, $2.35; Roche Harbor, $2.35 per hhl.

CEMENT.—Imported, $2 50@2.75 per hhl.; California carload lots, $2 25 f. o. b. at works; small lots, $2.50 per hbl. in sacks, 4 sacks to hhl.

GENERAL SUPPLIES.

POWDER.—F. o. b. San Francisco: No 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.50 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11c per set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 23@24c per lb.: carloads, 23@23½c; in tins, 30c; soda ash, $2.00 per 100 lbs.; hyposulphite of soda, 3@3½c per lb.; caustic soda, in drums, 3@3½c per lb; Cal. s. soda, hbls., $1.20@1.40 per 100 lbs.; sks., $1.05; chlorate of potash, 12@13c; nitrate of potash, hhls., 10c; caustic potash, 10c in 40-lb tins; roll sulphur, 2½@2¾c; powdered sulphur, 2@3c; flour sulphur, French, 3½@3¾c; alum, $2.00@2.25; California refined, 1¾@2c; sulphide of iron, 8c per lb; copper sulphate, 5½@5¾c; chloride of lime, spot, $2 50@2.75: sulphuric acid, in carboys, 66% B, 1¾@2c per lb.; nitric acid, carboys, 8c per lb.

OILS.—Linseed, boiled, hhl., 44c; cs., 49c; raw, hhl., 42c; cs., 47c; Lucol oil, boiled, hhl., 41c; cs, 46c; raw, hhl., 39c; cs, 44c. Kerosene—Pearl, per gal., 20½c; Astral, 20½c; Star, 20½c; Extra Star, 24½c; Eocene, 23½c; Elaine, 26½c; Water White, in hulk, 14½c; Mineral Seal, iron hhls., 18½c; wooden hhls., 21c; cs, 24c; Mineral Sperm, cs, 26½c; Deodorized Stove Gasoline, hulk, 17c; do., cs., 23½c; 86° Gasoline, hulk, 21c; do., cs., 27½c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19½ c; Lard Oil, E. W. S., hhl., $1.00; cs., $1.05; Neats-foot Oil, pure, hhl., 75c; cs., 80c; Sperm, crude, 50@60c; Natural White, 70c; Bleached do, 75c; Whale Oil, cs, 50@55c.

COAL.—San Francisco, coast, yard prices: Wellington, $8.00; Seattle, $6.50; Coos Bay, $5.50; Southfield, $8.00. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymho, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $13; Cannel, $8.50; Welsh Anthracite, $13.00; Rock Springs, $8.50, long ton; Colorado Anthracite, $14.00. Coke, $10.50 per ton in hulk, $13 in sacks; Sunnyside, $8.50, long ton.

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6c; less than 500 lbs., per lb., 6½c; in 25-lb. tin pails, ½c per lb. above keg price; in 1 and 5 lb. tin cans, 100 lbs. per case, ½c per lb. above keg price. Dry Lead—In hhls., 1 ton and over, 6c; do. in kegs, 6½c.

BONE ASH.—Extra No. 1, 5@6c per lb. No. 1, 4@5c.

RED LEAD.—500 lbs. and over at one purchase, per lb., 6c; less than 500 lbs., 6½c.

LITHARGE.—Pure, in 25-lb. bags, 8 @9c per lb.

BORAX.—Concentrated, 6@7c per lb powdered, 8@10c; fused, 20@25c.

BORAX.—Crystal, 7c; calcined, 25c.

MANGANESE.—Pure, per lb., 60c.

SODIUM.—Metal, per lb., $1.00.

MOLYBDENUM.—$2 per lb.

CHROMIUM.—(90% and over) per lb., $1.00.

BISMUTH.—Subnitrate, per lb., $1.75.

MERCURY.—Bichloride, per lb., 90c.

PHOSPHORUS.—(American) per lb., 75c.

SILVER.—Chloride, per oz., 90c@$1.00; nitrate, 55c.

ALUMINUM.—No. 1, 99%, small lots, 37c per lb.; 100 lbs., 35c; 1000 lbs., 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

URANIUM.—Oxide, per lb., $3.50.

ZINC.—Metallic, chemically pure, per lb., 50c; dust, per lb., 10c; sulphate, per lb., .04c.

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having charge of property in Mariposa county, temporarily closed down, would examine, assay and report on mines in this vicinity. Correspondence solicited. P. O. Box 65, Coulterville, Mariposa County, Cal.

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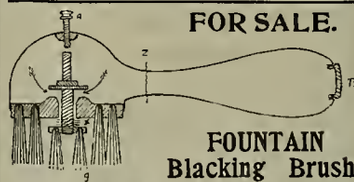
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NOTICE

of Receiver's Sale of the Electric Plant, Apparatus, and Other Property of the Cochiti Gold Mining Company.

Notice is hereby given that the Receiver, by appointment of the District Court of the Second Judicial District of the Territory of New Mexico, for the County of Bernalillo, in that certain cause pending therein wherein Raymond P. Ripley and others are defendants, will, under and by virtue of an order of said court made August 20, 1903, receive bids for the purchase and sale of all the property of the said Cochiti Gold Mining Company, now in his possession as such receiver. Said property consists of a complete cyanide mill of two hundred and fifty tons capacity, built of structural iron, various other buildings such as stores, boarding house, store house, bunk houses, etc., etc. The machinery consists of dry crushing apparatus, Davis and Allis finishing rolls, twenty steel leaching tanks of two hundred and one hundred and thirty tons capacity; also sixteen thousand dollars worth of mining and mill supplies; office furniture, etc. And also, situated at Madrid, N. M., an electric power plant and structural steel building, one eight hundred horse power engine, one 600 K. W. generator, complete switches, etc., etc., for a twenty-thousand-volt transmission, and other property such as is generally used in connection with such a mill run by electricity, including one hundred miles of copper transmission wire.

Also the Albemarle, Pamlico, Huron, Ontario patented mining properties, and the U. M. C. and three-fourths interest in the Red Cloud, containing in all almost one hundred acres and having five thousand feet on the strike of the vein. These mines and the mills are situated at Albemarle, Sandoval County, New Mexico, twenty-four miles from Thornton on the A. T. & S. F. Ry.—the other property at Madrid on said railway.

Bids will be received by the undersigned for the sale of said property, or any part thereof, for sixty days from the date of this notice. For the Madrid power plant property, and the electrical machinery, bids must be itemized, fixing the price to be paid upon each separate article; and, also, separate bids must be submitted for the wire, on account of conflicting interests in the property. The buildings and other property may be removed by purchasers from the premises on which they are located.

A reasonable deposit, certified check or cash, must accompany each bid as a guaranty of good faith and responsibility.

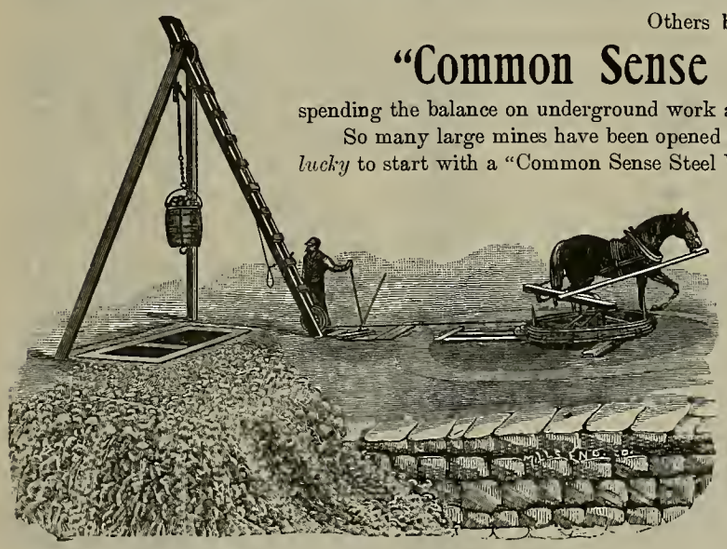
Lists of the property and all other information requested will be furnished upon application to the Receiver. WILLIAM SPENCER, Receiver.

P. O. Address: Albuquerque, New Mexico.
August 21, 1903.

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MINING AND SCIENTIFIC PRESS

Whole No. 2253.—VOLUME LXXXVII. Number 13. SAN FRANCISCO, CAL., SATURDAY, SEPTEMBER 26, 1903. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Duplication of Names.

It seems advisable to have some sort of legislation to protect investors and others from the imposition of those persons who give to their unproven mining schemes names so similar to those of famous and valuable properties that the inexperienced and unwary are readily deceived, and invest in worthless stocks, or those having only present speculative value, merely because the name is a familiar one and is associated in their minds with success and dividends. There are great and valuable mines throughout the West, the names of which are household words, and there should be some means of putting an end to this sort of piracy, which permits a mine promoter to assume for his unknown property a name so similar to that of some great and well-known mine that those who are not thoroughly familiar with the mining industry are easily imposed upon, and make investments in the belief that they are buying into a "going concern," and that dividends are assured, either at once or in a very short time. The names of mines are as various, almost, as the names of the men who locate them, and there is no end to the names that may be given; but as a matter of fact the names are often very confusing, owing to the duplication of the name and the duplicity of the promoter. Often a new enterprise may derive some glory, reflected from a near rich neighbor, but this need not extend to the duplication of names. In most cases this is done with only a single purpose—that of taking an unfair advantage of the unwary. Those who contemplate the investment of a large sum of money in a mining enterprise should approach it with the same caution that would be exercised in an investment in merchandising, in real estate or in bonds. Many people seem to think—judging by the ease with which they are induced to part with their money—that the simple fact that the investment is in a mine is sufficient assurance against possible loss. The word mine is not synonymous with profit, nor is it equivalent to failure. The mining industry of America has paid—and is still paying—larger dividends on capital properly invested than any other business, but there is much required of a mine beside a euphonious name, or a pirated one. One in looking over the names of mines is impressed with the constant repetition of those names which have become familiar and associated with large and long-continued dividends. These mines are not in a single locality, but are found all over the mining region.

As there is no law prohibiting this duplication of names, the only thing that would-be investors can do is to investigate any mining investment which they contemplate making. In general, if the investor feels too poor to have such an investigation made by a competent mining engineer, he is too poor to take the risk which such an investment involves. It is true, a number of people of moderate means may consolidate their funds and thus form a strong association, and collectively they can investigate the merit of a new enterprise, and thus protect themselves at small individual cost from imposition on the part of those who would take advantage of their lack of knowledge, individually, and of their dislike to incur the expense of investigation, which, singly, would probably in most cases exceed the amount of the intended investment.

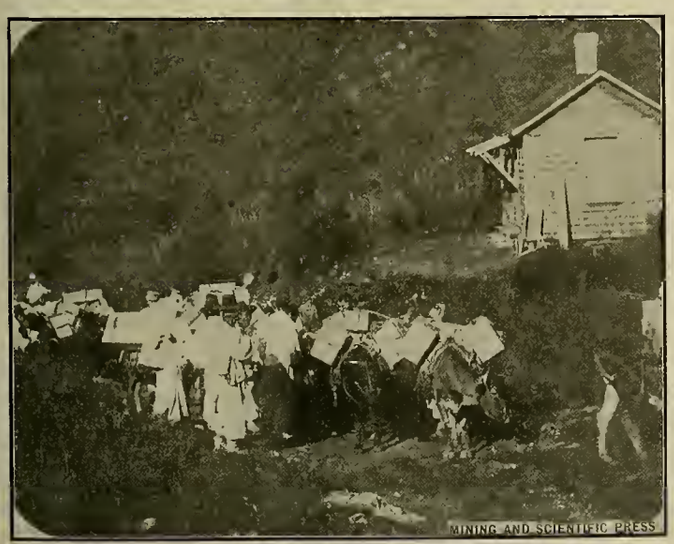


Forty-Stamp Mill at Mia Bong, Korea.

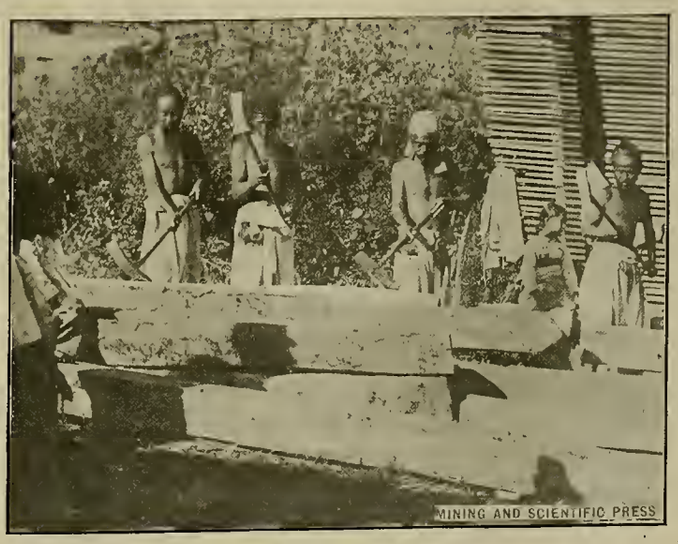
Mining in Korea.

The most important mining operations at present being carried on in Korea are under the ownership of the Oriental Consolidated Mining Co., of San Francisco, Cal., of which H. C. Perkins is president. This company controls a large concession in the northwestern portion of Korea. On the concession there are one 80-stamp, two 40-stamp and two 20-stamp mills, and it is the intention to soon add 60 more stamps, making a total of 260 stamps. One of the accompanying illustrations is that of the company's 40-stamp mill at Mia Bong. Another view is that of a train of cows packing nitro powder and other supplies to the mines. Nearly all of the packing is done on these animals, for which purpose they answer very satisfactorily to the natives who pack and drive them. It is not uncommon to see 200 cows in line on the trail bearing various burdens of things intended for use in the mines. The third picture represents native carpenters squaring timbers with their clumsy adz, in the use of which, however, they are expert. The mines consist of quartz veins which, according to H. B. Kaeding, of San Francisco, Cal., are in a granite country. The veins are accompanied by dikes of granite porphyry and other dike rocks. The company's mills are completely equipped with all modern appliances, and have cyanide plants as well. The several mines are connected by telephone and the plants lighted by electricity. A dam is being built for the purpose of utilizing water power, with which it is the intention to eventually supply all the mines on the concession, by electricity. About 5000 men are employed. All labor is performed by natives, all officers and bosses being from the United States.

Korea is situated north of the 34th parallel, extending to the 44th parallel, and is directly west of California, but the climate is much more rigorous than at the same latitude on the Pacific coast of North America.



Cows Packing Powder in Korea.



Native Carpenters Hewing Timbers, Korea.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION.

United States, Mexico and Canada.....$3 00
All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

BRANCH OFFICES:

NEW YORK CITY, 720 Park Row Bldg. DENVER, 606 Mack Block.
CHICAGO, 1115 Monadnock Block.

J. F. HALLORAN..... Publisher

San Francisco, September 26, 1903.

TABLE OF CONTENTS.

ILLUSTRATIONS: *Page.*

Forty-Stamp Mill at Mia Bong, Korea....196
Cows Packing Powder in Korea....196
Native Carpenters Hewing Wood, Korea....196
Box Electric Drill....199
Plan and Section California Drift Mine....199
Arrangement of Tiles in Quicksilver Furnace....201
Quicksilver Furnaces at New Almaden, Santa Clara Co., Cal....201
The Wilfley Slime Table....202
The Hampson Patent Turntable....205
Mining and Metallurgical Patents....206

EDITORIAL:

Duplication of Names....196
Mining in Korea....196
The Choice of Manager....197
Evils of Modern Methods of Mine Promotion....197
Silver....197
Reducing Costs....197

MINING SUMMARY....207-208-209-210-211

LATEST MARKET REPORTS....212

MISCELLANEOUS:

Concentrates....198
The Mechanical Drying of Minerals....199
The Box Electric Drill....199
A California Drift Mine....199
Aerial Tramways....200
Quicksilver Reduction at New Almaden, Cal....201
The St Louis Exposition....201
Public Lands in Cuba....201
Some Structural Features of the California Gold Belt....202
The Wilfley Slime Table....202
Aluminum and Bauxite....202
Notes on the Metallurgy of Copper of Montana....203
American Machinery for South Africa....203
Good Roads for Mines....204
The Golden San Juan....204
Ore Deposits of the Northern Black Hills....205
The Hampson Patent Turntable....205
Mining and Metallurgical Patents....206
Personal....211
Books Received....211
Obituary....212
New Patents....212
Notices of Recent Patents....212
Commercial Paragraphs....212

Silver.

The present condition of the silver market emphasizes the distinction between silver as a commodity and silver as a currency. No nation can by legislation permanently advance the price of silver as a commodity. But any nation in proportion to its wealth and power can try to create and maintain a relative value for its silver currency, with due regard to the requisite limitation of its silver coinage.

There is in present transit from San Francisco to the Philippines several hundred kegs of silver coin minted at Philadelphia and destined for Oriental circulation. Meanwhile silver as a commodity is steadily appreciating in value; a further rise of less than 6 cents per ounce above to-day's quotations would occasion some complications. The currency system of the Philippines is on a gold basis, the gold peso being the unit of value; the silver peso is redeemable at a gold value of 50 cents. In this silver peso are 416 grains of silver, and in its present upward move should silver as a commodity touch 65 cents per ounce, it would be worth more as bullion than as coin, and, instead of passing into circulation, would be melted down into bar silver and be absorbed. Though it is not probable that that figure will be reached, yet the possibility is present illustration of the difficulty that beset any attempt to set a standard of values as between that which is a currency or commodity, as circumstances determine.

When the U. S. Government began buying silver for the Philippine coinage, it paid 49 cents; it suspended purchase when the price touched 55 cents. Though there is a demand from France and India for silver, and China gives indications of willingness and ability to absorb a fresh supply, yet the contingency indicated is a remote one, because of the plentitude of possible supply. The subject is, however, of interest in every mining camp in America where at present prices silver can be produced at a profit.

The Choice of Manager.

One of the most unfortunate things that can overtake a mining enterprise is the employment by the owners of an inexperienced, or dishonest manager. The position of mine manager is a very responsible one, and requires not only strict integrity, but experience in mining and metallurgical operations, and good sound business capacity and experience as well. The manager should have a knowledge of the details of the business under his direction, though it is not essential that he should "take a hand" at mucking or tramming cars, or even running a machine drill, but he should know something of all of these things, and to have had actual experience in these toilsome tasks is not to his disadvantage.

An American engineer, who a few years ago was unknown to fame, accepted a position as manager of a large mine in South Africa. The salary attachment was large—that is, large for him—more than he had ever received before for his services. In accepting this position he displaced a European engineer who had held the place at a salary far below that paid the American engineer. The new manager made many changes in and about the mine and works, and for a time the company thought they had imported an extravagant luxury—an American engineer—but the end of the year showed that the new manager had not only accomplished all his predecessor had been doing, but exceeded him, and produced from ore of the same grade and tonnage as that formerly worked, a profit of over $150,000 in excess of that made by the former manager. This was during the first year, the following year he increased this materially, and the stockholders realized they had found a valuable man in their manager. The secret of the whole business, if it is a secret, was that the American engineer not only had technical training—his predecessor also had that—but he had learned much in the school of hard experience in the frontier mining camps of the Western United States. He was accustomed to encountering difficulties and finding ways of meeting and successfully overcoming them. He seemed equal to almost any emergency.

In a general way it may be said that of such men as he are the mine managers of the West made up. Some have had more experience than others, some have a greater faculty for mastering obstacles than others, but on the whole they are a class of men equal to almost any occasion, and who, if given an opportunity, will distinguish themselves—for there is much in opportunity.

There are those managing mines in the West, however, who represent a different class. One of these, in charge of a property for an Eastern company, had a small prospect far up on the mountain side. He described the property and its prospective merit in such glowing colors that he nearly persuaded the directors to send him a large mill and smelter, explaining that long before the machinery could be placed in position to operate he would have developed through a tunnel, over 2000 feet in length, sufficient ore to keep the reduction plant in operation for several years. There were some members of the board, however, whose natural business caution suggested that the mine be examined by some other engineer for corroborative testimony. This was finally decided upon, and the engineer engaged reported no ore in sight, and that the proposed tunnel could not be completed within fourteen months, and would probably take longer, and would cost, with compressor equipment, no less than $25,000; that it was highly problematical whether the proposed tunnel would develop any ore; and suggested that the surface showing of ore be followed downward by means of a shaft to determine something of its extent and value before any expensive, long and deep tunnels be run, and particularly before any reduction machinery was bought.

While the prospect was a good one, the company were so discouraged—not to say disgusted—with this sudden awakening, that the mine was shut down for a time; but is in operation again along more common sense lines.

It is most unfortunate that mining property sometimes falls into the hands of mine fakirs, who either are wholly ignorant of mining as a business, or are unprincipled and seeking only to further selfish ends. Mining companies should place the management of their properties in the hands of men of experience and integrity, and when this practice becomes more common, mining investments can not fail to become even more popular than they are to-day. Many mining enterprises of the latter class referred to are placed in the hands of the promoter or principal stockholder as a reward for the large personal influence they wield, but it is often at a sacrifice of the remainder of the stockholders.

Reducing Costs.

Where a mine is in operation and it seems either necessary or desirable to reduce working costs, the first step usually taken by a wise manager is not in making a cut in wages, thereby decreasing the efficiency of the labor employed, but changes are made by the introduction of labor-saving devices, conveying belts are substituted for arrangements requiring labor, and ore and materials are handled by mechanical devices instead of men, and everywhere that it is possible to substitute a mechanical device for men it is done. Plants are built to work automatically as far as possible. The result is generally a greatly increased output at reduced cost, and the men displaced by the machinery are employed in some other branch of the industry. There are a few who condemn labor-saving devices of any sort, but such ideas are short-sighted and foolish as well. Labor-saving machines and devices are in demand and they have come to stay, and the experience of the past shows that they in most cases make work for a larger number than are displaced by the machines. Labor-saving devices render the work of the laborer lighter and usually they permit him to make a higher rate of wages than he previously earned.

Along the line of reducing costs much attention is being given the utilization of waste products. Experiments made in the iron manufacturing regions of Pennsylvania show that the large volume of gases generated in blast furnace operations may be utilized as a means of power. Some engineers who have given this matter a great deal of earnest attention predict that the next decade will see the gases of blast furnaces which are now allowed to go to waste employed in the production of power, and that for this purpose the gases will have a value at least equal to the metal product of the furnaces. This is an extremely optimistic view to take of the matter, but there is little doubt that the near future will see these waste gases utilized in the manner indicated. The gases which arise from the top of the blast furnaces contain a large amount of carbonic oxide, upward of 25% usually, constituting a valuable fuel. For generations these gases have been allowed to pass off into the atmosphere, but the metallurgical world has at last awakened to the fact that these gases possess great value, and already they are being utilized.

In the metallurgy of other ores than those of iron it is now a recognized fact that some of the gases evolved in smelting operations represent a direct waste of valuable raw material. The sulphur which for ages has been burned either in the open air or in furnaces in the treatment of ores, is now recognized as an excellent fuel, by the means of which the ore may be practically made to smelt itself. The pyritic smelting process has a wide field of usefulness, and we may expect to see it introduced into many mining regions where the cost of transportation makes prohibitory blast furnace operations of the ordinary type, where a large amount of carbonaceous fuel is essential in the treatment of the ore. Great advancement has been made the past twenty years in metallurgy, both in mechanical and in chemical operations; but the greater advance has probably been made along mechanical lines. In the future it may be expected that an equal advance will be made along chemical lines.

THERE are many evils in the modern methods of mine promotion. Among these are the gross misrepresentation of facts and the duplication of the names of valuable properties, with which the new scheme is in no way identified or entitled. If mine promotion could be relieved of these two evils, of which the greater is the misstatements made concerning the extent of ore deposits and their value, the placing of meritorious prospects would be accomplished with comparative ease.

CONCENTRATES.

THE COAL in croppings of a vein is usually of poor quality, and the coal generally improves with depth.

♣

LEAD PAINT should never be used for structural iron, as it exercises a corrosive influence.

♣

WITH a 12-inch pipe running to a turbine, with a tank of water holding 1,500,000 gallons, and with a 10-foot fall, there would be a pressure of 4½ pounds per square inch at the turbine.

♣

THE rock from Pocabontas, Ark., is a fine-grained quartzite, containing small crystals of pyrite. The accompanying ore is green carbonate of copper malachite. This ore contains 71.9% cupric oxide.

♣

SUPERHEATED STEAM is superior to saturated steam on account of the large losses due to the condensation of the latter. The method of superheating the steam as it leaves the boiler is simple, and consists merely in passing the steam pipe through the heated gases before it enters the tender.

♣

VENTILATING FANS, having propeller-shaped blades, have proved inefficient in mine ventilation, though fans of this type answer admirably for the ventilation of mills or other rooms, where the resistance is low, but for mines the direct-acting centrifugal fan has been found to meet most requirements.

♣

THE usual form of lead in zinc blende is as sulphide. Oxide and sulphate are formed when it is roasted. These compounds react with the still undecomposed sulphide, forming sulphur dioxide and metallic lead, which volatilizes. Lead sulphide and oxide are also directly volatile, though at a higher temperature than the metal.

♣

ORES containing free gold which is at all coarse cannot be successfully treated by cyanidation, as the coarse particles of gold will not dissolve in the solution. Such ores should first be amalgamated, and subsequently the tailings may be cyanided, if they contain sufficient values to warrant it and it is found the material is amenable to the process.

♣

THE mineral from Pinon, Montrose Co., Colo., is evidently a highly metamorphosed rock, evidently from the plane of a fissure, where it has been subjected to movement and crushing. The scaly mineral incrusting the dark pieces is gypsum (selenite). The rock has no value, though ore may occur elsewhere in the same fissure or vein.

♣

PLATES which have been cleaned with a rubber will usually yield a further amount of amalgam by placing over them either a quantity of hot sand or sacks upon which boiling water has been poured. As soon as the plates are hot go over them again with the rubber. A still further amount of value may be obtained by careful scraping with a steel chisel, but the latter process cannot be recommended.

♣

THE small black rock specimen from Greenhorn, Or., is olivine basalt of ordinary type. The metallic gold color showing on one side has been produced artificially, probably by one striking the rock with shoes nailed with brass tacks. The other specimen is apparently a fragmental rock, consisting of rounded grains of quartz and other hard minerals cemented by a much decayed material. It has the appearance of being arkose—that is, derived from granite.

♣

THE small rock specimens from Buena Vista, Colo., contain quartz, orthoclase (potash feldspar), more or less altered, and small greenish white scales of an altered hisilicate mineral, probably originally hornblende. It has a finely granular structure, and may be called an aplite. It is too greatly altered to make identification positive. It also contains, as secondary, pyrite in small crystals and grains. Specimens for determination should be larger than those here referred to.

♣

JAVASITE is a composition of sulphur trioxide 31.9, iron sesquioxide 47.9, potash 9.4, water 10.8. It is ochre yellow, yellowish brown and clove brown in color, with a yellow, shining streak. It has a hardness of 2.5 to 3.5, and is brittle. The mineral is found in many ores, particularly those in sedimentary formation as in quartzite and limestone. It often looks like yellow silt, and sometimes presents a bright subadamantine luster. The brownish varieties are sometimes found in lignite.

♣

WITHOUT DOUBT the "order of drop" of stamps in a battery has an important influence on the capacity of the battery, if not also on amalgamation. If the stamps are allowed to fall in the order 1, 2, 3, 4, 5, it would result in the pulp being all driven toward the end of the battery where No. 5 is located. It is the aim of the mill man to have an even distribution of pulp in the battery at all times, and this is accomplished to a great extent by the sequence of drop of the stamps. The two methods most in vogue are 1, 3, 5, 2, 4 and 1, 4, 2, 5, 3. Beside these 1, 5, 2, 4, 3 and 1, 5, 3, 2, 4 are also often used. In various regions the number of stamps per mortar varies all the way from a single stamp to eleven stamps, but long experience has demonstrated that the most satisfactory results are obtainable with five stamps per mortar where more than two stamps are employed.

♣

THE grade of mill plates is variable, ranging from 1½ inches per foot to 2½ inches or over. Heavily sulphuretted ore requires heavier grades than lighter quartz, comparatively free from sulphides or other substances of high specific gravity. The amount of water employed in the battery also has an important influence on the amount of grade given the plates. A large volume of water with heavy grade is almost certain to result in scouring. Many mill men divide their plates into a series of steps. The height of drop should be about ½ inch, as a greater drop will cause scouring.

♣

MERCURY has many uses besides the amalgamation of ores. One of its chief uses is in the making of mirrors. This is accomplished by means of tin amalgam. A sheet of tin foil of the same size as the glass to be silvered is laid upon a level table and rubbed over with mercury, a thin layer of the metal being afterward poured upon it. The glass is then carefully slid upon the table and directed in such a manner as to push before it the excess mercury. Heavy weights are then laid upon the glass, and in a few days the tin and mercury will be found to adhere firmly to the glass. The amalgam contains one part of mercury and four parts of tin.

♣

IN figuring the width of belting for high-speed work, the matter of centrifugal force must be taken into consideration. The natural tendency of the particles of the belt is to move straight ahead and not pass around the pulley. This tendency forces the belt away from the pulley, so that as the speed increases the belt adheres less and less to the surface of the pulley, and a wider belt is required to transmit a given power than would otherwise be the case. For this reason doubling the belt does not double the power it will transmit, but multiplies it by something less than two, and for this reason, also, there is a limiting maximum speed above which a belt can not be run without great loss of power. For laced belts this is about 5400 feet per minute, and for cemented belts about 6300 feet per minute.

♣

IN Mexico, where A intends to prospect for mineral, he should present a written notice to the mining agent of the district within which he wishes to prospect, and the agent, after clearly defining the limits of the territory within which the prospector may operate, shall return one of the duplicate notices to the prospector, after endorsing thereon the day and hour of the presentation thereof. This secures to the prospector the exclusive privilege of exploring within the territory described in the notice, but a failure to secure such permit from the mining agent of the district gives to the prospector no privileges, and any person entering on the same territory and complying with the requirements of the law may "denounce" any mineral veins or deposits that may be discovered.

♣

IN the bromo-cyanide (Sulman-Teed process) the bromine solution is made up in a separate tank, having a strength of 7% or 8% bromide of cyanogen. From this tank the bromide solution is added to the regular cyanide solution, but an excess must be avoided, as the bromo-cyanogen is no longer operative after passing the zinc boxes. The amount of bromo-cyanide should not be greater than 25% of the potassium cyanide present in the regular solution. The process has been successfully applied on some arsenical gold ores. The theory of the process is that the bromo-cyanide process contains a greater cyanogen "potential" than the ordinary solution. By the Sulman-Teed process the gold is precipitated by means of what is known as zinc fume in a special apparatus, known as the Sulman precipitation cone.

♣

THE speed at which a flywheel may run with safety is determined by the strength in tension of the arms of the wheel; by the strength, in a tangential line, of the weakest point in the rim, which, in sectional wheels, is the point of the union of sections, or of both combined. Thurston, in A Manual of the Steam Engine, says: "For a maximum safe stress of 10,000 pounds per square inch, or 1,440,000 pounds per square foot, as for wrought iron or steel, the breaking speed has been found to be about 300 feet per second. For cast iron, the maximum speed is about 220 feet per second, and about one-third of these velocities are usually taken as safe. The safe speeds are not far from 150 to 200 miles per hour." A wire-wound flywheel of special construction in the Mannesmann works at Landore, Wales, is over 20 feet in diameter, wound with seventy tons of wire, and runs at 240 revolutions per minute, which gives a tangential velocity of 15,080 feet, or 2.85 miles per minute.

♣

THE least expensive method of mining ores is probably by the open-cut system. This method is largely in use in the Minnesota iron mines, where the ore occurs in immense shoots either at or near the surface. The iron ore is of such a character that it breaks up upon blasting into comparatively small fragments and it is loaded upon railroad trains by means of steam shovels. The cost of mining by this method is but a few cents per ton and is considerably cheaper than any other method known. Gold ores are rarely, if ever, mined in this manner, owing partly to the fact that the gold-bearing deposits seldom occur in a form to make this method of mining advisable. The next cheapest method is by what is known as the milling system. This is by means of an open cut in which the ore is broken and passed down through a raise (mill hole) to a chute below, from which it is trammed to the reduction works. Underground methods are the most expensive. No average of cost of mining can be stated, for the reason that conditions vary so greatly. One mine may be able to deliver rock at a mill for less than 40 cents per ton, and at another mine in the same vicinity the cost may exceed $4. Cheap mining requires a large deposit or vein, good standing ground, good climatic conditions, cheap supplies, good miners and good management.

♣

NITROGLYCERINE is manufactured in large quantity at a number of places in the United States. It is used chiefly in the preparation of various kinds of explosives, chiefly for rock blasting. Its manufacture may be briefly described as follows: A quantity of concentrated nitric acid is mixed with twice its volume of strong sulphuric acid, in a lead-lined tank. The mixture is cooled by means of leaden coils through which a stream of cold water is constantly circulating. Glycerine is sprayed into the acid, particular care being taken to prevent a rise in temperature above 30° C. The mixture is then allowed to cool, upon which a large percentage of the nitroglycerine floats on the surface and is drawn off into water and thoroughly washed. The lower layer is then drawn off into water for the purpose of separating the nitroglycerine remaining, which sinks to the bottom. An alkali is added to the last washing water to neutralize any free acid which may remain, and the nitroglycerine is then ready for use. It is one of the most violent explosives known. As nitroglycerine can only be used conveniently in blasting in "down holes" it is mixed with various absorbents in varying proportions for convenience in mining operations. Nitro-powders are equally effective in dry or wet holes. Blasting gelatine, which is made by dissolving collodion-cotton in nine times its weight of nitroglycerine, is stated to be a more powerful explosive than nitroglycerine alone.

♣

GOLD is malleable and ductile to a greater extent than any other metal known, and it possesses these properties at all temperatures below the point of fusion. A single grain weight of gold can be drawn into a wire 500 feet in length, and sheets can be obtained by beating of which 300,000 would be required to make an inch in thickness, and these leaves, though so thin as to transmit light (green in color), may be still further reduced in thickness by floating for a short time on a solution of cyanide of potassium. In hardness gold is between aluminum and silver. Pure gold has a tensile strength of seven tons per square inch, but an admixture of some other metals having high atomic values, such as lead, bismuth, tellurium, etc., renders the metal very brittle. One part of bismuth in 2000 of gold makes an alloy which may be crumbled in the fingers. Gold fuses at about 2240° F., and when highly heated is slightly volatile. The volatility of gold is increased by alloying with some other metals. Experiments have shown that 100 parts of gold alloyed with twelve parts of copper, if subjected to a heat sufficiently high to keep it melted for a period of six hours, loses 0.234% of the gold and an increase in the amount of copper was accompanied by an increase in loss of gold. Gold alloyed with silver only is not as volatile as when copper is also present. There is always a certain loss by volatilization when gold is poured from a melting pot into molds, particularly when copper is present.

♣

THE Federal statutes limit each placer claim to an area twenty acres, but permit an individual to take as many as eight separate locations of twenty acres each, or total of 160 acres. These may or may not be contiguous locations. On each claim $100 worth of work must be performed annually, or, if desirable, the work may all be done at a single place—$800 worth for the benefit of all the claims which, to take advantage of this provision of the law, must be contiguous, or if only two or more are contiguous the work necessary to "represent" the two or more claims—$100 worth being done for each claim in the group. For instance, if five claims were located in one group, at one place, in a gulch, and three claims in another group in another gulch, it would be proper and miner-like to begin work on the lowest or down-stream claim, and in one instance $500 worth of work must be done or improvements made, and in the other case $300 worth. An association, company or corporation cannot take up more than 160 acres of placer ground, and such association must consist of at least eight persons. It is also necessary that placer locations shall conform as nearly as possible to the subdivisions of the surveyed lands, and for this purpose forty-acre tracts may be subdivided into ten-acre tracts—a block of ground 660 feet square. The mining laws of Arizona require that a hole 10 feet deep be sunk on the claim within ninety days after location (or deeper if necessary to show ore in place), and to record the location in the office of the County Recorder, and to properly monument the claim. In addition to the above the annual assessment work must be done as required by the laws of the United States. In a group of claims located in Arizona the territorial law requires that the 10-foot shaft, or its equivalent, be sunk on each claim, but the annual assessment work may thereafter be all done at one place—$100 for each claim in the group—if it can be shown that such concentration of work be for the benefit of all the claims of the group.

The Mechanical Drying of Minerals.*

Written by C. O. BARTLETT.

While the mountains of our country are rich in deposits of gold, silver and other precious minerals, and lead and zinc are found in many of our prairie sections, as well as in the mountains, and coal and oil in nearly every section, all of which have heen and are now heing searched for in every locality, yet there are many places where there are deposits of fine clay, suitahle for firehrick, sewer pipe, crockery, paints and Portland cement, which remain untouched.

Ten years ago the manufacture of Portland cement in this country was comparatively a new industry, and we were paying exorhitant prices for English and German hrands. Engineers hegan to investigate, and soon found a fine quality of clay, marls, limestone and chalk suitahle for making Portland cement. Capitalists put money into the husiness, and the result has heen that last year more than 15,000,000 of harrels of Portland cement were manufactured in our country, and of a better quality than could he produced in England or Germany. Entire huildings are now heing made of it and railroads are using it extensively.

To utilize these clays, limestones, etc., in cement, it was found necessary to dry them. Clay varies in moisture from 10% to 25% and limestone from 6% to 12%, hence the necessity for some kind of mechanical drier. As it is with clays for Portland cement, so with clays for paints. A certain so-called clay near Bedford, W. Va., is so rich in iron and aluminum that by drying and calcining (burning out the vegetahle matter), leaving iron, aluminum and silica, and afterwards mixing in oil, it makes a fine paint, rich in aluminum, and a pine hoard painted with one coat, will stand a high heat for some time without hurning the wood.

I have seen so-called clay paint in Madison county, Mont., so rich in aluminum and iron that by simply drying, pulverizing and mixing with oil, it has stood a severe weather test for years.

There are three ways to mechanically dry minerals:

First—By direct heat, by which is generally meant the use of the rotary drier, or a horizontal cylinder, set in hrickwork with front and grates similar to a horizontal hoiler. The cylinder is set on an incline and revolves from five to eight revolutions a minute. The material to he dried is fed into the cylinder at the front end, the fire heing at the other end, and at each revolution of the cylinder the pulp is carried forward toward the discharge end.

Second—By air, which has first heen heated, either hy direct heat or by steam pipes, and afterwards passed through the material to he dried.

Third—By steam heat direct, hringing the material to he dried in direct contact with the steam cylinder or pipes.

The first method is the cheapest, for the reason that hy using direct heat a temperature of 2500° to 3000° can be had, while by using heated air the temperature is very much less, and hy using direct steam heat the temperature is only from 230° to 330°, according to the amount of steam pressure, and this temperature is on the inside of the pipes of cylinder, which means considerahly less temperature on the outside, where the material is. By first superheating the steam the temperature can be made much higher, but the cost of superheating the steam will nearly counterhalance all gain in temperature. Great care should he taken in the construction and erection of all direct heat driers; all iron parts should he so constructed as to allow for contraction and expansion. All settings and bearings for the drier should he suhstantial, on account of the liahility to get out of place hy the settling of the brickwork and hy the extreme heat. The steel sheets of the cylinder should he of the entire length, and all seams should run the longitudinal way of the cylinder. There should be no cross seams at all.

In huilding steam driers great care must he taken with every joint and rivet, otherwise the contraction and expansion will cause the joints and rivets to leak.

In drying any and all kinds of materials they should first he broken into 2-inch cubes or less, as it does not pay to dry large pieces. All material is supposed to have been crushed hefore entering the drier.

It is necessary to have as large heating surface as possihle and to keep the material heing dried constantly in motion, cascading it through the heat so that the heat can easily penetrate through a thin hody of material, carrying off the moisture.

The cost of drying minerals depends, first, upon the amount of water or moisture contained therein. In other words, concentrates, ores or silica will not carry more than 10% or 12% moisture, while clays and marls will carry two or three times as much, and peat will sometimes have as much as 80% moisture. It is generally safe to estimate on evaporating ten pounds of water for one pound of coal (or its equivalent) used. When drying concentrates, ores, limestone and other similar suhstances, where the fire can pass through the material to be dried, therefore, it will he readily seen that it will not pay to dry any kind of material containing 80% moisture, unless it is very valuahle. It can be dried, but the cost of doing it will prohahly he more than the finished product is worth.

To dry peat, we start with 100 tons of peat containing 80% moisture, and reduce it to 5% moisture, which means to evaporate 75 tons of water, leaving 25 tons of peat, containing 5 tons of water. It will take one pound of coal (or its equivalent) to evaporate ten pounds of moisture, which means no less than 15,000 pounds of coal to dry the 100 tons of peat, and it is difficult in drying peat to evaporate ten pounds of moisture with one pound of coal, for the reason that when nearly dry it becomes combustible, and is liable to take fire and hurn, consequently it requires slow firing.

There are those who believe it is an easy matter to dry 200 or 300 tons of peat a day, and that it can be dried cheaply, hut I wish to say to all such that it is much easier to say than to do. It is far hetter to store the peat in large sheds, or even out of doors, where it will drain and dry by the winds and sun, down to 40% moisture, after which it may he profitably dried on mechanical driers.

It is quite a different matter to dry 100 tons of concentrates, or ores, for here we have but 8% to 10% moisture, which we wish to reduce to 2.5%, which means about 11,000 pounds of moisture, requiring ahout 1100 pounds of coal (or its equivalent) to dry it, and as the freight rates are frequently high in the mountain regions it will pay to dry out the moisture before shipping. It does not pay to ship water in ores and concentrates, for the cost of drying them is usually less than the cost of freight.

The second important matter as to the cost of drying minerals is, whether the material to be dried will admit of passing the products of the fire through the material without injury. Better results can often be obtained from the same amount of fuel hy first passing the heat around the outside of the drying cylinder, then through the material. By this means (the temperature of the gases passing off) the drier can be brought down to 125° F., which means that nearly the entire heat of the coal (or its equivalent) is utilized, but when used on the outside of the drying cylinder only, not quite so good results can he ohtained.

Most minerals, such as concentrates, ores and clays, are not injured hy passing the products of comhustion through them. Some fine clays, and even some kinds of sand used for glassware, will not admit of it, on account of the danger of coloration by the fire products. In all such cases it is necessary to use oil or gas for fuel, or to keep the products of combustion on the outside of the drying cylinder.

The third important feature is, Whether the material to be dried is of a siliceous or clayey nature. If it is silica the moisture is easily driven off; if of a clayey nature it will he more difficult to evaporate the moisture, hesides the sticky material is liable to adhere to the parts of the drier, causing trouhle, and consequently more expense in drying. It is seldom, however, that anything adheres to a heated surface.

The next feature as to the cost of drying is whether the material is of an expensive nature, or whether there is danger of hurning, such as coal, peat and similar materials. If so, the heat must he of a low degree. There is no danger of hurning anything when it contains a considerahle amount of moisture, and in drying some kinds of such materials it is sometimes well to use two driers, firing heavy on the first drier while there is plenty of moisture, and finishing on another drier with light firing.

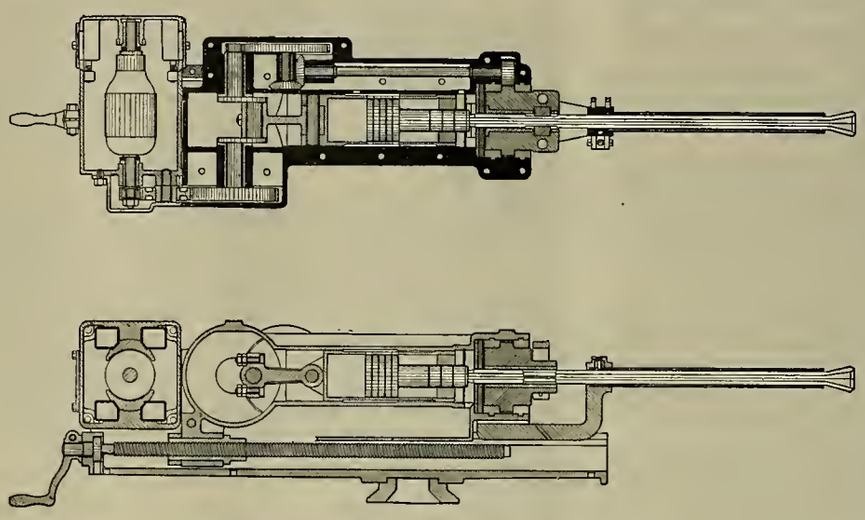
The fifth feature, regarding the cost of drying, is whether it be necessary to dry to a very low degree of moisture; in other words, it is more expensive to dry down to ½% than to 2%. Generally speaking, however, it is not necessary to go helow from 2% to 5% on most materials.

*Trans. Am. Min. Congress. (Condensed).

The Box Electric Drill.

The Box electric drill was on exhihition at Deadwood, S. D., during the session of the American Mining Congress. F. E. Shepard of the Denver Engineering Works Co., Denver, Colo., had charge of the drill exhihition.

By referring to the accompanying illustration it will be seen that the connecting rod joins with a small light cylinder moving inside of the main drill shell, the cylinder being reciprocated by the motion of the crank. Inside of this moving cylinder is a heavy piston with a thick piston rod. This comhined one-piece-steel piston and rod is the hammer of the drill, and when in motion strikes the end of the drill steel with the end of the heavy piston rod. Each end of the moving cylinder is filled with air at atmospheric pressure, which, being alternately compressed and rarefied, is designed to act as a spring. To compensate for possible leakage, and to insure a full supply of air, two ports are cut in the side of the moving cylinder, located so that as soon as the piston moves from its central position one port is opened to the atmosphere and a supply of air rushes in. These two ports also serve to equalize the pressure on hoth sides of the piston every time the piston passes its central position.



Box Electric Drill

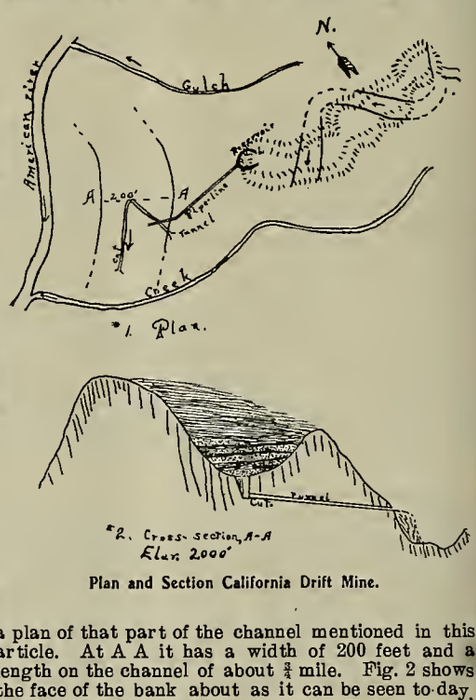
A hinge hetween the guide shell and the cone of the clamp enahles the whole drill to he tipped to one side or the other, therehy enabling long drill steels to be inserted or removed from the drill or hole without disturbing or changing the "set-up" of the drill.

The Denver Engineering Works Co., Denver, Colo., manufacture the drill.

A California Drift Mine.

Written for the MINING AND SCIENTIFIC PRESS by W. E. THORNE.

In the following the writer has endeavored to show some facts, not "theories," in regard to some of the cement covered gravels of California. Fig. 1 shows a plan of that part of the channel mentioned in this article. At A A it has a width of 200 feet and a length on the channel of about ¾ mile. Fig. 2 shows the face of the bank about as it can be seen to-day, having vertical height of 200 feet. The surface of



Plan and Section California Drift Mine.

tbe lava is covered by a growth of pine and spruce trees, most of it being small timber.

Number 1, or bedrock gravel, carried tbe most values and is about 5 feet in deptb. Number 2 is about 6 feet deep, carries some gold, but not enougb to pay to drift; number 3, 4 feet in depth, some gold; number 4, 3.5 feet deep, small values; number 5, 5.5 feet—in tbis, tbe upper cbannel, was found the coarsest gold, but not so rich as No. 1. All tbe bedrock gravel was drifted out in the early 50's and is said to bave paid well. Later it was worked by hydraulicking, about one-balf being worked over, tben the debris law put a stop to tbe work. In working ovsr tbe ground a good many quartz veins were found. In some of tbe side channels tbat crossed thsse quartz veins there was found an abundance of quartz boulders, also extending into tbe main cbannel, giving to tbe cbannels in sucb places nearly all white gravel and causing tbe miners to call tbem white cbannels, but were really only a part of tbe same cbannel. As a rule, tbese parts were tbe richest.

In sketcb No. 1, tbe channel from tbe east, according to some of tbe miners who were at work tbere, consisted of two series, running in almost opposite directions, but after a careful examination and by running levels over tbe same, tbe conclusion was reacbed that it was tbe same channel—as tbe sketch indicates. It was found tbat tbe upper end of tbe lower section was about 10 feet above tbe lower end and tbe lower end of tbe upper section was about 10 feet above the upper end of tbe lower section. Tbe missing section, of course, we could not tell tbe lengtb of. In places on tbis small cbannel we found there bad been two flows of lava, as we found two beds of gravel, one above the other. In the section of tbe main cbannel there are found four distinct flows of lava. In some parts of this work it was found tbat the erosion bad cut tbrougb the lava and in such places tbe bed of gravel was continuous. Again in working up the side cbannels we found tbat they bad not been covered by tbe first or second flows of lava and tbis would account for some of the gravel being on top of tbe lava in places, also proving that where we can now see five distinct gravel bsds tbat tbey did not extend all along the cbannel, but only formed small bars in places.

In working this by tbe bydraulic metbod a ditch was built some 12 miles with a capacity of 250 miner's incbes; tben by a series of storage reservoirs, one at tbe bead of tbe pipe line, a No. 3 giant was used for tbree or four hours at a time. A bedrock cut was brought up from the lower end and for a time carried off all the tailings; later a tunnel was driven and all material passed out tbat way. Tbere is quite a lot of clay in places in tbis gravel. Tbis caused the company to bave an undercurrent built about ½ mile down tbe canyon. Tbis undercurrent caught enougb gold to pay for a watcbman all tbe time during operation and leave about $100 per montb for the company. A sbort time after tbis company ceased operations tbree practical miners obtained a lease on the canyon between tbe undercurrent and tbe lower end of the main sluices and in less than six montbs they had cleaned up about $2500. Tbis sbows tbat a good undercurrent at tbe lower end of tbe main sluices migbt have been a good investment. The bedrock is of clay slates and after exposure tbey decompose rapidly. In some places tbat which looked like solid rock proved to be full of small seams that bad been cemented by tbe decomposing of tbe iron pyrites and were very rich in some places, paying to work to 3 or 4 feet in deptb.

Aerial Tramways.*

Written by S. DE ZOMBORIA, C. E.

In addressing you upon tbe subject of aerial tramways as an economical means of transportation, it is not my objsct to enter into a technical discussion of tbe subject, but, rather, to discuss the conditions wbich warrant the construction of such aids to mining enterprises, and those types wbich will give the most satisfactory results from tbe mine operator's point of view, as well as some of the many advantages of this system of transporting ores from the mine to the reduction plant.

As a curious fact, we could mention tbat wire ropes served for transportation methods many centuries past, and researcb among the ruins of Pompeii have brought to light wire rope, specimens of which are to be seen in museums in Naples.† Tbere are wood cuts in some of the mediæval German books which show perfectly developed tramways. The early methods of tbis mode of transportation passed into oblivion, bowever, and it was not brought again into extended use until the '40s of the last century.

Almost from the origin of trams we find that two distinct types were known—the single and the double rope tram. Tbe home of tbe former was in England, while tbe double rope system is extensively used in Germany and tbe wbole world.

Tbe experience of tbe past two or tbree decades bave sbown many marked advantages of this type of transportation. Discussing the merits of botb tbe single and double rope types the advantages migbt be expressed tbus :

Undulated profile is of little importance, since tbese tramways are equally effective on plains or in a mountainous country. Expensive understructures, viaducts or trestle work, is absolutely unnecessary, the ropes being suspended on wooden towers, wbicb are of simple construction, erected at intervals of 200 or 300 feet. If tbe formation of tbe ground does not permit tbese distances, it is possible to construct spans of even as many tbousand feet. Deep gulcbes and ravines (wbicb are effectual barriers to transportation of otber types), offer no obstruction to a rope tramway, and some of tbe finest tramways in the country bave solved just such problems for mine operators. Climatic conditions in no manner interfere witb tbe action of a tramway, permitting tbe continuous operation in most inclement weatber. Thus tbe beavy expense of keeping mountain roads open during tbe winter are avoided.

Anotber marked advantage is tbe fact tbat tbe time occupied in construction is mucb less tban for tbe construction of other systems of transportation. Especially is tbis true in a mountainous country. Tbe adaptability of tbe tramway is so great tbat it will meet tbe most urgent demands made upon it, and, unlike rail or wagon roads (should occasion demand), tbe plant can be wrecked and installed in a new location at moderate cost and witb a surprisingly short loss in operating time.

In tbe main these advantages apply to both tbe single and double rope types. Both types bave tbeir advantages. I only will compare tbem. Tbe single rope type being mucb simpler in its construction, baving less parts, bas tbe advantage in being cbeap in primary cost and erection. Its principal drawback is tbat it can convey only a limited amount of material. Tbere are tramways of this system with an bourly capacity of tbirty-five tons, yet tbese particular tramways did not get beyond tbe experimental stage, and it is not advisable to deliver more tban 20 tons per bour. Tbe practical mine operator, wbose bope and ambition is to vastly increase tbe output of bis mine, would hardly consent to install a system wbich in itself was of so limited capacity. Yet its main advantage, as stated, is its cbeapness of construction, a fact wbich always must be taken into consideration.

Anotber disadvantage of this system is the fact that tbe strain upon tbe parts is heavy, with consequent expense of repairs and loss of time in operation, itself no small item in working costs.

Tbe double rope system, wbich is of far more extensive use, is more costly in installation, but is always advantageous on account of its capability of increased capacity as occasion demands in tbe future development and output of a mine. Speaking of capacity, I could mention tbat tbere are lines whicb deliver 250 tons of ore per bour. This special line has been in almost continuous operation since tbe fall of 1898, and since its installation its repairs have been of such trifling cost tbat even its builders have been surprised. Operating costs are low. One Colorado tramway, wbicb traverses a very rougb, mountainous country, approximately 10,000 feet in lengtb, is bandling ore at a cost of 17.6 cents per ton, with the cost of maintenance 1.5 cent per ton. These admirably low figures are due to tbe fact tbat tbe systems now being perfected require the services of only very few men on the entire line. The addition of automatic devices, wbich perform tbe work of loading and dumping, bave generally decreased the labor costs until now only one or two men are required to watcb tbe loading of the buckets. As is generally understood, most of the double rope tramways wbich are in operation througb tbe mining districts of the country, require no power, being operated by gravity entirely. Even tben the power which is produced by tbe weight of the buckets can be turned into a source of profit, being sufficient to meet demands for ventilating purposes, for the operation of dynamos for lighting plants and operating mine pumps, as can be seen in some of the larger Western mines.

Tbe division of strain upon the ropes in this double-rope system reduces the repair bills and at the same time renders stoppages less frequent.

Returning for a moment to the matter of automatic systems: There is to-day a tendency to render these tramways more and more automatic in tbeir operation. It is a question in the mind of the trained engineer. Just what is the limit ? What is of more concern to the prospective or actual owner of a tramway ? How far can we go in making the tram entirely independent of human control and then take the risk of the eventualities which are connected with all such machinery ?

Reduction of labor costs is always an object in considering operating costs, but yet, in the opinions of many engineers, it will not be advisable to entirely dispense with it. The aim of tbe constructing engineer should be to plan a tramway which would be as nearly automatic as is consistent witb due regard for the safe conveyance of its traffic.

In all the double-rope systems which are in general use, tbe principle of construction is tbe same. That is, the ropes, pulleys and sbeaves, as well as the otber machinery in use, perform tbeir duties in the same general fasbion, differing only in design. The difference between the systems is cbiefly in the matter of attacbing buckets to tbe rope. Tberefore, double-rope tramways migbt be divided into tbree general types: First—Tbe system in whicb a clip or lug nut is permanently attached to tbe running rope wbicb drags tbe bucket suspended on a standing or immovable rope.

Second—Tbat system in wbich a clutch attacbed to tbe bucket seizes tbe running rope and remains attacbed thereto by means of friction. This latter system migbt be further subdivided into two classes : One in wbicb tbe friction is created by an eccentrically operating lever locked and released automatically, securing a constant friction tbat is independent of the angle whicb tbe traction rope forms witb the borizontal; second, one in wbich tbe clutcb exerts friction on tbe traction rope by a lever on whicb tbe weigbt of tbe bucket is transmitted. Tbis friction varies with tbe cosine of the angle tbe line forms with tbe horizontal.

The tbird and latest development is that system in wbich tbe buckets are fastened permanently at certain distances to the traction rope. On tbis system tbe buckets are loaded witb a walking bin, wbich runs simultaneously on parallel rails above tbe buckets in the station, loading tbe same.

It is impossible to here enter into extended discussion of tbe merits of tbese tbree systems of double-rope tramways; but I will mention some of the most marked differences. Tbe clip system enables us to bandle the buckets at exactly tbe same intervals. Tbis prevents accidents wbich might result from tbe failure of laborers to keep tbe buckets loaded and moving at the proper distances. One marked disadvantage of tbis type is tbe fact tbat tbe wear on the traction rope is constantly in tbe same place, tbereby weakening the strength of tbe rope at these points.

Sbifting tbe clips from time to time is resorted to in an effort to overcome tbis difficulty, but with a more or less extended loss of time. In tbe second class tbis difficulty is not encountered, because tbe grip seldom if ever clutcbes tbe same spot on tbe traction rope at tbe same place twice in succession. Slight alterations, also, in tbe relative position of tbe buckets on tbe rope work no disadvantage in the operation of tbis second type. To secure an even distribution of tbe buckets along tbe line, signals are easily arranged by whicb tbe workman is enabled to estimate tbe proper intervals. With the assistance of tbe electrically working, friction-grip arrangement, as well as witb tbe clip, all grades can be overcome, because the friction on tbe traction rope is constant and uniform. In tbe type in wbicb tbe weigbt of the bucket is transferred by means of a lever on tbe clutch and is transformed to friction, tbe limitation of tbe grades to be overcome is confined to tbose not in excess of 45°.

Tbe third system—tbat in wbicb tbe buckets are attacbed permanently to tbe traction rope—is probably tbe most promising one, as tbere tbe loading of tbe buckets is automatic, witb corresponding savings in operating costs. Tbe more or less complicated grips and clip catchers are done away witb. It requires buckets of less expensive construction and overcomes any grade tbat any other system of rope tramways can traverse. Tbis last type of construction is of sucb recent development tbat comparatively few plants are in operation in this country. As far as is known, it renders most successful service.

And now a word as to tbe costs of installation of rope tramways. Naturally, tbe single rope tramway is tbe cbeaper type of construction, but popular opinion is more favorable towards tbe double rope tramway, as evidenced by tbe number of tbat type which bave been and are being installed by mine managers. Tbe heavier the traffic to be bandled tbe heavier and more substantial parts must be used in the construction work. Many other considerations, based upon the peculiar conditions wbich attend the installations of tramways at different mines, must be considered in the individual case. Generally speaking, we are witbin limits when we say that including all the machinery parts tbe average price per foot of line constructed may be regarded as ranging from $1.80 to $2.00 per foot. These figures include tbe necessary wire cables, towers, sheaves and buckets. To these figures must be added tbe construction costs, which vary according to freight rates, prices of timber, labor and delivery to the point of construction. Very naturally this affords a wide variation in costs, but as an example it might be cited that in Colorado tbe construction costs would probably be from $1.00 to $1.15 per foot. Therefore, it is safe to estimate the entire cost of a tramway per foot in this region (Black Hills, S. D.), wbere the conditions are approximately tbe same as in Colorado, at from $3.00 to $3.10 per running foot.

The subject of rope tramways and tbeir application to mining and manufacturing industries the world over is a subject upon which any engineer might talk for hours. The economics which are effected in all industries in which tbeir use is possible are so generally recognized that no argument in tbeir behalf is necessary. Every mining man of the

†The Broderick & Bascom Rope Co. of St. Louis, Mo., of which the author of this paper is one of the aerial tramway engineers, have excellent photographs of some of these old Pompeiian cables.

*Trans. Am. Min. Congress. (Condensed).

West can probably cite examples of mines whose profitable operation without the aid of tramways would not be possible. In conclusion, let me repeat a beautiful tribute to the tramway, the work of a fellow engineer unknown to me, whose beautiful allegory is more expressive than language of my own:

"Nestled silently in the clouds, away up above the timber line, nature has hidden almost inaccessibly its treasures. Deep down below in a valley stands a reduction plant which day by day with the aid of human genius converts ore into wealth. Reluctant to give up her treasures, nature wages a constant warfare with man, calling to her aid the snows and ice of winter altitude, precipice and ravine. But man won the fight. Two slender wire cables, puny in appearance despite their strength, span ravine, rise over precipice and scale the heights, disappearing among the clouds. With their aid man has encompassed the defeat of nature. Silently, unpretentiously, disdainfully ignoring the grumbling of nature over her defeat and her efforts to overthrow the work of man, the cables modestly move forward—the connecting link between mountain and valley, a private soldier of the mining industry, always alert, always performing his duty, always obeying his commands and rendering invaluable service in adding to the wealth of the nation."

Quicksilver Reduction at New Almaden, Cal.

Written for the MINING AND SCIENTIFIC PRESS by WALTER W. BRADLEY.

Much has already been said and written in the past about the quicksilver mines and their equipment at New Almaden, 12 miles south of San Jose, Santa Clara county, Cal. It is not the writer's intention to enter into a lengthy technical discussion of means and methods employed there, but merely to give a short sketch of the present-day operations at their reduction works, as observed in a recent visit. The ore is brought down from the mines, about a mile distant, by gravity tramways and in trains pulled by mules. By dumping on grizzlies it is separated into three sizes—"granza" (coarse), 3 to 7 inches in diameter; "granzita" (medium), and "tierras" (fines) under 1½ inch in diameter. These three sizes are each handled by separate furnaces. There are two circular shaft furnaces for the granza, and four tile furnaces—three for granzita and one for tierras.

Such of the tierras as need drying are spread out, and, when dried, are elevated to the charging floor by means of a water hoist—a tank of water balancing a car full of ore—there being a tank under the rails of both hoist platforms. As water is plentiful, this furnishes a cheap and simple method of raising the ore the short distance necessary. This tierras furnace will hold ninety tons of ore and is of three compartments. Each compartment is charged every forty minutes from a half-ton car, making a total of fifty-four tons charged every twenty-four hours. It requires fifty-two hours from the time a charge enters at the top until it is drawn out from the bottom. The interior of each compartment of the tile furnace is constructed of a series of tiles set one above another at an angle of 45° with the horizon, each tile tilted toward the next below, as shown in the accompanying diagram.

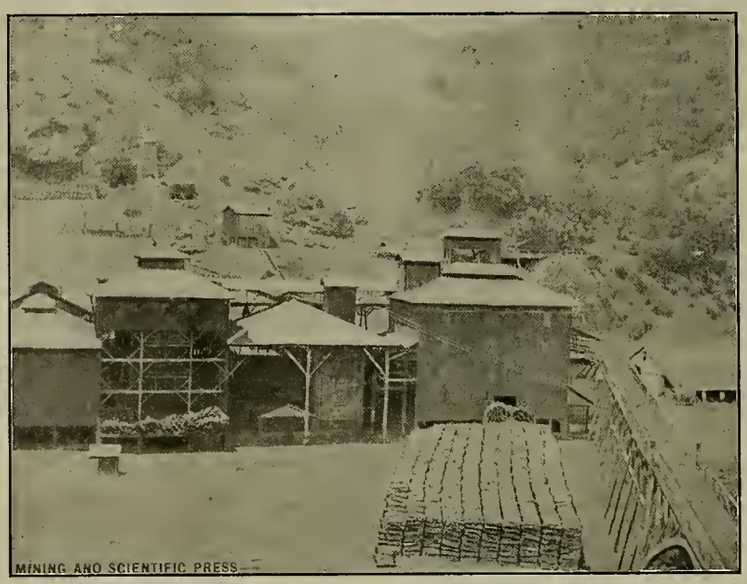


Arrangement of Tiles in Quicksilver Furnace.

Each double set of inclined tiles terminates in a hopper-shaped bottom, in which the roasted ore collects and from which it is drawn out into cars below. The charges are all shaken down simultaneously by iron arms operated by an exterior mechanism. About 12 feet below the charging floor is the firing floor, where a fireplace runs across one side of the furnace, being fed at both ends with 4-foot sticks of wood (oak and redwood). This furnace is the one seen on the left of the center in the accompanying picture (where the firewood is piled on the platform).

The furnaces in which the granzita is roasted are similar in construction to the tierras furnace, except that the tiles are farther apart. There are three of these furnaces—one of twenty-four tons daily capacity, one thirty-six tons and the third eighteen tons. The last two are located in a separate building, across Hacienda creek, a few hundred feet distant. The tramway leading to them is seen on the right of the picture. Both the 24-ton and the 36-ton furnaces are of double compartments. The two furnaces for the granza are respectively of nine and seven tons daily capacity. In construction they are modeled somewhat after the cupola. The firing floor is 12 feet above the bottom and point of discharge and about 20 feet below the charging floor. There are three firehoxes at equi-distant points around the circular shaft, which is 8 feet in diameter. Wood is also used here and a temperature of about 1300° F. is obtained. The furnace is charged every two hours.

Quite a lengthy treatise could be written and illustrated on the evolution of the condensing process and construction of the condensers at New Almaden. The lower grade of the ore of late years, as compared with the bonanza values in early days, has been the most important factor in causing these changes. Mercury, like other things of value, is elusive and prone to escape man's grasp. Recently, as Foreman Wasley informed the writer, they cleaned up the foundations of one of the old retorts, taking off the surface dirt and scraping clean the bedrock—all of which material was panned out as placer gold is panned. This netted several thousand dollars' worth of mercury. The first chamber through which the vapors pass after leaving the roaster is lined with iron pipes carrying circulating cold water. From the top of the first chamber the vapors pass to the bottom of a second chamber, and, emerging, are led with a right angle turn to another series of chambers, and then through a series of flues, which zigzag back and forth across the hill before reaching the flue (see hill on left of picture), running up to the stack. At each turn of the flues is a small chamber, which is cleaned up once a year, enough mercury being obtained from them to a little more than pay the expense of maintaining them. As a result of this lengthy condensing system, very little smoke and fumes are visible emerging from the stacks on the hill. The entire plant handles about 4000 tons per month of ore which is said to average 0.5% mercury. The cinnabar occurs in disseminated particles, looking like small, red blotches, throughout the containing gangue.



Quicksilver Furnaces at New Almaden, Santa Clara County, Cal.

The total output of the New Almaden mines since 1850 is given at approximately 1,000,000 flasks of quicksilver. The present company is the Quicksilver M. Co., with Thomas Derby of New Almaden as superintendent.

The St. Louis Exposition.

Written by G. W. PARKER.

On April 30, 1904, the gates of the greatest world's fair and universal exposition which the world has ever seen will be opened at St. Louis, Mo. When the Louisiana Purchase Exposition is spoken of, almost the first question asked is: "How is it going to compare with Chicago?" Many visitors to that great show, myself among them, conceived the idea that the exposition business had attained the acme of success in the White City of Chicago. If any one had suggested that within a half century at most a greater exposition would be thrown open to the world, he would have been considered of unsound mind. But the seemingly impossible is being accomplished. A decade has scarcely rounded out since we walked with wonder through the great buildings of the World's Columbian Exposition, gazed with awe upon the splendors of the illuminated Court of Honor and amused ourselves among the mysteries of the Midway Plaisance, and now we see rising at St. Louis another and a greater dream city. And when this is said, it is said without exaggeration.

The experience gained through the wonderful industrial development of the United States during the last quarter of the nineteenth century shows that it is to our coal mines, more than to any other one cause, that our present supremacy among the nations of the earth is due. In a recently published volume on the adjustment of wages, W. J. Ashley of the University of Birmingham, England, comments on the former superiority of Great Britain, which was founded on her coal, and shows how since 1889 the United States has outstripped that country in iron and steel manufacturing, and that we are forging farther and farther ahead, not only of Great Britain, but of the world—because of our wealth in coal. In 1901 the United States produced practically 40% of the entire world's supply of pig iron and 44% of the entire output of steel. In 1902 this country added nearly 2,000,000 tons to the pig iron product of 1901, and reached a total of nearly 18,000,000 long tons. In 1902 we produced almost exactly double the amount of pig iron made in this country in 1892, ten years before, and about four times that made in 1882. In the first half of 1903 the furnaces of the United States turned out pig iron equal in amount to that produced in all other countries in the world in a similar period for 1901.

A large space has been reserved in the Mines and Metallurgy building for the display of the exhibits representing the coal mining industry. This will be divided among the States according to the extent of their exhibits, and as nearly as possible according to geographical location.

Some of the interesting features of this coal display will consist of large relief maps of some of the principal coal fields of the country. It might be desirable to have such maps of all the coal mining region, but it is not possible to prepare them. Only such regions can be illustrated in this way as have been made the subject of topographical and geological surveys. It is possible, however, to obtain enough of such data and to prepare enough such maps to illustrate in a general way the manner in which our coal supply is stored away. These maps will show practically in miniature the country represented.

Another interesting feature will be maps of two or three typical mining towns or camps, illustrating the character of such communities in the different States. These maps will also show the tipple and other buildings connected with the operations of the mines, miners' houses, etc. On still larger scale will be shown models of working mines in the different States and illustrating, as far as possible, typical conditions existing in those States. It is proposed to show by such models drift mining by the pillar-and-room system; shaft mining under the pillar-and-room system, as practiced principally in Illinois and Indiana; slope mining under the pillar-and-room system, and under a modification of this system, as practiced in Arkansas and the Indian Territory; strip or open-work mining, as practiced to a considerable extent in Kansas and Missouri, and shaft mining under the long-wall system, as practiced in Kansas and Missouri and also in Illinois.

It is also proposed to illustrate ventilation, underground haulage and hoisting, and the pumping or hoisting of water.

Public Lands in Cuba.

The following statement shows the extent of the public lands in Cuba:

Province.	Area—Acres.
Santiago de Cuba	432,744
Puerto Principe	6,387
Santa Clara	22,677
Total	461,808

The boundaries of these lands are not fixed, and in consequence they have not been entered in the registry of property (Registro de la Propiedad). They are covered with forests, and as most of them are in the interior no availments can be made, owing to the absence of roads. Some of the public lands under the care of the Department of Finance are rented and other portions have been ceded to private parties in consideration of an annual tribute of 5% of the value assigned to each caballeria (thirty-three acres).

Some Structural Features of the California Gold Belt.

NUMBER VI.

Written for the MINING AND SCIENTIFIC PRESS by W. H. STORMS.

The Potazuba mine is situated a short distance northwest of the Baliol mine, but it is in the black clay slates of the Calaveras formation, and is in no way connected with the greenstone schists. The Potazuha vein has a strike N. 20 W., and can he traced by recurring surface outcrops several hundred feet. A shaft has been sunk 500 feet on the vein and extensive levels run. About 150 feet south of the shaft the vein is intersected by a fissure, striking approximately E.—W., and dipping south at ahout 50%. The quartz vein of the Potazuba ends abruptly at this intersection, it having the appearance of flexing sharply to the westward. Near this point of intersection on the surface a good prospect was discovered, and development disclosed a short shoot of high-grade gold quartz, extending from the surface to about the 100-foot level. From this ahout $20,000 was taken, when the pay ceased, and although a large amount of development has since been done, another pay shoot was not found. It is said hy some of the miners that the north drift followed a slip out into the east wall, ahandoning the main fissure, which maintained its true course, but as the writer never had an opportnity to investigate the grounds upon which this statement was made is unable to give any opinion, though such things are not unknown in the operation of mines.

Northward the Potazuba fissure enters the diorite, which forms a large mass in this vicinity, with an increasingly greater width to the northward. As only shallow shafts and prospect holes have been sunk on it, nothing can be said of it further than that gold is present occasionally in the quartz. The vein in the diorite is more massive than in the slates, where it is usually handed.

Two miles north of the Potazuba, at Gold Mountain mine, is found a large vein, 10 feet in thickness, lying at a low angle with a dip to the northwest. This vein occurs in the diorite (or grano-diorite), heing a portion of the mass near the Potazuba, above referred to. At Gold Mountain this vein has heen developed extensively and a large quantity of the ore milled. It contains sulphides of iron, copper, lead and zinc in small amount, with occasionally mispickle. Gold is associated with the eulphides, and is also found free, but owing to the low grade of the ore it has not been largely remunerative. An unusual amount of silver accompanies the gold for this part of the California gold helt. The quartz is massive with many vugs lined with crystals, and is wholly unlike even the massive quartz of the Mother Lode series.

North of Amador City, on the mother lode, occur some of the largest outcrops along the entire length of the belt. The shafts and tunnels are numerous on the various mines, and in some of these interesting structural features have been developed. The quartz occurs in the form of huge masses, usually of lenticular form, though not always as symmetrical as the term "lens" may suggest. Some of these occur wholly in hlack slate, and othere in the amphiholite schist, while a third class is found at contact of these two formations.

The Bunker Hill mine has developed several shoots of gold ore, some of which are of large size. This mine in its early history produced a large amount of gold, and recent developments have discovered additional bodies of ore.

A mile northward from the Bunker Hill is the Fremont Consolidated, which comprises a number of claims, one of which, the Gover, was formerly worked to a depth of 1500 feet on the vein. In the old Gover workings large ore hodies were found in the lower levels, one of which is stated to exceed 65 feet in width. This mass of quartz is divided by interior fissures, which lie approximately parallel with the walls. The quartz contains free gold and auriferous pyrite. A new shaft (Fremont) has been sunk near the southern end of the property since 1899, and this has also developed large masses of quartz similar in etructure to those occurring in the neighhoring mines.

In the upper portion of the Gover mine there are two veins, each lying at contact of slate and greenstone schist, the slate strip 90 feet wide occupying the central area between the veins. This slate increases in width with depth. The easterly, or hanging wall vein, occupies the contact to a depth of nearly 800 feet, where it pinches and becomes obscure. The foot wall vein continues for eeveral hundred feet as a solid vein and then hranches into numerous stringers. A zone of crushed slate, containing fragments and veinlets of quartz, calcite and other secondary infiltrated mineral, evidently marks the crossing of the foot wall fissure across the slate strip toward the hanging wall schist until it reaches the contact. On the ninth level of the mine the slate, which here forms the foot wall of the vein (the hanging wall vein having pinched out ahove), "straightens up" and a large mass of quartz forms between the slate and schist. As these large quartz masses are found at various levels between the surface and the 1000-foot level, it is not unreasonahle to expect to find them at intervals to much greater depth. In the south end of the Gover mine, on the fourth level, a fault was found which dislocated the vein, horizontally, its southward continuation being found 50 feet to the westward. This fault was described by the writer in the twelfth report of the State Mineralogist of California in 1894, and was at that time the first fault noted on the lode. Since then, however, numerous faults have been recognized along the lode, some of which have previously been described in these papers.

Proceeding northward along the gold helt the Pioneer mine, near Plymouth, is one of unusual interest, hy reason of its rich ores and the sudden disappearance of values in the vein. In this property there are also two veins, an easterly, or hanging wall vein of massive quartz, and a westerly vein of banded structure, the latter usually proving to be the better vein. These veins occur wholly in black slate. The lower workings are low grade; the country is heavily fissured, and there is some reason to believe that possibly the development was misdirected and that a further search in depth may result in finding the downward continuation of the upper ore bodies.

The Plymouth Consolidated mines at Plymouth have heen closed for many years, and the writer has never had an opportunity to inspect the underground workings of this property. It is said, however, that both walls are hlack slate, and this statement is probahly correct, as indicated by the dumps. Pieces of diabase and amphibolite schist are frequently seen also, but these may have come from crosscuts. The main ore shoot is described as a large mass of quartz with ribbon structure, 30 to 100 feet wide.

The Shenandoah mine is east of what is recognized as the mother lode, being east of the latter several thousand feet. The inclosing formation is diorite, which, near the vein, is altered to amphibolite schist. The gouge is black and often slaty. In this mine, also, is frequently seen two veins of quartz, the one massive, the other banded. It is a simple fissure, however, both veins occurring therein. The banded ore is generally the hetter in grade. There are no unusual structural peculiarities in this vein.

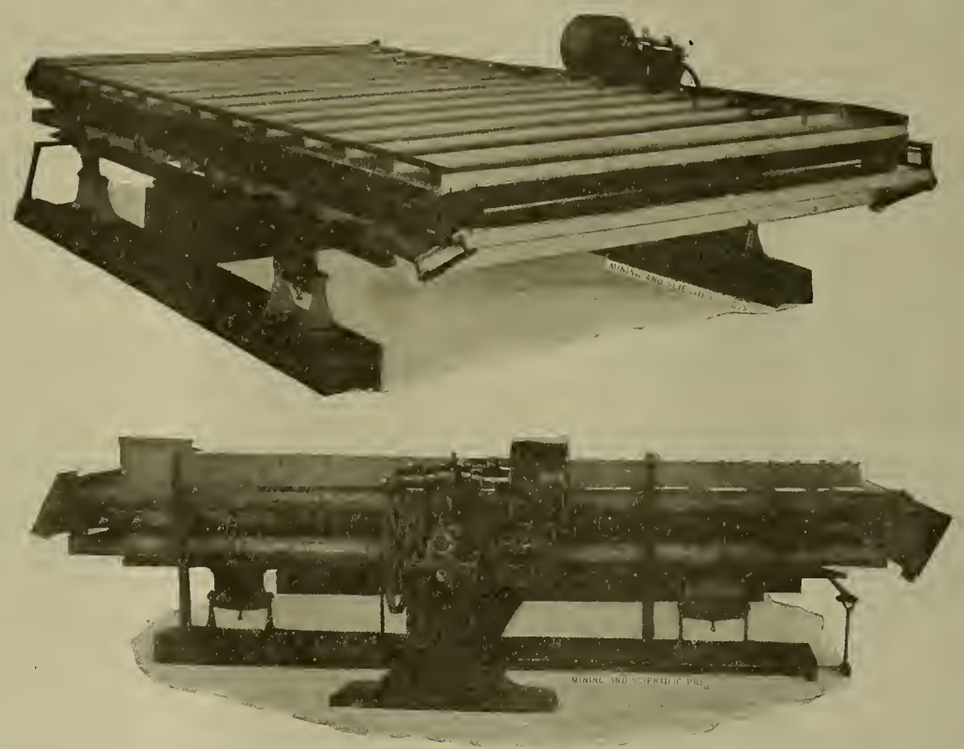
The Bay State mine is on the mother lode, 4 miles north of the town of Plymouth. There are in this property two veins lying side by side. The easterly, or hanging wall vein, is a heavy massive quartz vein, usually with small values, the foot wall section is banded and often granular. A large amount of calcite is present in the interstitial spaces of the quartz rock, and often on exposure the rock crumbles. A dike rock accompanies the vein. Beside these there are several other veins in the property lying westerly from that described. One of these is known as the Kretcher vein, which lies within the slates. Southward it joins a second vein, which has the black slate for a hanging wall, and a diabase foot wall. These veins hoth have a banded structure and have produced some good gold ore.

(TO BE CONTINUED.)

The Wilfley Slime Table.

Herewith are two vignette illustrations of the Wilfley slime table, as manufactured and supplied by the Mine & Smelter Supply Co. of Denver, Colo. Thls table was devised with intent to concentrate the slimes and finely divided particles of mineral which were too fine to be saved on standard Wilfley tahles. By placing the Wilfley elime table below these concentrators the manufacturers state that slimes and fine mineral are caught and saved automatically.

The Wilfley slime table is described as being an entirely new invention, in which is used a new principle for the separation of fine particles of mineral from its gangue. The table, as will be noted from inspection of the accompanying engravings, consists of a number of small, shallow troughs, arranged side by side, and attached to chain belts, forming in the whole a large helt which moves across the table very slowly. While this belt, or series of troughs, is slowly moving across the table a progressive motion is given the whole. This motion is produced hy a simple movement similar to that used on the standard Wilfley tables, the rotation of the helt being produced hy worm gear and sprocket wheels and chain. According to the claims of the inventor, the progressive motion carries off the silica and gangue, leaving the small particles of ore, concentrates and slimes in the troughs of the main belt or table top. As these troughs are slowly hrought to the lower side of the table they encounter a spray of water, which washes them into a concentrates box placed on the floor underneath the table, the troughs coming up on the opposite side of the table thoroughly clean. The tailings, silica, etc., are designed to pass off the end of the table into launders, which dispose of this worthless matter upon the dump.



The Wilfley Slime Table.

The manufacturers say that the Wilfley slime tahle is designed to receive the entire tailings and wash water from one or two standard Wilfley tables and reconcentrate the tailings, and that the slime tahle is adjusted to all classes of tailings by simple adjustment of the stroke and the adjustment screws under the rocker supports. The table is stated to require about 1 H. P. to operate it at a speed of 190 revolutions per minute. The shipping weight is 2300 pounds. The Mine & Smelter Supply Co. further say: "This table has been thoroughly tested with tailings from Michigan, Montana, Colorado, Arizona, New Mexico, Old Mexico and Nevada, and has given results in every case which have caused us to believe that there is a large field for this tahle."

Aluminum and Bauxite.

The report on aluminum and hauxite for 1902 by J. Struthers has just been issued by the United States Geological Survey. The production of aluminum in the United States during 1902 was approximately 7,300,000 pounds, as compared with 7,150,000 pounds in 1901, the sole producer being the Pittsburg Reduction Co., which has large plants in operation at Niagara Falls and at Shawingan Falls, Quebec, Canada, and is installing a large plant on the St. Lawrence river, near Massena, N. Y. The chief use of

aluminum is for the transmission of electrical currents and for alloys possessing exceptional physical and chemical properties, though a considerable part of the output is manufactured into domestic articles of various kinds. Two growing uses of the metal are for lithographic work and for the production of intense heat by the combustion of the metal as powder.

The production of bauxite during 1902 amounted to 27,274 long tons, as against 18,905 long tons in 1901. Georgia yielded the greater bulk of the product, the remainder coming from Alabama and Arkansas. The consumption of bauxite in 1902 amounted to 43,112 long tons, as compared with 36,218 tons in 1901.

The domestic production of alum and aluminum sulphate in 1902 amounted to 88,614 short tons, valued at $2,238,171, as compared with 82,496 short tons, valued at $2,026,554 in 1901. The imports in 1902 were valued at $16,808, as compared with $20,781 in 1901.

Notes on the Metallurgy of Copper of Montana.*

NUMBER IX—CONCLUDED.

Written by H. O. HOFMAN.

ELECTROLYTIC REFINING OF COPPER.—The work of the two electrolytic refining plants in the Butte district, at Great Falls and Anaconda, is of especial interest, as they work under different conditions of power, while they treat similar anode copper by the multiple process. The works at Great Falls, driven by water power, have 312 tanks, 9 feet 9 inches long by 2 feet 4 inches wide by 3 feet 9 inches deep, in three sets of 104 tanks, each set having a separate solution; a tank is charged with twenty anodes and twenty cathodes; the current is of forty amperes per square foot of cathode area; two Westinghouse direct-current machines generate 9000 amperes at 200 volts. The works of Anaconda, driven by steam power, have 1400 tanks, 8 feet long by 4 feet wide by 4 feet deep, in sets of 200 each. A tank is charged with seventy-six anodes and eighty cathodes, the current is of ten amperes per square foot of cathode area. There are seven dynamos, each generating 4000 amperes at sixty volts for 200 vats.

The anodes of the Butte district assay: Cu, 98% to 99%; Ag, 40 to 120 ounces per ton; Au, 0.1 to 1.5 ounce per ton. They are cast either direct from the converter or the converter copper is first refined in a reverheratory furnace.†

The converter charge is blown to the point at which the copper still retains considerable sulphur dioxide in solution. In pouring anodes from the converter, the copper strikes a launder, swung in position, which delivers the copper into open flat moulds resting on a car moved slowly on rails laid between the posts of a stand. The strong evolution of sulphurous gas upon cooling makes the anodes very uneven. The moulds are of copper, but have cast-iron centers that take up the impinging force of the stream of metal. If the copper is first to be refined, the metal from several converters is emptied into ladles which discharge their contents into the stationary refining furnaces. Here the rabbling of the copper, in order to cause the oxidation necessary to produce set copper, has been replaced by forcing air into the copper by 1-inch wrought-iron pipes inserted through the side and end doors of the refining furnace. The two hours required for rabbling have been reduced to one and one-quarter hour by blowing; 6 feet of pipe are used up with a forty-ton charge. Oxidation is continued until a small ladle-sample, when broken, shows the characteristic single bubble in the depressed center. Care is taken to bring the copper only to this point, when the copper is saturated with cuprous oxide, as otherwise the surface will quickly become oxidized and covered with melted oxide. The set copper is then poled to tough pitch copper, fifteen poles (3 inches at end, 7 inches at butt and 15 to 18 feet long) being required for fifty tons of copper. From the reverheratory furnace the anodes are cast by means of an improved form of Walker casting machine.

A tilting reverheratory furnace constructed along the general lines of the Bruckner cylinder was used at the old Anaconda works, but given up after a short trial.

Converter anodes are less evenly corroded, give more scrap and furnish a mud of lower grade than do anodes from the refining furnace. Coarse copper, e. g., with Cu, 99.27%; As and Sb, 0.07%; Ag, 61.14, and Au, 0.22 ounce per ton, cast from the converters into anodes, gave 8% scrap, and the anode mud, after having passed through a 40-mesh sieve, washed and dried, contained Cu, 41%; Ag, 7000, and Au, 18 ounces per ton. Similar copper, refined in the reverheratory furnace and cast into anodes, gave in corroding only 5.5% scrap, while the 40-mesh anode mud assayed Cu, 18%; Ag, 15,000, and Au, 38 ounces per ton.

The Great Falls anodes are 24 inches wide by 35 inches long by 3 inches thick at the top and 2½ inches thick at the bottom; they are beveled at the bottom; the two lugs on top are 4½ inches wide by 2½ inches long by 2 inches thick. The anodes are suspended from cast copper cross bars (1½ inch by 1¼ inch) by means of the Morrow clip, a loop of sheet copper, 2½ inches wide (recently replaced by a rod ¼ inch in diameter) by 3½ inches high, the ends of which are allowed to project into the anode moulds before they are filled with liquid copper. A converter anode weighs 500 pounds, and is sufficiently corroded in about eighteen days to be withdrawn and regarded as scrap, a new anode being put in its place. The Anaconda anodes are 24 to 24½ inches wide, 32⅞ inches long, and 1¼ inch thick at the top, and 1 inch at the bottom. They have two top lugs 6 inches wide with holes, and are suspended in pairs from iron copper-covered cross bars (⅞ by 1⅝ inch), nineteen to a tank, by means of copper hooks ⅝ inch thick. An anode weighs 230 pounds and is corroded in thirty-seven days.

The cathodes are made in the usual way, in tanks set apart for the purpose. They are slightly longer and wider than the anodes. At Great Falls they are 26 inches wide by 36½ inches long and weigh two and one-half pounds; at Anaconda they are 11 inches wide by 33 inches long and weigh three-quarters to one pound. At Great Falls the cathodes are suspended by the Morrow clip, which is fastened to the starting sheet by a machine, which punches a hole through the loop and sheet, bends over the lugs and clamps them fast. At Anaconda the upper rim of the starting sheet is bent and clamped over the ends of a piece of sheet copper, 4½ inches wide by 11 inches long; four cathodes go to a cross bar; the electrode distance ranges from 1½ to 2 inches.

The tanks are made of 3-inch plank and are lined with eight-pound lead; the bottoms have a board cover to protect the lead lining from pieces of anode copper that may become detached. At Great Falls, the vats are arranged in pairs with three conductor bars, the central bar serving as cathode bar for one tank, and as anode bar for the other. At Anaconda, with the Thofern disposition, the tanks are arranged in single rows.

The electrolyte contains with the heavier current 170 grams concentrated sulphuric acid and forty-two grams copper per liter; with the lighter current, 150 grams acid and forty grams copper. The resistance appears to begin to increase when the copper rises above forty-two grams. The temperature of the electrolyte at the head tank is 64° C. and 50° C., and the circulation, six and three gallons per minute. Solutions are admitted and drawn off, either at the ends or the sides, precautions being taken by means of perforated lead baffle plates to have an even distribution, and thus avoid stirring any mud. The different forms of plunger pumps, which were formerly used to raise the electrolyte, have given way to Pohle's air lift pumps working under a pressure of twenty-five pounds. These have proved very satisfactory, especially since the delivery pipe has been cut in two near the discharge and the ends joined by a rubber hose, thus breaking any electric connection. The electrolyte becomes enriched in copper and takes up iron, arsenic and antimony. A foul solution contained, e. g., per liter:

Cu, 51.8 grams; Fe, 13.2 grams; As, 14.02 grams; Sb, 0.62 gram; H_2SO_4, 48 grams.

The low percentage of antimony is due to the practice of adding daily enough concentrated crude hydrochloric acid to the head tank to maintain .04 gram chlorine per liter in solution. This addition precipitates antimony, it is believed, as oxychloride. When there is deficiency of hydrochloric acid, a sample plate becomes streaked, tarnished, black and, at the same time, brittle. The excess of copper over the normal is removed by shunting off part of the electrolyte and making it pass through tanks with lead anodes. By retarding the flow of this current through a second set of tanks, arsenic will be deposited with the rest of the copper. The slime deposited in such a purifying vat showed Cu, 57.1%; H_2SO_4, 11.8%; Ag, 0.3%; As, 7.2%; Sb, 1.8%; H_2O, 18.4%; difference: traces of $PbSO_4$ and traces of Fe.

While the difference in potential between electrodes with soluble anodes is 0.6 (Great Falls) and 0.3 (Anaconda) volts, with insoluble anodes it rises to 2.5 and 2.0 volts. When iron is to be removed, the solution freed from copper, and arsenic is concentrated by heating to one-third of its volume and then cooled, when most of the iron will crystallize out in the form of ferrous sulphate. At Great Falls the cathodes are renewed every second day. They weigh fifty-five pounds and contain Cu, 99.95%; As, 0.0012%; Sb, 0.0033%; Ag, 1 ounce. Although this method of working uses up a large number of starting sheets, it is found to be advantageous, as with the large current of forty amperes there is a loss in efficiency on account of short circuiting if the cathodes are allowed to grow heavier. Thus with two-day cathodes there is an ampere efficiency of 91%, while with four-day cathodes this falls off to 85%. The cathodes, taken out four at a time by means of an overhead traveling pulley, are transferred to lead-lined cars and replaced by starting sheets. The twenty cathodes in a car are then raised together by means of an electric crane, dipped into water, drained, dipped into milk of lime and allowed to dry. The coat of lime protects the plates in melting down from the sulphurous gases in the products of combustion of the refining furnace.

At Anaconda, cathodes are removed only when the anodes are completely corroded. After two days depositing they are, however, taken out and straightened. A tank receives its anodes all at once; in the same way all the cathodes are taken out in one operation.

The anode mud made at Great Falls is removed by a steam injector pump and rubber hose from the electrolyzing vat into a settling tank covered with a 40-mesh screen; it is then drawn off into an acid egg, forced through a filter press, steam dried (when it still retains 2% water), broken up, sampled, sacked and sold.

At Anaconda, the anode mud is discharged through an opening in the bottom of the electrolyzing vat, after the solution has been drawn off from the side, into a V-shaped trough leading into a tank; from this it is drawn into an acid egg and forced into a tank in the refining department, drawn onto filter cloths, washed, dried, sampled, sacked and sold. Until recently the mud was treated at the works. It was melted down in a reverheratory furnace, refined by the addition of nitre, cast into small ingots and parted with sulphuric acid, the silver being precipitated by means of the copper.

The anode scrap at Great Falls is remelted in the converter, while at Anaconda it goes back into the anode furnace.

REFINING OF CATHODES.—The reverheratory furnaces used for refining converter and cathode metal have retained the pear-shaped form of the original Welsh furnaces. They have charging doors on both sides, and the usual working and ladling doors at one end; and there are air flues in the bridge leading onto the hearth.

The following are the leading details of a standard furnace: Length of hearth, 22 feet 6 inches; width at bridge, 7 feet 1.5 inches; at middle, 14 feet 8 inches; at flue, 1 foot 8 inches; hearth area, 225 square feet; thickness of hearth at bridge, 2 feet 7 inches; at flue, 2 feet; depth of metal, 12 to 13 inches; length of grate, 8 feet 6 inches; width, 7 feet 1.5 inches; depth of grate below top of bridge, 2 feet 6 inches; ratio of grate to hearth area, 1 : 3.7; height of roof above bridge, 1 foot 10 inches; above hearth at bridge, 2 feet 3 inches; at flue, 1 foot 10 inches; rise of arch, 1 inch per foot; size of flue at vulcatory, 3 feet 9 inches by 19 inches; of flue leading to chimney, 24 by 19 inches; size of chimney, 32 by 32 inches; height, 80 feet; charge: liquid, 125,000 pounds; cathodes, 75,000 pounds; analysis of bituminous coal: ash, 18.8; fixed carbon, 54.6; proportion of charge to coal by weight, 3 : 1; tons of charge to number of poles, 4 : 1; tons of charge to bushels of charcoal, 1 : 1.

The method of working differs little from that in common use, excepting that flapping, or rabbling, is replaced by blowing with compressed air; the metal bath, in poling, is covered with charcoal only toward the end of the operation, a few poles, however, floating on the metal; of the two poles inserted through the working door, one is depressed near the door, the other toward the middle of the furnace; ingots, cakes and wire bars are cast by means of suspended ladles, 14 inches and 19 inches in diameter. All moulds are of copper. Cake and wire bar moulds are painted with a mixture of lamphlack and benzine; they are warmed at first by pouring in some copper. Ingot moulds are smoked before the first round by means of burning rosin held in a ladle. The tests applied to the copper are those of the Bell Telephone Co. for No. 12 wire: Conductivity, 96% to 97%; tensile strength, 65,600 pounds; torsion, forty twists in 6 inches between the clamps with 1% elongation. Three test bars are made from each charge, one bar being made when dipping begins, one when the charge is half out, and the third at the conclusion of the ladling. The test bars are 8 inches long, and have the full cross section of a regular wire bar. From each of these bars a section 6 inches long by 1 inch square is sawed; this section is rolled into a rod and afterward drawn cold to a No. 12 wire, Brown & Sharpe gauge, on which all tests are made. Conductivity tests are made with the Willyoung conductivity bridge.

†Refining converter copper before casting into anodes has been given at Great Falls in spite of the advantages mentioned later on in the text as regards corroding, because the gain did not warrant the expense. At Anaconda, where power is generated by steam, it is of considerable advantage to have refined anodes.

*Trans. Am. Inst. Min. Engs. (Condensed).

American Machinery for South Africa.

The importation of machinery into South Africa is increasing, as these figures from Consul-General Hanauer show:

Description.	1901.	1902.	1903.
Machinery:			
Mining.....	$ 305,864	$ 573,526	$ 968,263
All other.....	1,337,387	2,672,631	3,166,149

The steady extension of the railroads in South Africa account for the increased importation of locomotives, which were valued in the three years at $545,315, $1,148,095 and $1,963,253, respectively.

New lines of railroad, estimated at 4000 to 5000 miles in length and to cost about $100,000,000 to $125,000,000, are projected. American manufacturing concerns are already in the field; thus the Pittsburg Westinghouse Co. has a contract for the construction of a line of roads in the De Beers mining district. The General Electric Co. of New York is

to furnish to the railroad shops of the Natal government 119 motors, 6 dynamos of 300 H. P. each, 3 electrical cranes and other appliances. Another United States firm has received an order for seven locomotives for the Cape Colony railroad.

The municipal tramway of the city of Durban is being constructed by an American firm.

Good Roads for Mines.*

Written by JAMES W. ABBOTT.

It is indeed an anomaly that while in every other phase of civilization—in the home, the office, the city, on rail and water—we lead the world's progress, the general standard of maintenance and construction for our common roads has remained stationary during the past hundred years. The lumberman hauls his logs, the farmer his cotton, wheat and corn, and the miner his machinery, supplies, coal and ore over roads no better than those used by his forefathers a century ago.

It is a no less striking paradox that the old world countries have splendid roads because they can not afford poor ones, while our material resources are so abundant that we have been bearing year after year the appalling loss from bad roads without realizing the drain. From abundant data gathered in all portions of the United States by the office of Public Road Inquiries, it was demonstrated years ago, and has been signally confirmed by my own investigations, that the cost of wagon freighting under average existing conditions is, approximately, 25 cents per ton per mile. It is also interesting in this connection to note that the contract price (determined by very earnest competition) paid in 1901 by the Government for hauling supplies in Yellowstone National Park, where the mountain road system is of a very high standard, was 25 cents per ton per mile. In gathering statistics of the cost of freighting to and from mines by wagon road, I have found several instances, where the roads were the best, in which this average cost figured exactly 25 cents per ton per mile. I have found none in which the rate was even a fraction lower. Climate, the price of labor, hay and grain, volume of material to be handled and the newness, or otherwise, of the mining region, are all, of course, factors in determining this cost of wagon freight. But the one factor which always controls, and which overshadows in importance every other, is the character of the road. I have in mind a mining camp, situated far below timber line, distant 18 miles from a populous, thriving agricultural center and important railroad point, where the established freight rate each way is $12 per ton—66⅔ cents per ton-mile. At no place along the line is the rise excessively rapid, but the grade in places is so very steep that 3000 pounds is an average load-up for a six-horse team.

At the request of the Department of Agriculture, on Nov. 20, 1895, a circular letter was addressed to many consuls in European countries, requesting information similar to that already elicited in this country on the cost of hauling farm products. A very large number of reports in answer to this circular were received and published. They show costs ranging from 6 cents to 13 cents per ton-mile for hauling different products under different conditions. While no certain general average cost per ton-mile can be adduced from these figures, any one who studies them will conclude that it lies between 10 cents and 12 cents. With reference to the question, whether this light cost in Europe is not partially due to lower prevailing standards of wages, it may be said that, while wages there are somewhat lower than with us, the cost of feed averages considerably higher; that very much of the hauling in Europe is done with one horse or mule, while all the data from which the American average was adduced assumed one driver for not less than two horses.

Assuming the cost of hauling at 25 cents per-ton mile, and taking figures for production from census returns, the director of the office of Public Roads Inquiries in April, 1896, estimated the grand total annual cost of hauling on the public roads of the United States at about $950,000,000. Had these roads been constructed on European standards, this cost would have been reduced more than one-half.

For the same year covered by this estimate the gross freight receipts of all the railroads in the United States was less than $730,000,000.

It is only by some such comparison that the mind can grasp the significance of these figures of annual waste, which, although they equal the entire amount expended since its beginning by the Government on improvements to rivers and harbors, does not fully measure the appalling loss to this country from its defective highway system. We must add a great many millions for perishable products spoiled because they could not reach market in time, the restriction or congestion of railroad freight, due to closed roads and their subsequent opening (because of climatic conditions), the failure to reach market when prices are good, the enforced idleness of vast numbers of men and animals, the limitation to the area of profitable cultivation of the soil or exploitation of the ground, and many other adverse results due to prevailing highway conditions.

But it is particularly to the effect upon the mining industry that I desire at this time to call special attention. The tonnage involved in mining operations is always very great. The machinery required for mine and mill equipment runs into tonnage alarmingly fast in the very great majority of cases. Material of all kinds which enters into this equipment must be transported a greater or less distance over a common road. In the beginning of most mining enterprises the product, as well as all needed supplies, including fuel, must be hauled in wagons. Whatever this wagon haul costs more than it would over properly constructed roads is a tax to be deducted from possible profits. Take a mining enterprise that requires an average wagon haul of twenty tons a day for 300 days in the year; supposing that improving the road will result in a saving of but 25 cents on each of these tons; this means $5 a day, or $1500 for the year. All who are familiar with mining methods in the United States will recall instances without number where a great drain upon the net output has been suffered year after year without persistent effort for relief, and, in many cases, even without protest.

The annual product from the mines of the United States has a money value of more than one billion dollars. The amount which is expended annually to cheapen the transportation of these products by rail and water, and for mechanical devices of all kinds by which they may be placed upon car or boat or removed therefrom, is prodigious. Isn't it an anomaly that, with almost insignificant exception, no effective study is given to this waste in wagon freighting? Compare existing practice in this respect with what the railroads are doing. Grades are being cut down, curves lightened, tunnels bored, heavy steel rails substituted for the lighter ones, more capacious cars and more powerful engines purchased, and every method practiced to reduce the cost of transportation. In the 1901 report of the Pennsylvania Railroad Company will be found some very interesting pages bearing upon what has been accomplished along this line. In 1865 the average cost of hauling each ton of freight 1 mile was practically 2½ cents, and the average profit ⅝ of a cent. In 1901 the average cost of the haul had been reduced to ⅝ of a cent, and the average profit had fallen to ⅛ of a cent. We see that by the improvements effected the cost of the haul has been reduced to one-sixth of what it formerly was. As demonstrating the critical need for this economy, appears the profit on the transaction, which has decreased to a less figure than it was when the cost was so much greater.

The loss resulting to the mining industry from unsuitable roads is by no means confined to regions where there are actually developed mines. The wealth still hidden in the almost impenetrable fastnesses of our Western mountains probably far exceeds all that has ever yet been disclosed. The intrepid prospector and his faithful burro outline the primitive trail into each new district. These trails in turn give way to pathways which are dignified as roads. These roads gradually develop into great arteries and money is often poured out to open a new mining camp, a tithe of which thus squandered would build good roads. Prospects which, if accessible by good roads, would tempt capital and be developed quickly into mines, lie idle year after year and decade after decade, solely because there is no way by which they can be economically equipped and operated. With short-sighted economy, counties hoping to make such prospects accessible, build roads leading to them, located with such steep grades and in such improper places that the cost of hauling over them soon becomes manifestly impracticable. They actually defeat the very purpose for which they were built, because the fact that some kind of a road is already built makes it ten times more difficult to raise the means to construct another along correct lines. The man who exerts his influence against the building of a road which must inevitably prove unsuitable, confers a greater benefit upon a mining region than he who subscribes himself and induces his neighbors to do likewise for a kind of road which effectually disappoints the very hopes which it at first encouraged. Many a mining enterprise of merit has been irretrievably wrecked because an expensive and appropriate equipment has failed to produce a paying mine where wagon transportation has been so excessive as to consume the profits. It is only through economy and by the most careful methods that a very large percentage of mines have been made commercially successful. Is it not just as important to look carefully after that portion of the expense which goes into wagon transportation as it is to hoist cheaply, to drill effectively, to ventilate properly or to save the ultimate nickel by elaborate metallurgical methods?

The fundamentals of any mountain road construction are grade and drainage. From an extended observation and experience in mountain road construction and in mountain freighting, I have reached the conclusion that under no circumstances, on any road designated for general freighting, should there be a grade exceeding 12%. I further believe that no distinct economy is secured by reducing mountain grades, at much cost, below 8%. This latter conclusion, reached by myself solely from experience and observation, has been confirmed by traction experiments made by the Government and by individual engineers.

Of course, the most difficult place upon any road where trail wagons are not used determines the load which can be hauled. The engineer who is locating a mountain road should determine in his own mind, from all the circumstances in the case, what his maximum shall be, and, when he has once determined it, should adhere to it inflexibly in making his location.

Grades should always be eased and the roadbed widened on curves and the approaches to every sharp curve should be level.

It is much easier to drain a road on a side hill than one located along the bottom of a gulch. Roads facing the east and south dry out more quickly after being wet than those which face the north and west.

A side hill road should always slope towards the inside bank, and never towards the outside; otherwise the tendency will be for the outside of the grade to get lower and the inside higher, until it becomes dangerously sidling.

The essential principles of mountain road construction are few and simple. The main need is common sense and the power to reason clearly. If every mining man would get these principles firmly fixed in his mind, and whenever he rides over the road would mentally inquire: "Is the road here rightly built? How could it be made better?" the beneficial results of the industry would be quickly apparent. Out of such habit would come discussions and a general influence for better methods and higher standards.

Next winter there will be introduced into both houses of Congress bills designed to bring in the Government as a co-operating factor with States, counties and localities in improving roads. These bills will provide for the appropriation of a definite sum to be apportioned equitably among the States, the amounts thus apportioned to be expended in conjunction with equal amounts contributed by the States. They will provide for apportionment directly according to population. Some favor apportioning half the amount according to population and the other half equally to each State, on the same basis as the States get representation in Congress.

The States must provide by law how their quota shall be raised—that is, whether the State shall furnish it all, or the State a part and the county a part, and perhaps the locality another part.

All bills will provide that the money shall be expended under the direct supervision and control of expert road builders, in Government employ, and the effort will be made to thoroughly safeguard the funds from waste or peculation.

This is a movement that grows as its benefits become apparent. One good road brings another. We don't expect the Government to help build all the roads, but we do expect it to help start us.

*Trans. Am. Min. Congress. (Condensed.)

The Golden San Juan.*

Written by A. H. ELFTMAN.

Taking Red mountain as a center, a circle with a 10-mile radius will include most of the producing mines of Ouray, San Miguel and San Juan counties. Prominent among the mines are the Camp Bird, Virginius, Revenue, Smuggler–Union, Tomboy, Barstow, Yankee Girl, Gaston, Silver Ledge, Henrietta, Gold King, Sunnyside, Esmeralda, Silver Lake, Highland, Mary, North Star and others. Between these are numerous prospects, the development of which was begun during the last three years, and many of which are now nearing completion of the dead work and will soon enter the list of producers. This prospect work has been especially active in San Juan county.

The San Juan district, embracing the southwest portion of the State, produced in 1902 22% of the output of Colorado. This area produced $5,490,000 in gold and about the same value in other metals.

One-half of all the copper produced in Colorado came from this district. Its gold value was three times the value of its silver. It paid 26% of its production as dividends.

The ores of the San Juan country occur principally in fissure veins, which traverse the country in well-defined systems, traceable often for distances of 5 miles and more. The veins are well mineralized, and at frequent intervals form large ore shoots. The veins vary in width from 1 foot to 200 feet. Ore bodies 25 to 50 feet wide are of common occurrence. The ore shoots are frequently 1000 to 1500 feet long.

Generally speaking, the ores of the San Juan country are milling ores. The ores which are or have been worked vary in value from a probable minimum of $600 to several thousand dollars per ton. The ore from the Camp Bird is all milled and runs from $40 to $200 per ton. The Tomboy ore runs from $7 to $20 per ton. The Gold King ore averaged over $25 per ton in 1902, and this will be materially increased during the present year. The Sunnyside ore last year averaged $35 per ton. Silver Lake ore varies from $8 to $70 per ton.

The cost of mining and milling the ore varies from

*Trans. Am. Min. Congress. (Condensed).

$4 to $7 per ton. The mining is principally carried on hy tapping the ore hodies at depths of 1000 feet or more by tunnels. The ore is then transported to the concentrators hy aerial tramways.

In milling, the ore is crushed by drop stamps or rolls, then passed over copper plates to the concentrators. Ahout one-third of the values are saved hy amalgamation, the halance heing saved as concentrates, which are shipped to the smelters. The tailings run from $2 to $5 per ton.

The cyanide process is being applied to these tailings with satisfactory results.

I have only attempted to call your attention to the existence of the San Juan country. In many ways the size of the ore hodies and the original mineralization are the same as those found in the Black Hills. While the San Juan country has always been looked upon as a silver camp, it is, however, a unique fact that the deeper the mines go the proportion of the gold value increases and free gold hecomes more ahundant.

Ore Deposits of the Northern Black Hills.*

NUMBER III.

Written by J. D. IRVING.

MISCELLANEOUS DEPOSITS IN THE ALGONKIAN ROCKS.—At several localities within the productive mining region ores have heen found which may he properly described with the Algonkian lodes. They are partially in eruptive rocks and partially in brecciated material composed of schist and porphyry, while at times they form veins which pass from one rock into the others; at other points they pass from porphyry inty Camhrian rocks. While none of these have yet attained any great importance, there are two that deserve special mention. The first is in Strawberry gulch, where quite a numher of small mines have been intermittently worked. Much of the ore occurs in a decomposed porphyry in the form of thin auriferous limonite sheets, filling the small fractures, or of impregnations in the country rock. In general, these pass downward into unoxidized pyrite, while in a few cases sphalerite and galena have heen reported. The porphyry mass in which these ores have been found is extremely large and so irregularly intruded into the schists that its relation to them can not he readily made out. Some of the ore ohtained from the mines is reported to have heen rich, hut it has so far heen too irregular in its occurrence to form the hasis of extensive mining. The second locality where ore has heen found, which is chiefly in porphyry, is the Old Ironsides mine, near the mouth of Squaw creek. Here there is exposed in the side of the creek a sheet of mica-diorite-porphyry ahout 40 feet thick, with beds of Camhrian rock both above and below. Through these rocks run a series of vertical fractures striking about north 85° east, along which silicification has occurred and from which telluride of gold has heen introduced into the adjacent rock, often to considerahle distances from a fracture. Some of the crystals of telluride—presumahly sylvanite—are quite large. The deposition has occurred chiefly in the diorite-porphyry, but also to a minor degree in the Camhrian rocks. At the surface, where the rocks are highly oxidized, gold may he seen along the fractures in a free condition. There are other places in which ore has been found in eruptives, either as fillings of fissures or as impregnations, but they are not of any economic value. The eruptive rocks, as a whole, have not heen the loci of considerable deposits.

ORE DEPOSITS IN CAMBRIAN ROCKS.—As a producer of gold the Cambrian is second in importance only to the Algonkian series. In the rocks helonging to this age, or those which lie immediately above the metamorphic schists, there are four varieties of ore—first, the gold-hearing conglomerates or gravels, generally known as the cement deposits; second, the refractory siliceous ores; third, the pyritic ores, and fourth, the lead-silver ores.

THE GOLD-BEARING CONGLOMERATES.—At the hase of the series of Camhrian strata, immediately above the upturned schists, there is generally a hed of gravel. It varies in thickness from a few inches to more than 30 feet. Throughout a large number of areas where the Camhrian strata yet remain uneroded this conglomerate is generally ahout 3 or 4 feet thick, and passes upward into a hard, dense quartzite, which has a vertical range of from 15 to 30 feet. The quartzite is almost universally present at the hase of the Camhrian series. The gravel is generally quite thin, hut attains a notahle thickness in a few localities. One of these is in the vicinity of Lead City. Here the gravel is gold-hearing and has produced very heavily in the past. The productive areas of this gold-hearing gravel are closely grouped ahout the Homestake helt. They are five in numher. One, comprising the Durango and Harrison mines, is west of the Homestake lode, near the southern extremity of the present outcrop. The other four, east and north of it, include the Hawkeye, Monitor and Gentle Annie. One of these lies just east of the Caledonia cut; another on the divide between Bohtail and Deadwood gulches; the third on that between Bobtail and Deadwood gulches, and the fourth on the north side of Bohtail gulch, beneath a heavy capping of rhyolite, which forms the high ridge beyond. The gold-hearing conglomerate occupies irregular depressions in the old schist surface, and was probably not uniformly distributed along an old shore line. It thins out to nothing along the strike of the Homestake lode and allows the higher measures of the Camhrian series to lap over onto the mineralized rock of the Algonkian. A general downward inclination of the schist surface toward the northeast may also he ohserved.

It is not possihle to give exact houndaries to the original extent of these gold-bearing gravels on account of the dissected nature of the areas which now remain. The gravel is composed of rounded, water-worn pehhles of quartz schist and a few fragments of softer schist, which seem to decrease in ahundance as one proceeds farther from the Homestake lode—that is, from the old pre-Camhrian shore line. The gold-hearing portions of the gravel may he at once distinguished from those which are harren by the character of the material which cements the pebhles. In the gold-bearing portions this is chiefly oxide of iron when weathered, or pyrite when it has not suffered alteration. The non-gold-bearing portions, on the other hand, have also a rather sandy, quartzose matrix, or are in some instances slightly calcareous. The gold in the richest portions of the conglomerate—those first mined—is chiefly placer gold, for it is rounded and worn hy attrition and is concentrated near the hedrock. It was undoubtedly derived from the erosion of gold-hearing lodes in the Algonkian rocks, and mechanically deposited in depressions along the old shore line. Some of it has heen dissolved by ferric sulphate which has resulted from the oxidation of the pyrite and has heen redeposited from this solution in thin films in the laminæ of the underlying schists. This has also produced an enrichment of the lowermost layers of conglomerate. Besides these two types of gold which occur in these gravels, it is also possihle that gold was introduced with the pyrite which either cements or once cemented the pehbles. The introduction of pyrite was suhsequent to the deposition of the conglomerates, since it penetrates fractures in the quartz pehhles. It is prohably a replacement of the original quartzose cementing material. Intrusions of rhyolite cut the conglomerate in many places, and are often quite heavily impregnated with pyrite. The close relation hetween these gravel deposits and the Homestake lode, together with their ahsence along its line of outcrop, seems to indicate that the Homestake zone projected ahove the level of the surrounding rocks and formed in the old Camhrian sea a reef ahout which these gravels were deposited. A greater portion of their gold was thus, with little question, derived from the disintegration of the old Homestake lode. They are not to be compared exactly with the gold-hearing sands which are found in the Nome district of Alaska, but are somewhat exceptional, not only hecause they are the only representatives of what may he termed fossil placers, hut hecause they are not uniformly deposited along the shore, hut were confined to the vicinity of an outcrop of a large gold lode, and the detrital material from that lode was held in irregular depressions in the suhmarine surface in the vicinity.

REFRACTORY SILICEOUS ORES.—Of all the ores occurring in rocks of later age than the Algonkian, the refractory siliceous ores have thus far heen the most important factor in the gold production of the northern Black Hills. They are widely distrihuted over a large area, extending from Yellow creek on the southeast to Squaw creek on the northwest, in a hroad, irregular helt.

This helt includes five productive areas, which will he later discussed. The country rock in which the ore occurs is a dolomitic limestone of fine-grained, crystalline texture, and varying, like the ore, in its degree of oxidation. It is termed "sand rock" hy the miners. In its fresh condition it is a dense, gray, crystalline rock, showing innumerable small cleavage faces of dolomite and generally interrupted by hands of greenish-hlack shale of varying width. When oxidized it has a deep red color, hut presents the same crystalline texture, while with very advanced alteration it passes into a red, earthy material termed "gouge." Chemical analysis of this rock shows it to be a dolomite of nearly normal composition, while the microscope shows that it is composed of irregular masses of dolomite, with some scattered grains of quartz or clearly-hounded rhomhic crystals of dolomite. When the rock has been mineralized these are altered to silica and often heautifully preserved. The dolomite beds of this character which have so far heen most extensively prospected occur at two positions in the Camhrian series. The first is immediately ahove the hasal quartzite, from 15 to 25 feet ahove the schists of the Algonkian, and known as the "lower contact;" the second, from 18 to 30 feet below the scolithus, or so-called "worm-eaten" sandstone that forms the top of the Cambrian series, termed the "upper contact." Many other beds of dolomite occur at intervening levels and some of them have produced a little ore. There has as yet been hut little systematic prospecting upon these beds, and it is very probable that they may become important ore horizons in future. The ore is an extremely hard, brittle rock, composed largely of secondary silica and carrying, when unoxidized, pyrite, fluorite and, at times, harite, wolframite, stibnite and jarosite. It shows many cavities, which are lined with druses of quartz crystals, or contain clusters composed of cubes of fluorite. Some of the cavities show large crystals of barite. In some localities the siliceous ore is heavily charged with wolframite, so that in many instances it grades from beds of siliceous ore into flat hodies of almost pure wolframite. Occurrences of this kind are found in the Yellow creek and Lead creek areas. When carrying large quantities of wolframite the ore usually contains great quantities of harite. The ore occurs in flat, banded masses in which the handing is continuous with the bedding planes of the adjoining strata. These masses possess a regular, channel-like form and follow zones of fracture that vary for the separate districts in their general direction, but exhibit a very uniform trend within the limit of any single productive area. These channel-like ore hodies are known as shoots and have a width of from a few inches to, in rare instances, 300 feet. The average width is, perhaps, about 30 feet, although all widths hetween 5 and 100 feet are of frequent occurrence. The length is in all cases many times in excess of the breadth, and in the case of the Tornado–Mogul shoot is ahout ¾ mile. The vertical dimensions vary from a few inches to a maximum of 18 feet. The average thickness is ahout 6 feet. The shoots generally follow either single fractures which are parallel to their longer diameter, or broad areas of parallel or intersecting fracture. The heds of rock that lie above the ore are generally shale of a more or less impervious character, but sills of eruptive rock not infrequently play the same role. On the lower contact the floor is sometimes of basal Cambrian quartzite, but in many cases varying thicknesses of dolomite intervene hetween it and the ore. In such cases the widest portion of the shoot is directly beneath the impervious rock of the roof, for the solutions have spread out and replaced dolomite to the greatest distance along the under surface of the impervious rock. The shoots have thus a wedge-shaped form in many cases, the hroadest portion of the wedge heing at the top.

THE FRACTURES.—When the ore that forms the hody of a shoot has heen removed, the fractures by which the mineralizers have gained access to the rock replaced may be traced in the overlying and—where they are uncovered—in the underlying heds. These fractures have been rendered prominent by a slight silicification of the adjoining rock, which has often caused them to project from the softer shaly material. They are often iron-stained, also. These silicified iron-stained fractures are commonly known as "verticals." They may be ohserved in greater or less number in all of the shoots of the refractory siliceous ore. The fractures are generally slightly warped surfaces along which slight movement has occurred, or they may he composite zones of fracture caused by the intersection of many small irregular fissures. The displacement along such planes of movement is generally very small—not more than 2 or 3 inches—but it sometimes reaches 6 or 7 feet. They are usually without appreciable open space, for the walls have not generally heen removed from one another for distances greater than $\frac{1}{4}$ inch. Some notahle exceptions occur. They are generally vertical, or nearly so. They frequently extend into the heds that form the roof of the ore hodies, and sometimes terminate in the ore-bearing beds themselves. They have also heen traced through the lower quartzite into the Algonkian below, hut on entering that formation their traces are lost in the vertical laminæ of the schists.

(TO BE CONTINUED.)

*Trans. Am. Min. Congress. (Condensed).

The Hampson Patent Turntable.

Among the points of merit in the Hampson patent turntable, illustrated herewith, are that there will



The Hampson Patent Turntable.

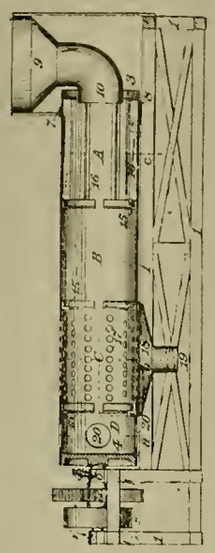
be found no tracks to clog up with ore, dirt or snow. The car can he pushed on or off, to or from any track at any angle: no matching of rails necessary. The manufacturers say that it doubles the amount of work possihle with other turning devices, and that the heaviest car can be turned by a child. These tables are made only by the Colorado Iron Works Co., Denver, Colo., under authority from the patentee. Standard size, 36 inches diameter; weight, 600 pounds.

Mining and Metallurgical Patents.

PATENTS ISSUED SEPTEMBER 15, 1903.

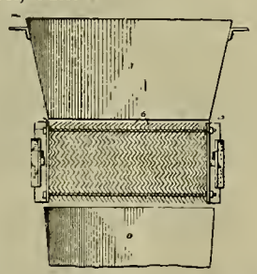
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

MACHINE FOR WASHING AND CLEANING GRAVEL IN GOLD MINING.—No. 738,408; J. G Camp Sacramento, Cal.



In machine for washing and cleaning gravel, combination of rotably mounted cylinder, feed spout leading into one end thereof, and transverse retaining plates dividing interior of cylinder into sections, first adjoining delivery spout, provided with longitudinal lifting plates, second is imperforate and unobstructed, third provided with perforations for escape of water and of smaller portions of material treated, and fourth provided with discharge openings of larger diameter for passage of larger portion of material treated.

ORE SEPARATOR.—No. 738,331; C. F. Lancaster, East Liverpool, Ohio.



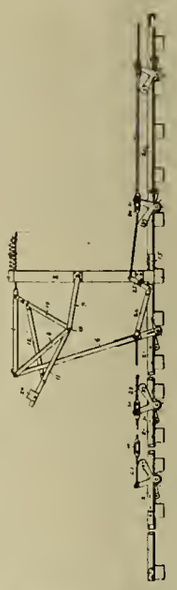
Ore separator, comprising in combination with magnet, separator box, magnetizable corrugated plates supported therein, adapted to be excited by magnet, and feeder for feeding material between plates.

ROTARY DRIER.—No. 738,106; D. Grupe, Davenport, Iowa.



Rotary drier comprising cylindrical shell having discharge opening, inner supporting plate and outer plate providing steam chamber at one end of shell, steam supply pipe connected with steam chamber, outer supporting plate having central opening and located at outer end of shell, steam flues having their inner ends fixed in inner supporting plate and extending into steam chamber, outer ends movably mounted in outer supporting plate and extending beyond same, small steam chambers having inner openings in which outer ends of flues are fixed, and outer openings opposite inner openings, removable caps secured to outer openings of small steam chambers.

MINE CURTAIN RAISER.—J. Wack, Canton, Ohio.



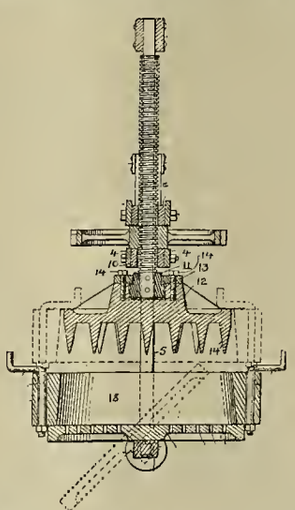
In combination, curtain frame, curtain hung on frame, adjacent rocking frame comprising rock shaft, rock posts on shaft, curtain arms pivoted to rock posts above and attached to curtain below, toggle levers pivoted respectively with curtain arms to rock posts and to curtain frame, toggle joints being tied to curtain arms, weight on rocking frame located to bear with curtain when same is lowered, and partly counterbalance it when raised, and means for oscillating rocking frame whereby is curtain raised and lowered.

EARTH BORING AUGER.—No. 738,760; A. M. Bevier, Superior, Wis.



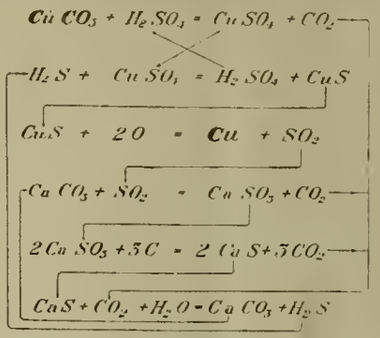
In auger, combination of cylinder, open at one end and provided at end with boring point forming continuation thereof, and having port formed in opposite end, and outwardly opening valve adapted to govern port.

PRESS FOR SQUEEZING MUSHY, ZINKY OR COPPERY LEAD DROSSES.—No. 739,003; W. H. Howard, Pueblo, Colo.



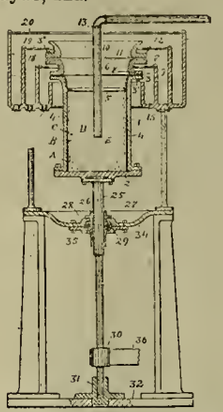
In press, combination with support, of fixed upright screw secured therein, plunger loosely swiveled on lower end of screw, plurality of teeth projecting from under side of plunger, adapted to indent material being treated, frame supporing material, and nut meshing with screw for feeding frame up toward and down from plunger without relative turning thereof, whereby after material has been withdrawn from plunger latter can be freely turned to cause teeth to make new series holes in material.

PROCESS OF TREATING ORES.—No. 739,011; F. Laist, Salt Lake City, Utah.



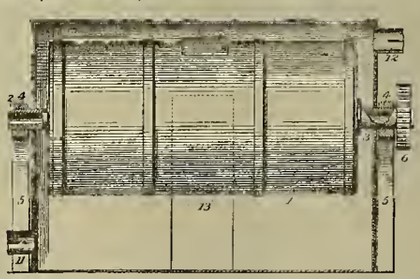
Method of generating hydrogen sulphide and precipitating copper by subjecting an alkaline earth sulphide in the presence of water to the action of carbon dioxide, producing hydrogen sulphide and carbonate of alkaline earth, conducting hydrogen sulphide into the presence of copper in solution, precipitating copper sulphide, treating copper sulphide to obtain metallic copper and gases rich in sulphur dioxide, absorbing gases by alkaline earth carbonate, forming sulphite of alkaline earth, and reducing sulphite to sulphide.

CONCENTRATING MACHINE.—No. 739,081; T. H. Hicks, Fort Wayne, Ind.



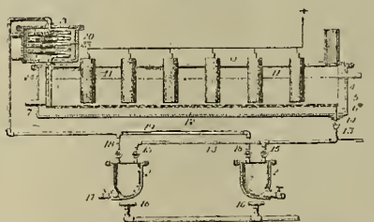
In concentrating machine, rotatable cylindrical vessel adapted to contain mercury, discharge opening for mercury escaping from vessel, mercury-coated lining covering interior of vessel and extending through discharge opening, means for adjusting area of discharge opening to prevent discharge of water or ore while permitting discharge of mercury.

PROCESS OF TREATING TELLURIDE ORES OF GOLD AND SILVER.—No. 739,138; C. E Baker and A. W. Burwell, Cleveland, Ohio.



Process treating ores of gold and silver containing base metal and tellurium by combining base metal and tellurium with chlorine, and separating base metal chloride from other metals or metallic compounds in mass.

ELECTROLYTIC PROCESS OF RECOVERING METALS FROM THEIR COMPOUNDS.—No. 739,139; C. E. Baker and A. W. Burwell, Cleveland, Ohio.



Electrolytic process of recovering metals from compounds by electrolyzing the metallic compound with liquid cathode of a metal more volatile than metal to be recovered, distilling resulting amalgam or alloy, and condensing the vaporized cathode metal and continuously returning it as condensed to cathode.

Mining Summary.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

The Bartels Tin M. Co. is driving two tunnels into the hills back of Tin City, 15 miles above York, says the Valdez News.

S. Elmgreen and A. B. Frick report finding ore on Windfall creek, near Juneau. The strike is 8 miles from Yankee Cove.

R. K. Neill of Spokane, Wash., of the Kendall mine, interested in the Kyak oil fields, says the English company is sinking a well and is down 400 feet. It has not yet reached the oil sands. Two other companies are putting up rigs. M. J. Sinclair and J. A. Finch, of Spokane, are also interested in the district. The oil has been tested and is said to be of good grade.

The Saw Tooth Power & M. Co. is being organized by several operators at Cape Nome to supply all of Seward peninsula with electricity and water power for hydraulic mining. East of Port Clarence and a few miles from salt water are the Saw Tooth or Kigiuaik mountains, in which rise several streams. It is proposed to harness these small rivers and generate an aggregate of 100,000 H. P., using the water power for generating electricity, which will be carried by wire to Nome and all other mining districts of Seward peninsula. The electric current will then be utilized in lifting the water from the various rivers and creeks for hydraulic mining purposes. At present steam plants are being used, but the cost of the machinery and fuel is so great that they can be employed only where the ground is rich. Two engineering parties are now in the field surveying the falls and rivers of the Saw Tooth mountains. It is expected to get part of the machinery in next summer.

ARIZONA.

GILA COUNTY.

(Special Correspondence).—Copper mining is active in the Globe district. The Old Dominion has disclosed by recent developments ore reserves which in richness and quantity excel estimates heretofore given. The Old Dominion company is running two jackets of 125 tons each. In one of them it is treating sulphide ores from the Copper Hill mines, owned by the Arizona Commercial Co., which company has recently developed in its lower levels large bodies of sulphide ores. The new shaft of the Old Dominion is being pushed night and day, and excavations for a new and modern plant are being made.

There are a number of small properties that are shipping ores to the Globe and El Paso smelters at good profit.

The Black Warrior C. Co., Amalgamated, recently made a run in its new plant which is leaching, concentrating, smelting and refining, the result of which was satisfactory. The superintendent reports higher grade ores on the lower level. The company will put in a new 100-ton blast furnace to treat these ores together with refiners' slag from the refining furnace.

The Pacific M. & M. Co., J. D. Coplen, general manager, J. B. Coplen, superintendent, has fifteen claims in the Globe district, and also owns fifteen claims in Pima county. The company is developing its property and proposes to erect a plant of three-fold character, leaching, concentrating, smelting and refining, total capacity 500 tons per day, as their developments show carbonates, oxides and glance ores, with sulphide coming in at the lowest level, 250 feet below the outcrops on the surface. There is nearly 2500 feet of development work consisting of tunnels, shafts, winzes, adits, etc., on the Globe properties. On the north side the ore body can be tapped at a depth of 400 feet by tunnels; on the south side it can be tapped at the depth of 500 feet by a tunnel. Development has been planned by the company by running a drift from the lowest point throughout the entire length, some 8000 feet on the vein, gaining a depth of more than 1000 feet.

Railroad building in Arizona the coming year promises to be a most important factor in the affairs of Arizona. Tonto Basin reservoir, to be the largest artificial body of water in the world, now building by the Government 35 miles north of Globe, will figure in the mining development of that section.

Globe, Sept. 15th.

MARICOPA COUNTY.

The Mormon Girl mine, at Cave Creek, has been sold to Davis & Sons of Congress and Chicago, Ill., men. The ore shows free gold and sulphurets. They are repairing the mill to use until they can build one to be run by electricity.

At the Oro Grande mine, near Wickenburg, the 5-stamp test mill is being put in place, says Vice-President G. B. Upton. The mill has 900-pound stamps, and is of the same pattern as the proposed larger mill.

PIMA COUNTY.

To work a group of mines in the Old Hat district in the Catalina mountains, near Tucson, the Gold Canyon M. & M. Co. has been organized. The officers are: C. H. Pogue, A. H. Tihbals, B. Brooks, D. S. Cochran and W. I. Perry of Tucson, W. H. Tihbals of Salt Lake City, Utah, and J. S. Acker of Prescott.

YAVAPAI COUNTY.

The Tiger G. M. Co., operating in the Bradshaw mountains, southeast of Prescott, has completed a survey from the Oro Belle mine to Bradshaw City for a narrow gauge railroad, which railroad later will be extended from Bradshaw City to Crown King, says the Prescott Courier. A wagon road has been built from Bradshaw City to Crown King, having a 4% grade, and can be used for the railroad when it is built. The Cleveland tunnel has been run in 815 feet from the Cleveland to the Gray Eagle ground, and at the end of the tunnel a station cut and a hoisting engine set up. A double compartment shaft is being sunk.

T. J. Rigby, president of the Rigby M. & R. Co., which is building a chlorination plant at Mayer, says work is progressing. The plant will handle the siliceous ores.

Shipments of onyx are being made to London, England, from the onyx quarries at Mayer.

YUMA COUNTY.

It is reported work will be started on the Rio del Monte claims, 8 miles south of Harrisburg, next week. Machinery has arrived and development will be increased. The group consists of thirty-two patented claims and owned by J. P. Jones and R. F. Pettigrew.

J. P. Moffett of Palomas, manager of a group of mines in Castle Dome district, says, with Eastern parties he is arranging for opening of work next month. The five claims in this group are 18 miles north of Gila City and 8 miles south of the Luce mine. Since location, three 60-foot shafts have been sunk, exposing veins of pyritic ore carrying copper, gold and silver, giving average assays of $30 values.

CALIFORNIA.

AMADOR COUNTY.

At the Bunker Hill mine, near Amador City, grading for the 20-stamp mill was completed last week and construction work is under way.

The work of repairing the shaft at the Argonaut mine at Jackson, preliminary to starting up, is expected to begin this week. Supplies of timber and lumber are being received.

At the Kennedy mine at Jackson the new hoist is in operation, using the old skips temporarily. The new skips are expected to be attached this week.

CALAVERAS COUNTY.

Operations are going ahead at the Voinich mine, near Angels, and the shaft is down 195 feet. The lode lies 8 feet east of the shaft, the shaft being sunk on the foot wall side and parallel with the pitch of the vein, says the Echo. Several stringers of ore have been cut, coming from the west and making for the main lode. The company is preparing to put in heavier machinery and a compressor, and is also making ready for a 20-stamp mill.

At the Angels mine, at Angels, owned by J. V. Coleman, the 20-stamp mill is running steadily and work is progressing on the second twenty stamps that are being added. It is expected to have them dropping by Oct. 15.

The Utica M. Co.'s group at Angels, embracing the Stickle, South Stickle, Madison and Gold Cliff mines, are all running in full operation. The log yards of the company are being filled up, and sawed timbers and planks are coming in for the winter operations. As soon as the Madison is unwatered extensive explorations will be made.

The Red Bird gravel mine in Chili Gulch, near Mokelumne Hill and adjoining the Duryea mine on the east, was bonded last week to a Chicago, Ill., company for $2100, says F. L. Peek, part owner. Work will begin next month.

At Jenny Lind, F. M. Hammond manager, the California G. Dredging Co. is building a dredger to work the gravel beds. The work of prospecting the gravel has been going on for several weeks, and several tracts along the river are under bond.

EL DORADO COUNTY.

(Special Correspondence).—The Georgia Slide mines—Blue Rock, Pacific, Beattie and Parsons—are not working at present, due to lack of water. Schirer Bros. & Co. have given up their lease on the Parsons mine.——The El Dorado C. Co., near Georgetown, are doing work on the Modoc mine.——The Josephine at Volcanoville is reported shut down temporarily.——E. W. Chapman has bought the Gem mill and says he will remove it across the gulch to the Garfield mine and begin development. The 80-foot incline shaft shows ore.——The Two Channel Co. is not working at present.

Georgetown, Sept 23.

Superintendent O. Emery of the Emery G. M. & W. Co. says the company is preparing to extend its ditch system so as to convey water to the placers in Secret Diggings district, 3 miles north of El Dorado.

FRESNO COUNTY.

The Westmoreland-Coalinga Petroleum Co. has been organized by Eastern men, and W. P. Kerr is field manager. The company's holdings are ½ mile south from the producers of the California Oil Fields, Ltd., and 28 Oil Co., near Coalinga.

The Coalinga Star Oil Co. was organized last week at Grass Valley by W. A. Sleep, R. J. Fitzgerald, D. E. Matteson, W. G. Thomas, D. E. Morgan, I. W. Hays and L. C. Wilhelm, to operate on a 20-acre tract which they have bought at Coalinga. The principal place of business will be Grass Valley.

KERN COUNTY.

The Columbian Oil Co., at Kern river, near Bakersfield, is preparing to drill seven additional wells on its land, and work has started on the first of this number. The company has five wells completed and pumping, says Superintendent Coburn.

The Potomac Oil Co., which is pumping nine wells in the northern part of Kern river, near Bakersfield, intends to sink six more wells this winter, says Superintendent Ritchie. He has a reservoir with a storage capacity of 8200 barrels.

Twenty-one non-union miners arrived at Randsburg on the 23rd inst., to work for the Yellow Aster M. Co.

It is reported the Spreckels-Crocker-Woolworth combination have, in addition to their control of the Monarch oil property at Sunset, absorbed the several leases of that company—the Ohispo, the Copper Con. and the Tremont. These properties have producing wells. It is also thought the same men have bought the Clark-Bryan-Wilson property, which was sold a short time ago for $40,000, says the Bakersfield Californian. The Spreckels-Crocker-Woolworth men are owners and operators of the Pacific Oil Transportation Co., operating its own steamers and refineries.

LOS ANGELES COUNTY.

The holdings of the Dividend Oil Co., consisting of nine wells on Boyleston avenue, Los Angeles, have been sold to the Boyleston Oil Co., of which B. G. Adams and H. E. Adams are president and vice-president, respectively. The price paid for the property, which includes two pumping plants and storage tanks of 5000 barrels capacity, is reported to be $15,000.

NEVADA COUNTY.

(Special Correspondence).—Six feet of free gold ore has been opened up in the Yuba mine, near Washington. Lessee Miller has transferred his lease on 100 tons of ore to the company for $1000 cash, he being permitted to remove the ore already broken. J. L. Bryson is manager.

Washington, Sept. 24.

T. F. McAvory, managing director of the Standard M. Co., says he intends to put in additional machinery on the mine on Alta Hill, near Nevada City.

The Planet Con. Drift M. Co. has bonded all its property at Lowell Hill, near Nevada City, to C. A. Bailey of San Francisco, says the Miner. It adjoins the Liberty Hill mine, and will be worked by drift mining. It is intended to drift on the bedrock and then stope the gravel. They have a surface area of 320 acres on which there is considerable timber.

PLACER COUNTY.

The water right and electric power plant of the Pioneer-Lynn M. Co. has been sold to the International M. & S. Co., owners of the Southern Cross and other quartz properties near Euchre Bar, 7 miles from Towle, for $7500 cash and stock. The sale includes a water right of 3000 inches, dam, flume, power house, 350 H. P. turbineeew hl, electric plant with complete equipment.

SAN BERNARDINO COUNTY.

(Special Correspondence).—The Chase G. M. Co., operating at Stagg, is preparing to put in a 10-stamp mill and cyanide plant. E. H. Stagg, of Johanneshurg, Kern county, is manager.

Stagg, Sept. 22.

SAN LUIS OBISPO COUNTY.

In Carisa oil district in eastern San Luis Obispo county, west of McKittrick (Kern county), development work is increasing. Three drilling rigs are on the ground. Wagon roads have been built, one through the Temblor hills from McKittrick to the Carisa district. On the Congdon property, a supply of water has been developed, and work on the oil well being drilled is going ahead. H. H. Bardin, manager of the Los Chimneas ranch, southwest of the Congdon well, reports finding oil shale. Four wells are to be drilled.

SHASTA COUNTY.

The Great Western G. Co. report paying $90,000 as second payment on the Afterthought copper mine near Bella Vista this week. The total price was $150,000. The final payment is due in March, 1904. The Great Western has had a working bond on the property for over a year, and is putting in a 150-ton smelter. Machinery is on the ground, and the building is going up.

Work was resumed last week at the Quartz Hill mine, of the Original Quartz Hill M. Co., near Redding, under Foreman A. Jackson. A 300-foot shaft will be sunk and a cyanide plant will be built, says President M. Maryanski.

The Star of Hope mine, at the head of Little Churn creek near Churntown, near Redding, is being reopened and ore produced for shipment to the Keswick smelter. The mine was formerly the Dale & Dawson mine. S. S. Stickley, of Buckeye, and C. Dale are owners. A drift has been run from a lower level and a ledge tapped.

SISKIYOU COUNTY.

J. F. Reddy of Spokane, Wash., has bonded the interests of his associates in the Blue Ledge and Sam's Ledge copper mines on Elliott creek, consisting of twenty-seven claims, for $150,000.

Manager Conolly of the Quartz Hill M. Co. has finished a 7-mile ditch to Scott Bar, and is getting ready to start hydraulic mining, with expectation of putting up a new quartz mill in place of the 10-stamp mill, later on, for working quartz veins of the claim, reports the Siskiyou News. The ditch is 7 feet by 3 feet, and carries 1200 inches, with a pressure of 240 feet at Scott Bar.

TRINITY COUNTY.

O. H. Bagley and E. W. Bacon have a lease from the Brown Bear M. Co. on the bed of Deadwood creek, from the China tunnel to the Gibson arrastra, where they have built a 4-foot flume with several undercurrents, and are running through the tailings from the Brown Bear mine, near Deadwood. A concentrator is being set up. The values are in sulphurets and fine gold.

TUOLUMNE COUNTY.

(Special Correspondence) —The Black Oak G. M. Co., near Soulsbyville, G. W. Campbell manager, are putting in two 4-inch steam pumps to handle the water of the mine while repairs are being made to the Cornish pump system. New rods are being put in for the Cornish pump, each piece of timber being dipped in an asphaltum-tar mixture for a preservative. The work of replacing has progressed down 300 feet.

Soulsbyville, Sept. 23.

(Special Correspondence).—Development work is progressing at the Street mine, near Tuttletown. Stroud & Kinsman, owners, are preparing to add another five stamps to their 5-stamp mill; also two more concentrators and a heavier engine and boiler.

Tuttletown, Sept. 24.

P. Seiler of San Francisco has bought the Ajax mine and mill site, near Sonora, together with all improvements, machinery, water rights, etc.

The electric current was turned off from the Phœnix lake power plant on the 14th inst., says the Mother Lode Magnet. The shutdown this year does not include any of the mines on the east belt or about Tuttletown, the Dutch mine at Quartz, Jumper at Stent, or the Crystalline, near Jamestown. At the Jumper mine half the men were laid off for a few days. Operations will be resumed with the auxiliary steam plant. The management will keep forty stamps dropping steadily and 100 men at work. This is said to be the first time that the Jumper mill and compressor have been kept running during the dry season. Forty-two men were laid off at the Republican mine at Jacksonville, only a few being retained. The sixty stamps in the Harvard mill at Jamestown were hung up by the giving out of electric power. The mine will work a few men during the dry season on development. The Shawmut mine, near Chinese, let out 200 men, but will keep sixty men on, doing development work, making repairs and running the chlorination plant. At the Rawhide, near Jamestown, twenty men are retained. The Tuolumne Water Co. says it has a considerable reserve supply of water in two reservoirs and Phœnix lake, sufficient, it is thought, to supply patrons for battery and other purposes than power for two months.

YUBA COUNTY.

The State Anti-Debris Association has

refused to consent to an application made by Eastern men to work the Blue Point mine, east of Marysville. The mine, which is owned by P. Campbell, is closed under an injunction. It is desired to work the mine by a new process and to put in additional machinery, but before doing so a certain slide of gravel, amounting to 800,000 cubic yards, must be removed by the sluice process, and the petitioners sought to get the consent of the association to its removal so the parties removing it would not be in contempt of court. The Campbell mine is above the barriers being constructed by the Federal and State Governments near Deguerre Point, on the Yuba river. The Anti-Debris Association holds that to wash down the gravel would impair the navigability of the Sacramento river.

Near Rackerby the Seabolt & Davis quartz mill was destroyed by fire last week, the result of a forest fire in that section. The building and machinery were valued at $4000 with no insurance.

COLORADO.

BOULDER COUNTY.

Work is again under way at the Trojan mine in Sugar Loaf district, near Boulder. The mine is said to have two separate veins, one bearing gold, the other silver. The two veins are coincident at top, but at depth of 50 feet separate, and at this point two shafts are sunk, one on each vein. These are down 200 feet. J. Cohry, of Denver, J. T. Phillips, of Eldora, and J. Myers, of Wall Street, own the mine.

——A depth of 200 feet has been reached in the shaft of the Fanchon mine, near Sugar Loaf, and will go deeper and a crosscut be run to cut the Dinero, Orinoco and Gunnison veins.

CHAFFEE COUNTY.

C. E. Mulloy, of the Ohio-Colorado Smelting Co., at Salida, says the smelter is running full force and handling a large tonnage. The new stacks have been completed and the twelve additional roasters will be finished by Oct. 1st.

CLEAR CREEK COUNTY.

A third lode has been cut in the Wilcox tunnel, near Georgetown, which is in 1100 feet. Men have been put to work with machine drills to drift on this lode. It showed pyrite and galena.

The Coming Nation mine, on Santa Fe mountain, near Idaho Springs, was sold last week to J. B. Papenbrock of Cincinnati, Ohio; W. H. Hamilton of Terre Haute, Ind., and other Eastern men for $25,000. They have incorporated as the Wire G. M., M. & Cyaniding Co., and will start development work this month.

Plans are being drawn for a concentrating plant for the Con. Gem M. Co., to be built near the mouth of the Newhouse tunnel, near Idaho Springs, says Manager W. E. Renshaw. The first section of the mill will have a capacity of 800 tons daily. In connection with the concentrating plant a cyanide process is to be used. The second section, to be built later, will be of 500-ton capacity. The Con. Gem M. Co. controls a number of the principal veins cut by the Newhouse tunnel, including the Gem, Freighters' Friend, Silver Edge, Franklin, et al. Drifts are being run from the Newhouse tunnel. Low grade ore body is as wide as 50 feet. The first raise is being run to connect with the Gem shaft. Four additional raises will be driven to connect with other shafts of the property.

EL PASO COUNTY.

The strike of the coal miners at the Danville and Pike View coal mines, north of Colorado Springs, has been settled by a compromise and the men have returned to work. One hundred and fifteen men were affected.

GILPIN COUNTY.

Sinking operations have begun at the Gomer mine, near Russell gulch, under lease and bond to Tanner, Carlson, Anderson and King, of Idaho Springs. The shaft was 100 feet deep and they intend to go at least 100 feet deeper, and later put in a heavier plant of machinery. C. A. King, of Idaho Springs, is superintendent.

Sinking operations have been suspended at the Shafts Extension or True Democracy shaft on King flats, near Central City, at depth of 500 feet, and drifts are being run. Lead and copper-iron ore is showing. On the west side of shaft, besides drifting, a crosscut is being run north. E. O. Wolcott and D. Sullivan, of Denver, with Bolsinger Bros., of Nevadaville, are interested.

It is reported the Mutual Benefit G. M. Co., operating the Pleasant View mine, on Gunnell hill, near Central City, propose to build a concentrating mill at the property this fall, says Manager Remer.

The Onoko G. M. Co is putting in a steam plant for its Phillips mine in Leavenworth gulch, near Black Hawk. It includes a 10x12 double friction hoist, capable of hoisting from depth of 1000 feet, and a 60 H. P. boiler. The company is shipping smelting ore to the Denver smelters and concentrating ore to Idaho Springs. The ores are coming from the 120-foot level. They will sink the shaft from the 220-foot point to 500 feet.

CUNNISON COUNTY.

The Waunita Mutual G. M. Co. has been incorporated by F. E. Sargent, of Idaho Springs, and H. F. & E. S. Alnutt, of Pueblo, to operate the Pog Leg group of three claims, 1 mile south of Bowerman. Development work has begun. An 8-foot vein has been opened and shows values in gold.

LAKE COUNTY.

The Twin Lakes G. M. Co., near Leadville, last week sold several of its claims to the International Investment Co. for $60,000, including the Spokane, Victor, Oro Cache, Wedge, Mountain Maid, Golden Eagle, Mammoth, Homestake and others.

Operations have been resumed in the South Winnie mine by Long, Callen, McArthur et al. of Leadville, and several other parties have taken a lease on the north end of the Fanny Rawlings, and are cleaning out the old workings.

The A. Y. & Minnie mine at Leadville is making shipment at rate of 2000 tons a month of ore. Heretofore the mine has been operating almost exclusively on milling ore, but some lead sulphide is being opened up which, it is claimed, can be handled at profit without running through the mill.

LARIMER COUNTY.

The president of the Mount Zirkel C. M. Co., operating the Mount Zirkel mine, at Pearl, says they will build a concentrator this fall and that slime tables will form an important part of the equipment.

MINERAL COUNTY.

Another Chilian mill for the Humphreys concentrating mill at Creede is being set up. Work has begun on the ground for the erection of the steam power plant and is expected to be finished by Nov. 1. With this addition of power the mill will be run at full capacity, as only half the jigs and tables in the mill are being used at present, owing to lack of power, the water having decreased.

PUEBLO COUNTY.

The coal land contest between the Government and the Colorado Fuel & Iron Co. that has occupied the attention of the Public Land Office and the Washington authorities for the last four months, has been settled by a compromise. The steel company will pay $20 per acre, the price asked for the coal land, instead of $2.50, paid for timber and stone land claims. It is understood the Colorado F. & I. Co. will pay about $500,000. The Victor Fuel Co. has also settled with the Government on same basis on a number of coal land claims taken up under the Timber and Stone Act.

The annual convention of district No. 15, United Mine Workers of America, which includes Colorado, Wyoming, Utah and New Mexico, is in session at Pueblo. The miners are asking a higher wage scale, an eight-hour day, no discrimination against members of the United Mine Workers, a bi-weekly pay day and changes in the system of weighing. The sentiment of the delegates seems to be in favor of a peaceful settlement if possible.

SAN JUAN COUNTY.

Work on the tunnel to drain the properties of the Frisco M. Co. and the San Juan G. & S. M. Co. at Mineral Point, near Silverton, is progressing, says N. R. Bagley, manager. It will cut six claims of the Red Cloud M. Co. at 600 feet depth. A shaft will be sunk to connect with the tunnel at the junction of the Cashier and Yankton veins. This development work is expected to be completed next spring, when other development on the veins and the hullding of a concentrating plant will be started.

A cross-compound eight-drill air compressor with drills has been put in at the Barstow mine at Red Mountain, near Silverton, says the Standard.

SAN MIGUEL COUNTY.

The Smuggler-Union M. Co. has bought the two Foster lode mining claims in Bridal Veil basin, near Telluride, for $300. A few men will be put on assessment work.

The Telluride M. Co., operating claims in Prospect Creek basin, south of Telluride, has bought a three-quarters interest in a group of seven mining claims, and have put men to work on development. In the spring a small reduction plant will be built.

Superintendent J. P. St. Claire says he will have the retention dam being constructed for the Tomboy, Smuggler-Union and Liberty Bell mining companies, near Telluride, to retain tailings from the mills and reduction plants of the quartz mining companies, and preventing the waste sand from running down the river and into the flume and pipe lines of the Keystone Hydraulic Co., finished this week. The valves for flushing the tailings out in the spring during high-water season have been set.

J. H. Litchfield, manager of the Double Eagle M. Co., is preparing to build a small milling plant at his property in Bridal Veil basin, near Telluride, and expects to have it in operation by Oct. 15. The principal gold values will be saved by amalgamation and iron and silver by concentration.

The Valley View group of five claims, a tramway, 10-stamp mill and millsite, near Telluride, have been sold to the Japan-Flora M. & T. Co. The group is across the gulch from the buildings at the Bullion tunnel and 1 mile from the Japan tunnel. No work is being done at present, but it is said as soon as the existing labor troubles have been settled men will be put on and extraction and treatment of ore begun.

Manager H. Buckley of the Silver Bell mine at Ophir has granted his mill men an eight-hour day and three shifts have been put on. Manager Davidson of the Caribou - Montezuma also granted an eight-hour day. This practically settles the labor troubles in Ophir, with the exception of the Butterfly-Terrible mine, whose manager, J. S. Keating, refused to treat with the union.

TELLER COUNTY.

A notice has been posted in every mine owned by members of the Mine Owners' Association in Cripple Creek district which says that no member of the Western Federation of Miners need apply for work. The Anchoria-Leland resumed last week, as also the Stratton's Independence at Victor, the military guard lines being extended to take in the Independence. The men not needed at the Golden Cycle were put on at the Independence. A number of men from Duluth, Minn., were put to work. The situation, in general, is quiet and the number of men at work is increasing.

The Cripple Creek drainage tunnel, by measurement made on the 18th inst., was throwing into Cripple Creek 2083 gallons of water per minute. Nearly all of the mines in the north end of the camp have felt the result of the pulling of the bulkheads. There has been a noticeable lowering of the water, particularly in the Elkton mine.

IDAHO.

BOISE COUNTY.

The shaft on the Mammoth quartz claim on Summit Flat, near Idaho City, has been unwatered. The shaft is 300 feet deep. W. A. Magee owns the Mammoth and the Jupiter, the latter being an extension of the Mammoth.

The Hopkins Summit Flat placer mines of 640 acres in Boise Basin, near Idaho City, have been sold to J. B. Adams for $50,000. Adams will start next month.

J. H. Berkshire of Winona, Mo., part owner of the J. I. C. M. Co. at Pearl, says they will put in an electric hoist, with an electric drill equipment, and will sink the shaft several hundred feet. The vertical shaft is down 125 feet, with two tunnels started from the bottom to tap the veins on either side, which are 200 feet apart. Both carry values at the surface. Later a mill will be built. J. C. Johnson of Pearl is president and manager.

The Quarles coal mine at Horseshoe Bend, 3 miles from Pearl, is being operated. The coal sells for $3 at the mine and for $6 in Emmett, a distance of 12 miles, and for the same price at Pearl. The development consists of a tunnel in 70 feet on a 4-foot vein.

BLAINE COUNTY.

The Golden Rule M. Co. has been organized to work a group near Hailey, under the management of S. B. Gieske.

IDAHO COUNTY.

W. Yearsley and E. L. De Camp of Colfax, Wash., have put men to work on their placer holdings on Slate creek, near Salmon river, in Florence district.

The Dewey mill at Roosevelt, in Thunder Mountain district, is in full operation.

LATAH COUNTY.

A. Hutsenteller reports locating mica deposits of commercial value near Moscow, and he and S. Rodgers of Lewiston will develop them.

SHOSHONE COUNTY.

The Eagle Creek Placer M. Co. has put in its hydraulic elevator at the mouth of Fancy gulch, near Murray. Seventeen hundred feet of 22-inch steel pipe was laid from the flume to the elevator site, and it is expected there will be ample power to sink 35 feet, if necessary to find bedrock. The flume is 4 miles in length.

T. Brown has leased the Bobby Anderson silver-lead mine, near Wallace. Ore has been opened up and preparations are being made for shipping. The Nabob silver-lead mine on Pine creek has also been leased.

In the 2400-foot crosscut tunnel being driven on the Hercules mine at Burke, 16 feet of galena-bearing ore is reported cut last week. This tunnel gives a depth of 1000 feet on the vein.

E. Hunter and W. M. Howland of Moscow report finding high-grade silver-lead ore on the north fork of the St. Joe river, 30 miles south of Wallace, 10 miles from the St. Joe river and 50 miles from the State wagon road. A 10-foot prospect hole showed the vein 22 inches wide.

MICHIGAN.

HOUCHTON COUNTY.

The mineral bins of the new South Range smelter of the Copper Range Con. Co., near Houghton, will contain flues for gases from the furnaces to dry the mineral as it comes from the mills, says the News.

The Quincy group, at Hancock, is reported showing good copper ground on the twenty-fifth level on the Mesnard and near the Franklin mine line.

KEWEENAW COUNTY.

The third head for the Mohawk mill, near Allouez, is on the ground and is expected to be in operation by Dec. 1st. The No. 4 steel rock house is ready for sheathing. When No. 4 shaft reaches the seventh level sinking will be suspended until the rock house is completed. The Mohawk territory reached through No. 4 shaft has been opened up. The vein of mohawkite which produced values of $140 per ton on the upper levels has been cut at the seventh level north of No. 1 drift. It is said to be without value where cut last.

The mill of the Phœnix Con. C. Co., near Phœnix, is reported put in operation last week. The Phœnix has been an intermittent factor at the lake since the Phœnix mine proper was opened in 1844. The mineral territory comprises 2505 acres, being the Phœnix, St. Clair and Garden City mines, and also eighty acres of the Atlas tract. The new mill is on Eagle river, two miles north of the mine. There is one stamp, twenty-four jigs and twelve concentrators. The building is of wood and the capacity will be 300 tons of rock daily. The property has produced copper, mostly in the shape of mass, and at one time a mass weighing 500 tons was taken out. Five fissure veins have been opened up.

ONTONAGON COUNTY.

At the Adventure mine, at Greenland, plans are being made for a test of the mineral deposits at greater depth.

The Michigan mine, at Rockland, will become a producer with one head of stamps at the Mass mill as soon as the extension of the Ontonagon Co.'s branch of the Mineral Range Railroad is completed, which will be next month. The rock house is completed. A forty-five-drill compressor will be put in this fall.

MINNESOTA.

SAINT LOUIS COUNTY.

An important find of iron ore is reported made on the Mesaba range, east of Biwahik, on lands owned by the Longyear Mesaba Land Co., of which J. M. Longyear of Marquette, Mich., is president. The find is south of the Miller mine. The limits of the ore deposit have not yet been located. The find is south of the ore formation as indicated on former geological maps and was made by Eaton Bros. of Duluth and Mesaba range men. They also discovered the Miller mine, which has been leased by the La Belle Iron Co. of Steuhenville, Ohio.

MISSOURI.

JASPER COUNTY.

At Webb City the pump put in by the Missouri Zinc Fields Co. has drained the ground so that the Duluth M. Co. is able to get into its ground, and it is being opened up. Their mill is running. The Slaight mill, which has been used as a custom mill, will start work in the ground; also the Carmean and Canada's Jewel C mine will resume. The Missouri Zinc Fields Co. expects to have deep-mining under way on the entire lease next month.

C. D. Pratt, manager of the Merit M. Co., says they are working the Sterling and other tracts at Tuckahoe. On the Sterling tract the ground was cut up considerably by former operations to depth of 160 feet, but there is still ground left untouched said to carry ore. The ground is soft, requiring much timbering. Because of cost of timbering, Pratt decided to take up the entire ground from the surface down past the ore level, or 160 feet. The ground to be worked lies between two hills, and at the head of the draw a mill has been built with a self-feeding hopper, and the ground will be shot down and elevated to the mill. Everything will be taken in as it comes, even the old dumps, and sent to the mill.

STONE COUNTY.

S. R. Ping has unwatered the Wyandotte ground, near Galena, and is taking

out ore. He says he expects to lease out all the shafts at a royalty.

The American Z. M. Co is opening up a prospect on its lease north of the Sweet Marie ground at Galena. W. L. and C. Cox, A. Brookings, A. L. Patton and T. Warden are interested.

MONTANA.

BROADWATER COUNTY.

The Stray Horse concentrator, near Winston, began operations last week.

LEWIS AND CLARKE COUNTY.

A 100-stamp mill will he built on the Jay Gould group, near Marysville, says the Basin Progress. There is a cyanide plant already on the property.

The Standard Ore Co. of Helena has operations under way on the Jay Gould mine, near Marysville, which the company has bonded. President Cory says the values are principally in gold and silver, and the average shipments made from the old workings went $40 per ton. A 100-ton mill will be built, a cyanide plant being already there Work will he carried on in the drift on the 300 foot level, which is in 1500 feet, all in ore, and stoping will he done above this level.

MADISON COUNTY.

The foundations for the Oregon mill near Pony are in place, the mortars set, and the machinery on the ground. Superintendent Weidman expects to have the mill in operation hy Oct. 15th.

Manager W. B Millard of the Kearsarge group of claims at Summit, near Virginia City, says he will move the Kennett 60-stamp mill to Summit. The equipment includes amalgamation, concentration and cyaniding. The development of the mine will he increased. A hoisting plant will he put in at the shaft, which will he sunk to depth of 600 feet, or 250 feet below the present workings. A tunnel will be driven in on one of the claims north of the Kearsarge and on the east side of Alder gulch. It is expected this tunnel will be driven in 1000 feet and will crosscut several veins. It is expected to have 200 men on the payroll. R. B. Turner is superintendent. The office will he moved from Virginia City to Summit.

SILVER BOW COUNTY.

The mines owned by the Amalgamated Copper Co., that have heen closed while the smokestack at the Washoe smelter at Anaconda was being connected with the plant, are again in operation. These include the Mountain Con., High Ore, Parrot, Anaconda, Moonlight, Never Sweat, Bell, St Lawrence and Diamond.

Butte reports say the High Ore mine of the Anaconda group of copper mines has resumed operations. As fast as the men can he summoned the other eight properties of the Anaconda group will he put in operation. The mines employ 3000 men and have been closed since July 1st, pending alterations heing made in the Washoe smelters at Anaconda. All the mines are expected to he in full operation this week.

NEVADA.

ESMERALDA COUNTY.

R. K. Colcord and J. Yerington of Carson report work progressing in laying the pipe for the mill at Pamlico, near Hawthorne. The pipe line is within 3 miles of the mill site, and machinery for the mill is being hauled in

W. R. Smith, part owner of the Copper Contact group, near Sodaville, reports a breast of ore 14 feet high exposed in the open cut and three teams are delivering ore at the railway.

EUREKA COUNTY.

(Special Correspondence).—There is considerable ore in the Eureka district, assaying from $3 to $15, and a method is heing sought by which it may be concentrated. The metallic values run about 10% lead, $2 gold, 8 to 10 ounces silver, 5% iron, with a limestone and quartzite gangue The discovery of a process for saving these values by concentration or reduction will mean much to Eureka.

Assays of the dump at the Geddes & Bertram mine in Secret canyon give returns of $1 65 in gold, $2.66 silver and a small percentage of antimonate of lead. This dump contains 40,000 tons. It can he cyanided.——The break in the three-compartment shaft of the Jackson mine, Eureka district, has been repaired and ore shipments resumed.——The Keystone mine, north of Eureka, is putting on more men and running a tunnel. C. Broessmer says he has opened up ore in his claims, north of Eureka, showing 8% copper, 18 ounces silver, 13% lead, $2 50 gold.——The Silver Connor mine has blocked out a good body of ore, and assays give an average of $6.53. It is expected to strike good ore below the 450-foot level of the Silver Connor, and below the present workings of the McNaughton, adjoining. The Silver Connor is idle at present. Assessor's records of smelter returns, Eureka district, show a production of $160,000,000 in bullion to date.——Ore shipments from the Barton & Altoona mine, on Adams hill, give 7.3% lead, 18 ounces silver and 2 ounces gold; also 76 6% silica and 5% iron.——Ore shipments from the Oro, on Adams hill, show 46 5 ounces silver, 2 6% lead, 1.65 ounces gold.

Eureka, Sept. 23.

LINCOLN COUNTY.

G. P. Smith, manager of the Newport & Nevada M. Co., operating the Horseshoe, Ross and Buck claims at Fay, says he expects the mill to be in operation hy October 1st. It will handle 160 tons of ore per day. In addition to this it is intended to run the tailings from the old Horseshoe mill through the leaching tanks.

LYON COUNTY.

The Jackson-Phillips mill in Silver City, which has been idle for some time, will resume crushing and reducing ore next week. The Pollard mill is crushing Silver Hill ore. With the starting of the Rock Point mill at Dayton and the smaller mills and cyanide plants that are in operation prospects are improving.

NYE COUNTY.

The diamond drill at work at the bottom of the 700-foot shaft of the Mizpah mine at Tonopah is down 500 feet, and the core is said to show a lode porphyry similar to that found in the upper levels of the mine. No water has yet heen struck. The west drift from the 500-foot station in the Mizpah has passed 100 feet beyond the east end line of the Buckboard, and the ore coming out is sacked for shipment. The ledge is said to be following a direct westerly course and cuts through the center of the Buckhoard.

W. M. C. Jones of Riverside, Cal., has hougbt a group of six claims 1½ mile from Ray, near Tonopah, and organized the F. E. A. M. Co. to develop it. On two of the claims four ledges have been traced which show assays of copper, silver and gold.

The King Baldwin M. Co. has been incorporated at Spokane, Wash., hy W. C. Miller, E. J. Roberts and W. J. Hall of Spokane, and J. King and C. A. Baldwin of Tonopah. The company is opening up a group of claims at Cloverdale, near Tonopah, with W. C. Miller as superintendent.

WASHOE COUNTY.

Manager A. Onn has begun operations at the No. 2 mine at Olinghouse, prospecting the surface to the north of the shaft and near the end line of the Williams property.

The Jumper mine at Olinghouse, near Wadsworth, will be worked hy Jelinek & Jackson.

WHITE PINE COUNTY.

The Bull Hill gold mine (the American Flag), in Gold Canyon mining district, 3 miles from Cherry creek, has heen honded for $20,000 to J. Sharpe and G. E. McMurray, of Cripple Creek, Colo., says the Cherry Creek Miner.

The 5-stamp mill of the Wide West M. Co., of Boston, Mass., in Egan canyon, 2 miles south of Cherry Creek, is in operation, says Superintendent Leishman.

NEW MEXICO.

GRANT COUNTY.

At Gold Gulch camp, near Silver City, H. Moses and M. V. Portwood have bought a two-thirds interest in the Owl claim and are sinking a shaft on the south end. This shaft is started 15 feet above the other shafts and is down 45 feet, having struck the zincblende body whlch is said to carry the gold. The Sanders one-third interest in the Owl has heen sold to J. Robertson of Easton, Texas, and W. Craig of Lone Mountain for $5000. Sanders retains his interest with Cornell in the Pactolus. A boiler and pumping plant is on the ground.

SIERRA COUNTY.

The pump at the pumping station of the Hillshoro G. M. & M. Co., at Hiiisboro, has been repaired and water is being forced over the hill to the company's mill in Ready Pay gulch, says the New Mexican.

J. Gardner is developing the Bertha mine at Hillsboro and is running two crosscuts to tap the vein. The Bertha is between the Empire and Garfield mines.——Machinery for the South Percha mill, near Hillsboro, is on the ground.

OREGON.

BAKER COUNTY.

(Special Correspondence).—Operations are progressing at the Gold Pan mine, 4½ miles southeast of Sumpter. They have a vein of ore, 6 to 10 feet between walls, averaging $6 gold per ton. The hoisting plant is run by a 25 H. P. gasoline engine, and costs $1 10 per day for gasoline. This does all of the hoisting, as well as running an 8-inch Cornish pump.

Sumpter, Sept. 22.

Work was resumed last week at the Maid of Erin mine, near Sumpter, says Manager C. P. Bowers. The 10-stamp mill is working on an ore reserve of 2000 tons and development work will he increased. The ore averages $6 a ton. Water power is used.

Superintendent Smith says work has hegun on the 10-stamp mili for the Snow Creek mine, near Whitney.

Operations will be increased on the Potosi, Golden Gate and Orphau Boy mines of the United Exploration & G. M. Co., near Sumpter, says Manager W. E. Hurd. Driving of tunnels will be continued on the latter two, which are in Granite and Red Boy districts, respectively. At the Potosi they wili sink, for which a hoist and pumps are going in.

The Fortune M. & M. Co., of Spokane, G. W. Daines president, has hought for $20,000 cash the Red Lion group, near Greenhorn City, and which adjoins the Morning mine. The company also owns the Humboldt group in same section, and the other company, of which Daines is also manager, owns and is operating the Belcher mine. They also control the Forty-Nine Jimmy mine. The Red Lion group is composed of two claims and a millsite, 3 miles from Greenhorn City. The property has heen developed by open cuts on the Red Lion. Ore milled from this cut assayed $15 There is a tunnel 169 feet long, with crosscuts showing ore with average of $8 per ton in gold.

The smelter at Oswego has heen sold to the Ladd Metals Co, of Portland, and will be used as a refinery. Men are at work placing a small furnace in position. Ore from the Bohemia district, Douglas county, has been contracted for and a shipment is beng prepared. The Ladd Metals Co. is preparing to operate its mine in Washington county, Idaho, from which will he shipped "pig copper." A smelter is being built. It is not the intention of the company to run the Oswego plant as a smelter, hut only use it in testing. When this has been completed the plant may be converted into a refinery.

CROOK COUNTY.

J. W. Robinson of Ashwood says the Oregon King mine, on Trout creek, near Ashwood, is being reopened.——The Red Jacket mine is being developed and ore is showing at a depth of 170 feet. It is owned by North Yamhill men.——The White Butte is sinking a new shaft, having abandoned the old workings.——The Oregon Queen G. & S. M. Co., composed of local men, is developing.

DOUGLAS COUNTY.

Manager J. F. Hard says he is preparing to build a sawmill of 7000 feet daily capacity on the Vesuvius claim, near Bohemia, to cut lumber for use on Hard's mining properties in Bohemia district.

The flume and dam of the Oregon Securities Co., near Bohemia, are completed and the power house under way. The Champion Tunnel is going ahead, hut all the work done thus far has been by hand. Coal is being hauled to the mine and the compressors will start next week. It is expected to have the mine and mill running to full capacity by Nov. 1st. Work is progressing on the Vesuvius and Oregon-Colorado mines.

GRANT COUNTY.

Manager J. W. Messner of the Prairie Diggings mine, in John Day valley, near Prairie City, expects to have his sinking plant in operation next week. The mili is operated hy water power and a steam plant has been set up for the hoist, which has a capaclty of 600 feet depth. The shaft was sunk 80 feet by hand, but, on account of the water, a centrifugai pump operated by steam is being put in. Levels will be established at 100 and 200 feet.

JOSEPHINE COUNTY.

The Dowell mines, on Mount Baldy, 3 miles east of Grant's Pass, have been hought hy the Comstock G. M. Co. of Danville, Ill. The Doweli mines consist of three quartz claims, the Golden Eagle, Mountain Eagle and Gray Eagle, and are partially developed. At one time a mill was operated on the claims.

The Gold King mine, on Josephine creek, near Grant's Pass, has heen bought by the Gold King M. Co., comprised of Texas men who have held it under bond. M. Marks of Seattle, Wash., is superintendent. The shaft that is being sunk shows a vein 6 feet wide, and carrying average values of $16 a ton in gold.

C. L. Mangum is developing a group of fourteen copper claims near Waldo. The claims are between the Cowboy and Waldo mines of the Waldo S. & M. Co. The ledges are from 4 to 25 feet in width.

The Champlin M. Co., composed of Montana and Chicago, Ill, men, who will dredge Foots creek, a few miles south of Grant's Pass, report preliminary work under way. Shipments of lumher are arriving, both for the construction of the dredger and for the dam that is being built across the creek near its junction with Rogue river.

MALHEUR COUNTY.

Manager W. Morfitt of Ontario, Or, says the Red Oxide mine, near Malheur City, has been sold for $7000. The Red, White and Blue mine will put in a mill, and the Black Eagle will increase its plant to a 100-stamp mill.

SOUTH DAKOTA.

LAWRENCE COUNTY.

(Special Correspondence).—S. D Foss, of Chicago, Ili, is at Central City, preparing to start work on the Aifreta mine, of which he is part owner. This mine ls near the Columbus mine.

Central City, Sept. 20.

(Special Correspondence)—The Lucky Strike mine is 2 miles southeast of the Clover Leaf mine, near Rouhaix, and covers 315 acres. The working shaft is down 100 feet and they are drifting from the 100-foot level on a vertical fissure vein. This company will put in a hoist, hoilers and compressor. C. A. Allen, of Deadwood, is manager.

Rouhaix, S. D, Sept. 20.

(Special Correspondence)—The Horseshoe mill is dropping sixty stamps and the other sixty will he ready for operation by Oct. 1st. The ore is crushed through two No 5 gyratory crushers and conveyed to the hins by a 500-foot helt conveyor. The helt is 24 inches in width. W. L McLaughlin is manager and C. C. Griggs, mill superintendent.

Terry, Sept. 20.

At Tinton a 100-ton mill is being huilt for treatment of tin ores The mill site is ½ mile from the mine, on lower ground, and a tramway with a 6% grade will deliver the ore direct hy gravitation. Water and timher are also right at hand.

PENNINGTON COUNTY.

The Lakota M. & R Co, owning the Grizzly Bear group, 5 miles southeast of Hili City, report having plans under way for a 40-ton cyanide annex to the mill to save the gold that escapes the amalgamatlng plates.

Seven miles from Hili City, adjoining the Burlington group on the north, the Sunbeam M. Co. has the shaft down 40 feet and a 20-stamp mill is being built. On the 300-foot level a drift is heing run on the ledge, which shows 4 feet in width of $50 ore. Besides this ledge, there are two others of lesser size and values.

TEXAS.

JEFFERSON COUNTY.

Fire on the 23d inst. in the east end of the Shoestring oil district, near Beaumont, destroyed twenty-five oil derricks, causing a loss estimated at $125,000. The principal loser was the West-Davis Oil Co. Other losers include the Davy Crockett, Emmett Landy and Jackson Tobin companies.

UTAH.

BEAVER COUNTY.

A bond and lease has been given on the Jumbo group, below the Cave mine, near Milford, to W. Thompson, of the American Exploration Co., for eighteen months at $75,000.

M. L. Powers has resumed work on his bismuth prospects in the Granite range, near Miiford, and will continue operations during the balance of the year.

JUAB COUNTY.

The Godiva mine near Eureka has a few men at work preparing to reopen it.

It is expected the Eureka Hill mili, near Eureka, will start up this fall. Smelting grade copper and silver-lead ores have been shipped, hut miiling ore is being broken down.

PIUTE COUNTY.

The Signal Peak M. Co. has been organized at Richfield to exploit a group in Gold Mountain district near Marysvale. D. D. Hanks, A. Rowley and E. E. Hoffman are officers.

Seventy men are on the payrolls of the Annie Laurie mine at Kimheriy. The tunnel at the Annie Laurie extension mine near Kimberly is in 300 feet and passing through seams of copper ore in the porphyry, says the Tribune.

SALT LAKE COUNTY.

Ore shipments were started iast week from the mines of the Continental-Alta M. Co. at Alta, says Managing Director H. M. Crowther of Sait Lake City. While shipments are in progress fifty men will be kept on the payroll, most of whom will be on development work.

The management of the Highland Boy mine of Bingham is negotiating with the smelters for terms that will enable the company to increase its daily output to 800 or 1000 tons of copper ore.

The copper-bearing properties of the Columbia M. Co. at Bingham have heen sold to H. & H. G. Catrow of Dayton, Ohio, O. A. Tihhitts et al for $225,000. Catrow says development will he continued and a mill built for concentration of the second-class

rock. Meanwbile be has in view tbe utilization of two other plants now idle in the camp. O. A. Tibbitts will be manager.

The Columbus Con. M. Co. are preparing to start work on their power plant, which is expected to be completed January 1st. The plant will cost $40,000. In addition to the equipment in tbe building there will be 4½ miles of pole line. The 300-kilowatt generator is to be driven by water power. Tbe works are to be in Little Cottonwood canyon, 12 miles below the company's mines at Alta. It is proposed to generate sufficient electrical power to drive tbe macbinery of the mill to he built later, also for tbe machine drills in tbe mine.

The Columbia C. Co. at Bingham are preparing to put in an air compressor and machine drills, also for building a concentrator, and it is expected arrangements will be made in the meantime to employ one of tbe present Bingham mills for the reduction of tbe low grade ores.

The Alta Germania M. Co. has been incorporated to operate a group of three lode claims in Little Cottonwood district near Alta The officers are: J. Sauer, L. Hohein and A. J. Weber.

W. W Armstrong, A. Colbath, L. A. Jeffs. J. A. Kirby, C. Heath, J. C. Clasby, W. V. Rice, J Orbednorfer, D. Keith and E. Bamberger have incorporated the Alta-Quincy M. Co; principal place of business, Park City, and W. W. Armstrong president. The company's ground adjoins the Columbus group at Alta. Development work is in progress.

SUMMIT COUNTY.

Sinking is again under way at the Wabash mine at Park City, and it is intended to go down 400 feet more, giving a total depth of 1000 feet.

The Presidential G. M. Co. has been organized to operate tbe Presidential group of six claims at Park City. The ground is east of the Steele Con. mines and near the Kearns & Lynch ground. E. D. & E. S. Crowther, F. S. Harris and M. Sommer are incorporators.

TOOELE COUNTY.

The Sunshine mine and mill at Sunshine were closed down last week, says Manager L. Harris. The company is said to be behind in its payrolls one and one-half months, and was employing fifty men. R. E. Busb is superintendent.

To further exploit the ore body the Herschel M. Co. of Mercur will begin driving to it next week from an opening in Sacramento gulch. Their ground adjoins the Sacramento M. Co.

WEBER COUNTY.

The Vindicator G. & C. M. Co. has been organized at Ogden to operate a group of ten lode claims in Byone's and Burch Creek canyons, with G. F. Busch, E. Bichsel, S. T. Meyers and G L. Becker as officers.

WASHINGTON.

DOUGLAS COUNTY.

Coal is reported found on the south half of the Coiville Indian reservation at a point 8 miles from Bridgeport and near the Columbia river, by S. Valentine of Bridgeport. Valentine has been denied the right to take up tbe land, as the Watervilie land office decided that the act allowing entries on the south half of the reservation under the mineral laws did not permit of coal filings. Valentine is continuing to hold and develop his find. He says a lead 8 feet wide has been opened up. It is so situated that the product could be handled from the mine to boats and barges on the river by a gravity system.

FERRY COUNTY.

F. W. Rolt of Rossland, B. C., secretary of the Zala Con. M. Co., operating tbe Zala M. mine at Sheridan, says a hoist and sinking pump are being put in on the 300-foot tunnel level. At present fifteen men are at work. The winze below the 300-foot level is down 55 feet. About 100 tons of ore has accumulated in the bins, ready for shipment. The winze is filled with water.

Last week the pumps were started and work resumed at the Tom Thumb mine, near Republic, says W. D. Cburch, superintendent.

Machinery consisting of a 40 H. P. boiler and a 32 H. P. hoist will be put in at the Minnehaha mine, near Danville. This will enable the management to go 500 feet deeper on the ledge. The company is driving a tunnel to cut the main vein at depth and the face of this tunnel is in ore.

OKANOGAN COUNTY.

E. T. Hogie, part owner in the Wyandotte M. Co., operating at Chesaw, says development work is being increased on their Oregon mine. A shaft has been sunk on a vein carrying gold, silver, lead and copper. M. A. Smalley is manager.

STEVENS COUNTY.

E. J. Wilson, manager of the Northport smelter, says the smelter is running four furnaces and the remaining two are being overhauled to permit of automatic feeding from tram cars The automatic feed is being put in all of tbe stacks. Tbore are 45,000 tons of ore on tbe dumps at tbe smelter and the plant is running 900 tons a day. Coke is coming in freely.

WYOMING.

LARAMIE COUNTY.

Tbe shaft house of tbe Louise mine 25 miles west of Cheyenne, was dynamited by unknown men last week, and the boiler and hoisting machinery completely destroyed, but other machinery escaped damage. The macbinery belonged to O'Reilly Bros., who have a contract to sink the Louise shaft 200 feet. H. Schwartz, superintendent of the Hecla M Co, which owns the Louise, says the wrecking of the machinery will delay work but a short time

The Colorado F. & I. Co. has begun work of opening its Cbicago group of iron ore properties. Tbe Colorado & Wyoming Railroad is being extended to tbe mines (8 miles), leaving tbat railroad 2 miles from Guernsey. The company takes out 1600 tons of ore a day at the Sunrise mines, and when the new properties are opened its capacity will be doubled. The ore is sbipped to Pueblo, Colo. The company's average production of coal and coke is shown by its annual report to be 17,000 tons a day. The sales average 10,000 tons a day, and it needs for its own consumption an average of 7000 tons a day.

FOREIGN.

AUSTRALIA.

QUEENSLAND.

The 18th annual report of the Mount Morgan G. M. Co., Ltd., recently issued, shows that the cost of treating the oxidized ore during the year amounted to 11.69s, and that for treating the mundic ore 15.18s, the average for all ores being 13 51s per ton. The cost of mining mundic ore per ton amounted to 11.74s, and for mining oxidized ores 3 03s. The total cost of both mining and treating the sulphide ores was 26.93s, and the total for mining and treating oxidized ores was 14 73s. For all ores the total cost of mining and treating amounted to 21.02s per ton. This does not include a few shillings for general expenses.

SOUTH AUSTRALIA.

The Northern Territories M. & S. Co., at the Howley mine, report work of putting in compressor plant and rock drills progressing. At the Mount Ellison mine the lode has been cut by crosscut from the main shaft at a depth of 120 feet. Water has been struck, temporarily retarding development. At the Iron Blow mine the engine and pump in position and ore bins started. In the smelting works the water jacket furnace is going in. No. 1 reverberatory furnace well forward; No. 2 reverberatory furnace, bottom brickwork and ironwork in position, and stack built up to 30 feet. No. 1 reverberatory furnace will be completed by November 1st, and No. 2 reverberatory furnace by December 1st. Work on the tramway is progressing.

WESTERN AUSTRALIA.

(Special Correspondence) —The ore in the Lakeview Consol. mine will average one ounce gold throughout. Extraction is satisfactory since properly treating tellurides. The Government here will not allow strikes. The courts have established a minimum wage and prescribe the conditions. The country is divided into districts and an award applies to all the mines or other works in that district. There are very comprehensive laws regulating mining and the government inspection is very strict; they even establish the procedure in case of accident. There is a large income tax and other taxes are very high.

Kalgoorlie, Aug. 1.

At Kalgoorlie the Great Boulder Perseverance M. Co. report, on Aug. 5, cutting what is believed to be the Perseverance main lode at the 900-foot level. The crosscut struck the ore body at a point 200 feet north of the Lake View Consols boundary and for a width of 8 feet the average value of the ore is 25 dwts.

BRITISH COLUMBIA.

BOUNDARY DISTRICT.

C. Woif, secretary of the Waterloo M. Co., in Camp McKinney, says the company will increase its stamp mill from five to ten stamps. Eighteen men are at work at the mine.

The third section of the ore bins for ore from No. 2 tunnel of the Knob Hill mine is being built, giving greater capacity from this part of the Granby mines at Phœnix, which will be needed as soon as the 2000-ton daily rate is started. Forty cars daily are being sent to supply tbe four furnaces at the company's smelter at Grand Forks. As soon as the slag-carrying locomotives arrive tho fifth and sixth furnaces will be blown in. They were connected up during the recent closedown. It is expected the six furnaces will be in operation by Nov. 1st.

EAST KOOTENAY DISTRICT.

Manager S. S. Fowler of tbe Paradise mine, on Toby creek, near Windemere, says the company is considering building a tramway a distance of 3½ or 4 miles. There are twenty-five men at work on development, and the ore being taken out is showing good values in lead.

The M. McInnis group of four claims at Crow's Nest has been sold to the Canadian Pacific R. R. Co. for $110,000. Tho railway company will develop this property to supply tbeir own coal requirements.

Work of repairing the St. Eugene concentrator, near Fort Steele, and putting in the zinc-saving apparatus has begun. Thirty men and six teams are building a flume 3 miles long at Perry creek. South Dakota men are preparing to enter into the work of turning Bull river from its present bed for its gold. It is supposed that the channel or bed of the river has been a veritable sluice box and can be cleaned up as soon as the river is turned into its new channel.

Work at the Bull river placer mines, near Fort Steele, is progressing. The road from the Chickamun to the falls of Bull river has been completed. Timber has been cut and buildings are going up. Men are at work cutting the right of way for the flume.

The Gold River M. Co. has put men at work cutting out the right of way for a ditch from the upper canyon to the falls on Bull river, near Fort Steele, says the Prospector.

NELSON DISTRICT.

The Relief mill on the Relief mine, near Erie, owned by Finch & Campbell of Spokane, Wash., has closed down for the year owing to lack of water. It will not be started until spring. The Relief ores are treated by a stamp mill and a cyanide plant. The principal values are in gold, averaging $10 per ton

Tbe Star group, Morning mountain, near Ymir, is reported sold for $30,000—10% paid. A 40-stamp mill will be erected. G. W. Stead of Philadelphia, Pa., is interested.

ROSSLAND DISTRICT.

E. B. Kirby, manager of the War Eagle-Center Star Cos., at Rossland, says the Rossland Power Co., a subsidiary company of the War Eagle and Center Star, has made arrangements to build a concentrator for treatment of low-grade ores of the War Eagle and Center Star mines. The mill will be built near Trail, ¾ mile north of the smelter, along the line of the Columbia & Western railroad, between Trail and Robson, and near the Columbia river. It will have a capacity of 200 tons a day to begin with, but it will be constructed so as to be enlarged later. Work will begin next week, and C. M. Eye will be superintendent. It is understood the Canadian Pacific will put in switches and other facilities at the millsite to handle the material for the concentrator. Water for the mill will be taken from Stoney, Rock and Murphy creeks, and conducted to the concentrator by a flume. Sixty men will be put to work.

SLOCAN DISTRICT.

In the Slocan, G. Jenkins of the Idaho mine at Aiamo will put in a 9000-foot tramway. Twenty-five men are at work on the Idaho; others are renovating the old concentrator, with which the new tramway will connect the mine. This concentrator was the first one built in the Slocan, and has been idle for over four years.

VANCOUVER ISLAND.

J. Dunsmuir says, near Cumberland, further development work is being done near Hamilton lake, where two slopes are being driven into the anthracite bed, and coal is expected to be struck this week. The men have started sinking a shaft at the same point. They have overcome the water more easily than was expected.

WEST KOOTENAY DISTRICT.

C. E. Averill of Indianapolis, Ind., has bought the Del Ray group—a free gold property adjoining the Homestake mine, in Lardeau section, near Camborne. He will start development on the Del Ray this week.

YALE DISTRICT.

The Coulee Coal & Iron Co. has been incorporated at Colfax, Wash., by T. Oliver, J. W. Lloyd, E. M. Warner, G. W. Palmer, H. H. Wheeler, C. E. Scribner and D. Leinbach of Colfax, to acquire and develop coal veins and iron ore deposits in the State of Washington and in British Columbia; to build and operate smelters, coke ovens and transportation lines in connection with their mining properties. Tbey own 3840 acres of coal land in Nicola coal basin, 150 miles northeast of Vancouver.

CANADA.

ONTARIO.

Secretary Berry and Director Pudritb of the Summit Lake G. M. Co., operating the Little Master group, near Wabigoon, report the main shaft going down and showing ore carrying free gold. The Big Master mine and stamp mill are in full operation.——At the Nelson Bay group of the Gold Standard Co. Superintendent N. C. Ahlstrom says work is progressing. Crosscutting is being done toward the dip of the vein as it appears on the surface. Notwithstanding this work is under the bottom of the lake, the miners have no trouble with water.

MEXICO.

CHIHUAHUA.

Stallforth Bros. of Parral, lessees of the Quebradillas mine at Minas Nuevas, report having a body of ore 20 feet wide at the 845-foot level. They paid a royalty of 75% on the first 65,000 tons extracted, and the royalty as per contract has since been 25%, says the Enterprise. E Stalknecht is manager.

The Mexican M & Ex. Co. have secured the lease on the Prieto mine, near Parral, and will start work next week ——The American Zinc Extraction Co., of Kansas City, Mo, A. E. Swain, superintendent, is down 400 feet in depth on the Tajo mine, which adjoins the Prieto mine on the northeast, says the Enterprise.

G. A. Burr has an option on the Purisima mine, in Las Animas district, near Parral. A meter of the vein averages 1300 grams silver per ton. The mine is near the Mexican Central railroad.

J. A. Creel's smelter at Terrazas was blown in last week and is turning out copper, says F. A. Schneider of El Paso, manager.

The Hoff & Robinson working interests in the Concepcion mine in Santa Eulalia has been given up, and the owners, C. Alleman, W. J Jones and C. Gasson, will continue the work in connection with Manager Gasson's work on the Kansas Boy mine.

R. J. Oaxaca has bought the two 5-foot Huntington mills and other machinery of the Boston company at the Placer de Guadalupe, near Parral, and will use it in treating ores of his mines other than the Oaxaca mine in the same section. The Oaxaca mine is idle pending the settlement of the estate.

The Guggenheims are doing nothing with the Veta Grande y Annexas at Parral except to ship the dumps, no work going on underground. It is claimed the dumps will return the price paid for the mine—$200,000 gold. A new shaft is expected to be sunk, says the Enterprise. J. F. Soule is superintendent.

The San Francisco del Oro mine, near Parral, owned by English capitalists, organized as the San Francisco del Oro, Ltd., J. B. Hyslop, manager, is being prepared for increased production. An aerial tramway a mile long is near completion. An electric pump and hoists are being put in and two air compressors are on the ground. Work is going on at both ends of the 3160-foot tunnel which is to tap all three mines for working and draining purposes, says the Chihuahua Enterprise. The cable tram will have a capacity of 100 tons every ten hours. Tho principal values are in gold.

COAHUILA.

Manager E. Ludlow of the Mexican Coal & Coke Co. says he has contracted to furnish 22,000 tons of coke to smelter No. 3 at Monterey, Nuevo Leon, from the Las Esperanzas coal mines at Las Esperanzas, in the northern part of the State. The coal body is 8 feet thick and is producing 2000 tons per day.

DURANGO.

The Durango M. Co. has been incorporated by Michigan men to exploit the mines of C. Fowler at Yerba Buena, near San Pedro.

OAXACA.

The Tiacoiuia M. Co., of Oaxaca, has been incorporated by R. W. Drennan and A. L. Zeckendorf to exploit the El Placer and Dolores y Annexas free gold mines, 18 miles east of Oaxaca. The ores are said to average $20 gold per ton.

In Sierra Juarez gold-silver district, 40 miles northeast of Oaxaca, most of the mines so far developed are at about 8000 feet elevation and are tunnel propositions. At the Natividad mine ten stamps are being added to the mill, making twenty in all. The Oaxaca M. & M. Co. of Denton, Tex., men, at its Barrohuates mine, has a 10-stamp mill running, and reports shipping $3000 bullion per week. The ore runs seven ounces in gold. The Sierra Juarez M. & Dev. Co. of Nashville, Tenn., has a 5-stamp mill in operation and expect to in-

crease the plant. The Mexican-American G. M. & M. Co., of Waco, Tex., is putting up a 10-stamp mill on the San Jose de Gracia mine. Several other companies are increasing operations. The Natividad and Socoro rivers furnish a sufficient water power. The Natividad is putting in an electric plant on the Natividad river for its mine and mill and the American-Mexican Co. has made a ditch a mile long for utilizing the waters of the Socorro river to generate 200 H. P.

SINALOA.

R. Coleman et al, of Salt Lake City, Utah, having bought the Lluvia de Oro mines in eastern Sinaloa, are arranging to put in a 20-stamp mill at the mine. Table concentrators will be used. This plant will handle ore taken out in development; and ultimately they propose to build a 100-stamp mill, water power and transmission of electric power to both mine and mill, together with an aerial tram line of 1½ mile in length.

SONORA.

Two furnaces at the smelter of the Greene Con. C. Co., at Cananea, which have not been in operation for several months, were blown in last week. It is also understood that four furnaces will be built, says the Cananea Herald.

The offices of the Sonora River Placer M. Co., operating on the Sonora river, have been moved from Los Angeles, Cal., to Cananea, says A. W. Tennant, manager.

A. Goldbaum and S. D. Kempton of Hermosillo have started work on the Imperio del Cobre mine, 30 miles south of Cananea. The ores carry gold, silver and copper.

The San Blas M. Co., which has taken over the San Blas mine, 45 miles northwest from Caborca, in Altar district, has been incorporated in Massachusetts. The claims are gold-bearing, with five veins, three of which were opened and operated by the antiguas. The directors are D. J. Brown, L. R. Godfrey, E. H. Beer, G. N. Rich, G. H. Miner, E. F. Gibbs and J. H. Trayne of North Adams, Mass., with J. A. Singey of Caborca, manager.

PERSONAL.

C. L TUTT, interested in Colorado mines, is in San Francisco, Cal.

I. E GOODNER has returned to Madison, Wis., from Deadwood, S. D.

T. REGAN of Boise, Idaho, is in San Francisco, Cal., on mining business.

R. DE LARGE has returned from mill construction at Tucson to Dewey, Ariz.

B. C. RIBLET has returned from an Eastern business trip to Spokane, Wash.

A. H. ELFTMAN of Silverton, Colo., is in Minneapolis, Minn., on mining business.

F. S. INGALLS of Yuma, Ariz., has been appointed Surveyor-General of Arizona.

G. A. HANCOCK has resigned as manager of the Comstock mine at Park City, Utah.

R. K. NEILL, of Spokane, Wash., returned last week from a trip to the Kyak, Alaska, oil fields.

R. G. WILSON is president and manager of the New York M. Co., operating at Park City, Utah.

H. E. CRAWFORD of New York is in the Black Hills, South Dakota, examining mining properties.

F. J. MURPHY, who has mining interests in Arizona, is in San Francisco, Cal., from Needles, Cal.

F. H. MORLEY has opened an office as mining engineer in the Exchange Building, Denver, Colo.

A. B. ADAMS of New York, interested in mines in Mexico, is in San Francisco, Cal., from the East.

GARDNER H. SMITH has returned to Pasadena, Cal., from a mine examination in Sierra county, Cal.

E. L. WHITE, State Mine Inspector for Colorado, has returned to Denver, Colo., from Deadwood, S. D.

J. T. MILLIKEN, formerly of Colorado, is manager of the mill of the Imperial M. Co. of Deadwood, S. D.

T. EVANS, owning mining and railroad interests near Cananea, Sonora, Mexico, is in San Francisco, Cal.

C. M. COLEMAN has retired as secretary and manager of the Keystone Hydraulic Co. near Telluride, Colo.

G. V. NORTHEY of Sulphur Creek, Colusa county, Cal., is in San Francisco, Cal., on mining business.

MANAGER H. G. BRUNNIER of the Conlin mine, Grass Valley, Cal., is in Davenport, Iowa, on business.

G. J. BANCROFT of Denver, Colo., is looking over mining properties in the Black Hills, South Dakota.

JESSE J. MACDONALD has returned to California from a successful cyanide operation in Peru, South America.

W. C. HODGE, JR., of the United States Geological Survey, is in San Francisco, Cal., from Washington, D. C.

F. A. LEACH, superintendent U. S. Mint, San Francisco, Cal., has returned from an extended Eastern visit.

JOHN LAWLER of Prescott, Ariz., owner of the Hillside mine, in Yavapai county, is in San Francisco, Cal.

J. H. BERKSHIRE has returned to Winona, Mo., after an examination of his mining holdings at Pearl, Idaho.

MANAGER REMER of the Mutual Benefit G. M. Co. is in the East on mining business from Central City, Colo.

C. W. PURINGTON, who has been making examinations in Clear Creek county, Colo., has returned to Denver, Colo.

O. A. TIBBITS of Dayton, Ohio, is manager of the Columbia M. Co., operating at Bingham, Salt Lake county, Utah.

H. F. JURS of San Francisco, Cal., was in Deadwood, S. D., during the mining congress, and has gone to St. Louis, Mo.

R. W. HILL is secretary and manager of the Keystone Hydraulic Co., near Telluride, Colo., vice C. M. Coleman, retired.

J. E. PHILLIPS of Denver, Colo., has returned there from New York on business for the Engineering Co. of America.

C. C. DERBY of Mount Bullion, Mariposa county, Cal., manager of the Mariposa Com. & M. Co., is in San Francisco, Cal

J. MCINTIRE of Sacramento, Cal., superintendent of the South Keystone mine in Amador county, is in San Francisco, Cal.

W. D. PAGAN of New York, interested in the North Star mine at Grass Valley, Nevada county, Cal., is in San Francisco, Cal.

L HAHN of Hastings, Neb., interested in the Four Metals mine, Deep Creek district, Tooele county, Utah, is visiting the camp.

O. HARKER, formerly with the Guggenheim Ex. Co., is superintendent of the Henrietta mine near Bajan, Nuevo Leon, Mexico.

J. W. LANGLEY, D. S. MURRAY AND E. D. THOMPSON of Salt Lake City, Utah, have gone to the Jackson Hole country in Wyoming.

J. B. HARRELL is superintendent of the Casbier 100-ton amalgamating and concentrator mill at Breckenridge, Summit county, Colo.

J. M. NOUGUES, JR., superintendent of the Josephine mine at Volcanoville, El Dorado county, Cal., is in San Francisco, Cal., on business.

I. MILLER, president of the Springfield-Nevada M. Co., is in the East on company business from Olinghouse, near Wadsworth, Nev.

E. COPLEY of Salt Lake City, Utah, is in the East in the interest of the Sheba and Nevada-Humboldt companies in Humboldt county, Nev.

CHAS. M. HAMPSON has returned to Denver, Colo., from Yankee Hill, Colo., where he started up the new plant of the Y. C. M. M. & T. Co.

MANAGER G. D. B. TURNER of the J. I. C. mine of Park City, Utah, has gone East, and will visit shareholders in Scotland before returning.

W. L. COBB, of San Francisco, is making an examination of the old Piute mine, east of Bakersfield, Cal., with a view of installing a 5-stamp mill.

C. F. STAVER, superintendent of the Vandalia mine, near Shingle Springs, El Dorado county, Cal., has returned to the mine from San Francisco, Cal.

J. A. YEATMAN of San Francisco, Cal., has gone to McCoy, Eagle county, Colo., to superintend installation of placer mining equipment with artificial head.

O. HENKEL AND T. BIRCH of La Colorada, Sonora, Mexico, have gone to South America for the South American Dev. Co. at Zaruma, Ecuador, as mine foremen.

JOHN ROSS, JR., manager of the Wildman-Mahoney mine at Sutter Creek, Cal., has returned from a business trip to Boston, Mass., and is in San Francisco, Cal.

MR. GREEN succeeds W. Frank Pierce in the presidency of the Standard Electrical Co, which removes its principal office from San Francisco to San Jose, Cal.

G. W. MYERS of San Francisco, Cal., has gone to Randsburg and Bagdad, Cal., and the desert district, on business for the Chrome Steel Works of Brooklyn, N. Y.

ROY D. HUNTER, Western manager of the Sullivan Machinery Co., with headquarters at Denver, Colo., and H. P. Dinsmoor, assistant manager, are in San Francisco, Cal.

E. H. PLATT has resigned the superintendency of the Commercial Lead Co. of Flat River, Mo., to take an important position with the Denver Engineering Works Co. of Denver, Colo.

W. MAGENAU, professionally engaged for the past six months in Guanajuato and City of Mexico, Mexico, has been appointed superintendent of the Commercial Lead Co. of Flat River, Mo.

G. E. QUINBY of Joplin, Mo., has been appointed State Inspector of lead and zinc mines for the western district of Missouri, which includes Joplin district, as well as the mines of central Missouri.

W. WESTON, mining engineer for the Moffat road, has left Denver, Colo., for a month's inspection and report on the Routt county, Colo., anthracite and bituminous coal fields. He will make his headquarters at Yampa and Steamboat Springs.

F. W. DENTON, in assuming charge of the Trimountain copper mine near Painesdale, Mich., has appointed J. Jolly, formerly head mining captain at the Baltic mine, as head mining captain of the Trimountain, and M. Trethewey, under captain at the Baltic, is appointed to the place held by Jolly.

ON the 22d inst. several of the friends of Ross E Browne, E. M., of San Francisco, Cal., gave him a dinner in San Francisco, Cal., prior to his departure for Johannesburg, South Africa, where he goes to take a position with an important mining company. There were present at the dinner: C. F. Hoffman, H. Bratnober, C. G. Yale, E. H. Benjamin, C. H. Lindley, F. W. Bradley and F. Leach of San Francisco, Cal., H. T. Power of Michigan Bluff, Cal., Mr. Perkins of Johannesburg, South Africa, and G. Hesse, S. B. Christy and A. C. Lawson of the University of California, Berkeley, Cal. Mr. Browne will be accompanied by his family and K. F. and J. D. Hoffman, the entire party going to London, England, when J. D. Hoffman will proceed at once to Johannesburg, Mr. Browne and family going later to South Africa.

THE following are announced as the graduating class of 1903 of the A. Van der Naillen School of Engineering of San Francisco: Electrical department—J. M. Minor, Arcata, Cal; F. R. George, Los Angeles; G. R Stebbins, North Platte, Neb.; J. Dooley, Sacramento, Cal; H. W. Koster, San Francisco; W. Bruce, Oakland; H. J. Ferguson, Knight's Ferry, Cal.; E. L. Hueter and L. H. Heuter, Alma, Cal.; F. B. Volkerts, Sebastopol, Cal.; W. Lazar, San Francisco; E P. Mann, Los Gatos, Cal; H. H Lewis, Sunnyside, Nev.; W. McCann, Ferndale, Cal.; F. H. Wilkins, Los Banos, Cal.; H. M. Tilson, Del Paso, Cal.; Arthur J. Iland, San Francisco; C. B Jackson, Pleasant Grove, Cal; C. J. Klevesahl, San Francisco; F. E. Duprey, Winters, Cal; R. Towle, Emmett, Cal; P. Potrz, Berlin, Germany; W. H. Grass, Milford, Cal; J. R. Rhodes, Uklab, Cal; L. D. Armstrong, Fortuna, Cal; D. W. Isaac, Tesla, Cal.; A. Jennings, Wickenburg, Ariz; H. W. Holmes, Alameda, Cal.; M. A. Herriman, San Francisco; R. H. Parker, Sierra City, Cal.; G. M. Dawes, San Francisco; P. W. Landell, Philippine Islands; W. E. Hollenberg, Reedley, Cal; F. Isbell, San Francisco; T. A. Church, San Francisco; G. R. Johnson, San Luis Obispo, Cal.; F. Hazelwood, Highland, Cal.; L. F. Scalione, Healdsburg, Cal; R. D. Tucker, Spanish Ranch, Cal.; R. L. Stewart, San Francisco; G. H. Farnsworth, Honolulu; W. H. Perry, Walla Walla, Wash.; O. A. McCobb, Hollister, Cal; L. Stark, Winters, Cal; V. G. Guthrie, Winters, Cal.; H. B. Stone, Chico, Cal.; C. W. Farrow, Downieville, Cal.; H. J. Zweifel, Jr., Downieville, Cal.; D. McCaustland, San Jose. Mining department—B. N. Sharp, Sandon, B. C.; W. G. Rennison, Kaslo, B. C.; G. F. Williamson, Amador, Cal.; M. C. Schmidt, Villaldama, Mexico; W. T. MacDonald, Chihuahua, Mexico. Draughtsmen—S. L. Cassella, Alma, Cal.; W. Krelling, San Francisco; J. Maxemin, Mazatlan, Mexico; S. Heiman, San Francisco; A. W. Pearson, Mt. View, Cal.; L. H. Brown, Red Bluff, Cal. Assayers—E. Williams, Nome, Alaska; D. D. McCallum, San Francisco; A. L. Stern San Francisco; T. S. Forrest, Ballard, Wash.; G. W. Bishop, San Francisco; J. Conway, Uncompahgre, Colo.; V. J. Hall, San Francisco; H. H. Lockhart, Descauso, Cal.; J. O. Lampshire, Los Angeles; M. E. Sayre, San Francisco; F. M. Evans, Victor, Colo.; A. T. Lesser, Garnet, Mont.; A. R. Wistrand, Menominee, Mich.; E. Pinter, San Francisco; M. B. Pope, Salt Lake, Utah; J. Thiebes, Bisbee, Ariz.; J. A. Millmore, Woodstock, Canada; E. N. Stone, Gazelle, Cal.; C. Gurnee, Nome, Alaska; W. A. Hersey, Penryn, Cal.; M. Brigman, Simiikameen, B. C.; G. H. Shaw, Murphys, Cal; R. E. Moore, Woodland, Cal.; W. H. Donohue, Tarryall, Colo.; J. M. Jessen, Omaha, Neb. Surveyors—A. G. Engblom, San Francisco; F. W. Wood, San Antonio, Tex.; H. P. Strough, New Hope, Va; D. M. Blood, Oakland; A. W. Steward, Butte, Mont; E. E. McCartney, San Francisco; E. O. Ord, Jr., Benicia, Cal.; W. H. Lipscombe, Mulberry, Cal.; G. Conlin, Victor, Colo.; S. H. Jordan, Angels Camp, Cal.; E. I. Clawiter, Mt. Eden, Cal.; W. M. Burns, San Dimas, Mexico; D. F. Valentine, Melbourne, Fla.; F. P. Zoffman, Jolon, Cal.; A. Joaquin, San Luis Obispo, Cal.; J. H. Elkinton, Oakland; B. A. Jeffery, Jackson, Cal.; J. P. Mackenzie, San Francisco; G. Schrader, Los Angeles; R. B. Wilcox, Stephens, Or.

Books Received.

"Chemist's Handbook," from Western Chemical Manufacturing Co, Denver, Colo, celluloid cover, with much technical information of value to chemists, assayers and others.

"Engineering Preliminaries for an Interurban Electric Railway," by Ernest Gonzenbach, is the latest work on electric railway engineering. The book is for the thoughtful perusal of those who contemplate building an electric railway, or who desire comprehensive information on this important subject. It deals with general requirements, makes a comparison between trolly and third-rail systems, and with power house and roadbed construction. Price, $1. McGraw Publishing Co., New York City.

"Iron, Steel and Other Alloys," by Henry M. Howe, author of the "Metallurgy of Steel," has been received. The publication of this book marks an epoch in our knowledge of metals and alloys. The work is thoroughly comprehensive, dealing with the composition of various alloys, blast furnace practice and the various types of furnaces. The book is written on new lines and deals comprehensively with the "solution theory" of metallography. It is a book at once for the student and practitioner. Price, $5. Sauveur & Whiting, 446 Tremont street, Boston, Mass.

"Chemistry, Inorganic and Organic," by Chas. London Bloxam (ninth edition), rewritten and revised by John Millar Thompson, LL. D, has been received from the publishers. The fact that this valuable textbook has issued its ninth edition is sufficient in itself to recommend the book to those who desire a thoroughly reliable treatise on the important subject of which it treats. Most books on chemistry deal with either organic or inorganic chemistry separately, but in this volume both are treated, making it a handy book of reference. There are 872 pages in the volume, with nearly 300 illustrations. The chapter on the fractional distillation of petroleum will prove of value to those interested in oil. The metallurgical section is particularly interesting and valuable. Price, $6; published by P. Blakiston's Son & Co., 1012 Walnut street, Philadelphia, Pa.

"The Metallurgy of Zinc and Cadmium," by Walter Renton Ingalls, is the title of a handsome volume on this important metallurgical subject, just published. It contains 700 pages of profusely illustrated text. The illustrations contain carefully made working drawings of furnaces and other machinery used in the handling and reduction of these ores. The zinc industry is an important one, comparing favorably with that of lead or copper, but until now there has been a dearth of technical information on the subject of the metallurgy of zinc. Mr. Ingalls is also the author of the "Production and Properties of Zinc." The present volume deals with the ores of zinc, their treatment in various types of calcining and roasting furnaces; the utilization of gases, and principles and practice of zinc distillation. Cadmium is also treated in a thorough manner. The latter part of the volume is devoted to the manufacture of the various products of zinc. Price $6, postpaid; Engineering and Mining Journal, 261 Broadway, New York City; 20 Bucklersbury, London, E. C., England.

Obituary.

B F. MORLEY, manager of tbe Buena Vista smelter, at Buena Vista, Colo., and of the Mary Murphy mine at Romley, and Adolph Abrahamson, superintendent of the mine, were killed by foul air wbile making an inspection of tbe mine workings on tbe 22nd inst. Tbeir bodies were recovered later. It is supposed the air in tbe mine had heen vitiated by powder gas The property is not operated at nigbt and tbere were no otber men in the mine when Manager Morley and Superintendent Abrahamson were making tbeir tour of inspection.

JOHN F. BLANDY died at Prescott, Ariz., Sept. 17, from a complication of diseases. He had long been in ill healtb. He was born in Newark, Del., April 24, 1833. He received his education at Freiberg, Saxony. He was engaged in mining in Lake Superior region for several years. In 1881 he removed to Arizona, wbich place has since heen his home. For several years be was Territorial Geologist of Arizona and his various official contributions, publisbed while acting in that capacity, are among tbe most valuable of the mining literature of Arizona.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR WEEK ENDING SEPT 15, 1903.

739,131—FIRE KINDLER—J. Adler, S F.
738,872—SAW SHARPENER—G. Y. Anderson, Dyea, Alaska.
738,752—ELECTRIC SWITCH—A. H. Babcock, Oakland, Cal.
738,756—COMPENSATOR—F. G. Baum, Palo Alto, Cal.
738,757—COMPENSATOR—F. G. Baum, Palo Alto, Cal.
738,981—FOOD CONTAINER—A. Buntenbach, London, Or.
738 982—EARTH AUGER—A. Buntenbach, London, Or.
739,058—BARREL AIR VENT—E. R Charles, Petaluma, Cal.
739,151—SHELL DECAPPER—M. Chick, San Diego, Cal
738,827—GAS GENERATOR—W. S. May, Clifton, Ariz.
739,215—WATER METER—Potter & Swank, Riverside, Cal
739,219—EXPLOSIVE ENGINE—J. H. Redfield, Spokane, Wash.
739,220—EXPLOSIVE ENGINE—J. H. Redfield, Spokane, Wash
739,028—ABRADING TOOL—J. O. Rollins, Tuolumne, Cal.
739,119—TACKLE BLOCK—H. W. Stocking, Avalon, Cal.
739 234—PUMP—Z Storch, Alameda, Cal.
739,042—SAND PUMP—M. C. White, Los Angeles, Cal.
739,043—OIL BURNER AND FURNACE—D. C. Wilgus, S. F.
739,248—SEAL—Wood & Cooper, S. F.

Notice of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

EARTH AUGERS.—No. 738,982. Sept. 15, 1903. A. Buntenbach, London, Or. This invention relates to improvements in devices for boring holes in the ground for the reception of fence posts and the like. Its object is to provide an auger of simple construction, having means for feeding constantly a small quantity of water into the bole to soften the earth and aid in the boring.

FOON CONTAINER.—No. 738,981. Sept. 15, 1903. A. Buntenbach, London, Or. This invention has reference particularly to sucb containers as are used for sausages; and its primary object is to provide a simple and attractive substitute for the gut which constitutes the ordinary sausage casing; but it may also be used for the reception and preservation of a great variety of foods and other products.

ABRADING TOOLS.—No. 739,028. Sept. 15, 1903. J. O Rollins, Tuolumne, Cal.; one-half assigned to J. B. Ferguson of same place. This invention is designed to provide a fully equipped machine for shoemakers, wherehy they will have the means at hand for keeping the various knives and other tools in order, and are enabled, by means of the drill attachments, the grinder and the pollsher, to supplement to a marked degree tbeir own handicraft.

HYDROCARBON BURNERS AND FURNACES—No. 739,043. Sept. 15, 1903. D. C. Wilgus, San Francisco, Cal. The general object of this invention is to render more practicable the use of oil fuel in conjunction with marine boilers. Specifically its objects are, first, to provide a burner in which all tendency on the part of the burner to clog hy reason of impurities in the oil may be obviated without shutting off the fire or removing the burner from the furnace; secondly, to so construct the front of the furnace that the heat is equably distributed over tbe entire area of the fire box, while the engine room will be kept comparatively cool.

SEALS.—No. 739,248. Sept. 15, 1903. L. E. Wood of San Francisco, Cal., and C. R. Cooper of Berkeley, Cal. This invention relates to a device for sealing cars, rooms and receptacles of any sort, and it is especially designed for use upon freight cars, wbere it is desirable to seal the doors to prevent any removing or tampering of the goods contained therein. It consists essentially of a flexible metal strap adapted to pass through the hasp and staple or lock of any description hy which tbe door is secured, and in a means for securing the ends of said metal strap, so tbat it cannot be opened or removed without showing that it has heen tampered with.

Latest Market Reports.

SAN FRANCISCO, September 25, 1903.

METALS.

SILVER.—Per oz., Troy: London 27⅜d (standard ounce, 925 fine); New York, bar silver, 59c, refined (1000 fine); San Francisco, 59c; Mexican dollars, 47c @49c; San Francisco, 45½c New York.

The present price of silver in Now York and San Francisco is certainly the most encouragement silver men bave bad in many months. Tbere are tbose who predict a still higher price for the metal in tbe near future. It is making a vast difference to silver-lead miners, and in fact to all those whose ores carry silver in considerable quantity.

COPPER. — New York: Standard, $13.50; Lake, 1 to 3 casks, $13.50; Electrolytic, 1 to 3 casks, $13.50; Casting, 1 to 3 casks, $13.37½; San Francisco: $15.00. Mill copper plates, $17.00; bars, 18@24c. London: £55 7s 6d spot per ton.

A slight falling off in the price of copper is noticeahle, hut these small fluctuations in price from day to day do not signify anytbing of importance. The past week the market has been unusually quiet, hoth sellers and huyers apparently waiting for something unusual to turn up.

LEAD.—New York, $4.50; Salt Lake City, $3.50; St. Louis, $4.00; San Francisco $4.50, carload lots; 4¾c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5½c; pig, $4.75. London: £11 2s 6d per long ton.

SPELTER. — New York, $6.00; St Louis, $5.00; London, £21 per ton; San Francisco, ton lots, 6½c; 100-lh lots, 7c.

TIN.—New York, pig, $26.75@27 00; San Francisco, ton lots, 28½c; 500 lbs., 29c; 200 lbs., 29½c; less, 30c; bar tin, ℔ lb, 30c @32c. London, £118 5s spot.

PLATINUM.—San Francisco, crude, $18.00 ℔ oz.; New York, ingot, $19.00 per Troy oz. Platinum ware, 75@80c per gram.

QUICKSILVER.—New York, $46.00@47.00; large lots; London, £8 7s 6d; San Francisco, local, $43@44 ℔ flask of 76½ lbs.; Denver, $49.50. Export, $42.50@43.00.

BABBITT METAL.— San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

SOLDER. — Half-and-half, 100-lb. lots, 18.75c; San Francisco, Plumbers', 100-lb. lots, 15.50c.

ZINC.—Metallic, chemically pure, ℔ lb., 50c; dust, ℔ lb., 10c; sulphate, ℔ lb., .04c.

NICKEL.—New York, 50@60c ℔ lb.; ton lots, 45@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 34c.

ANTIMONY.—New York, Cookson's, 7½c; Hallett's, 6¾c; San Francisco, 1000-lb. lots, 8c; 300 to 500 lbs., 8½c; 100-lb. lots, 10½c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, $16.85 @17.35; gray forge, $15 35; San Francisco, bar, 3c ℔ lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $27 00@29.00; open hearth billets, $28.00 @30.00; San Francisco, har, 7c to 12c per lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer	$17.50@18.50
Foundry Northern 1	17.50@17.75
Northern 2	17.00@17.25
Northern 3	16.50@16.75
Southern 1	16.35@ ——
Southern 2	15.85@ ——
Southern 3	15.35@ ——
Forge	14.85@ ——
Charcoal	20.50@21.00
Billets, Bessemer	28.00@29.00
Bars, iron	1.55@ ——
Bars, steel	1.75@ 1.80
Rails, standard	28.00@30.00
Rails, light	34.00@40.00
Plates, boiler	1.90@ 2.00
Tank	1.75@ 1.80
Sheets, 26 store	2.90@ 3.00
No. 27	2.90@ 3.00
No. 28	3.00@ 3.10
Angles	1.75@ ——
Beams	1.75@ ——
Tees	1.80@ ——
Zees	1.75@ ——
Channels	1.75@ ——
Steel melting scrap	14.00@15.00
Relaying rails	26.00@28.00
Dealers forge	12.50@13.50
No. 1 railroad wrought	14.50@15.00
No. 1 cast, net ton	13.50@14.50
Iron rails	18.00@19.00
Car wheels	19.00@20.00
Cast horings	5.50@ 6.50
Turnings	10.50@11.50

LUMBER.—(Retail): Pine, ordinary sizes, $24.00@25.00; extra sizes higher; redwood, $28.00@30.00; lath, 4 feet, $4.50 @5.00; pickets, $21.00; shingles, $2.50 for No. 1 and $2.25 for No. 2; shakes, $13.50 for split and $15.00 for sawed; rustic, $28.00 @35.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, $3.35; Cut, $3.55; 10d to 16d, Wire, $3.45; Cut, $3.35; 8d, Wire, $3.50; Cut, $3.50; 6d and 7d, Wire, $3.60; Cut, $3.60; 4d and 5d, Wire, $3.70; Cut, $3.70; 3d, Wire, $3.85; Cut, $3.85; 2d, Wire, $4.10; Cut, $4.10. Special rates for carload lots.

LIME.—Santa Cruz, $2.35; Rocbe Harbor, $2.35 per hhl.

CEMENT.—Imported, $2 50@2.75 ℔ bbl; California carload lots, $2 25 f. o. b. at works; small lots, $2.50 ℔ bbl. in sacks, 4 sacks to bbl.

GENERAL SUPPLIES.

POWDER.—F. o. h. San Francisco: No 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s. 11c ℔ set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 23@24c ℔ lb.; carloads, 23@23½c; in tins, 30c; soda ash, $2.00 ℔ 100 lbs.; hyposulphite of soda, 3@3½c ℔ lb.; caustic soda, in drums, 3@3½c ℔ lb; Cal. s. soda, bbls., $1.20@1.40 ℔ 100 lbs.; sks., $1.05; chlorate of potash, 12@13c; nitrate of potash, hbls., 10c; caustic potash, 10c in 40-lb tins; roll sulphur, 2½@2¾c; powdered sulphur, 2@3c; flour sulphur, French, 3½@3¾c; alum, $2.00@2.25; California refined, 1¾@2c; sulphide of iron, 8c ℔ lb; copper sulphate, 5½@5¾c; chloride of lime, spot, $2 50@2.75; sulphuric acid, in carboys, 66% B, 1¾@2c ℔ lb.; nitric acid, carboys, 8c ℔ lb.

OILS.—Linseed, boiled, bbl., 49c; cs., 54c; raw, bbl., 47c; cs., 52c; Lucol oil, hoiled, bhl., 44c; cs, 49c; raw, bbl., 42c; cs, 47c. Kerosene—Pearl, per gal., 20½c; Astral, 20½c; Star, 20½c; Extra Star, 24½c; Eocene, 23½c; Elaine, 26½c; Water White, in hulk, 14½c; Mineral Seal, iron hhls., 18½c; wooden hhls., 21c; cs, 24c; Mineral Sperm, cs, 26½c; Deodorized Stove Gasoline, bulk, 17c; do., cs., 23½c; 86° Gasoline, bulk, 21c; do., cs., 27½c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19½ c; Lard Oil, E. W. S., hhl., $1.00; cs., $1.05; Neats-foot Oil, pure, bbl., 75c; cs., 80c; Sperm, crude, 50@60c; Natural White, 70c; Bleached do, 75c; Whale Oil, cs, 50@55c.

WHITE LEAD.—Per lb., in kegs: 500 lhs. and over at one purchase, per lb., 6c; less than 500 lbs., per lb., 6½c; in 25-lb. tin pails, ¼c per lb. above keg price; in 1 and 5 lb. tin cans, 100 lbs. per case, ½c per lb. above keg price. Dry Lead—In bhls., 1 ton and over, 6c; do. in kegs, 6½c.

BONE ASH.—Extra No. 1, 5@6c per lb. No. 1, 4@5c.

RED LEAD.—500 lbs. and over at one purchase, per lb., 6c; less than 500 lbs., 6½c.

LITHARGE.—Pure, in 25-lb. bags, 8 @9c per lb.

BORAX.—Concentrated, 6@7c per lb powdered, 8@10c; fused, 20@25c.

BORAX.—Crystal, 7c; calcined, 25c.

MANGANESE.—Pure, ℔ lb., 60c.

SODIUM.—Metal, ℔ lb., $1.00.

MOLYBDENUM.—$2 per lb.

CHROMIUM.—(90% and over) per lb., $1.00.

BISMUTH.—Suhnitrate, per lb., $1.75.

MERCURY.—Bichloride, ℔ lb., 90c.

PHOSPHORUS. — (American) ℔ lb., 75c.

SILVER.—Chloride, ℔ oz., 90c@$1.00; nitrate, 55c.

ALUMINUM.—No. 1, 99%, small lots, 37c ℔ lb.; 100 lbs., 35c; 1000 lbs., 34c; ton lots and over, 33c, Pittshurg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

URANIUM.—Oxide, ℔ lb., $3.50.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

THE CALIFORNIA DEBRIS COMMISSION having received applications to mine hy hydraulic process from Middle Yuha Mining Co., in La Mina del Diablo Mine, near Sierra City, Sierra County, Cal., draining into ravine wbich dralns into Middle Yuha River; from South Yuha Mining and Development Co., in Melster Mine, near Emigrant Gap, Placer County, Cal., draining into Diamond Creek which reaches Yuba River; from Toy Kee, in Fairplay Mine, near Scales, Plumas County, Cal., draining into Rock Creek, which reaches Yuba River, gives notice that a meeting will he held at Room 96, Flood Building, San Francisco, Cal., Oct. 12, 1903, at 1:30 P. M.

Commercial Paragraphs.

THE Union Iron Works of San Francisco, Cal., are furnishing a 5-stamp mill to the Cbrystal M Co., Cottage Grove, Or., and a 40-stamp mill to tbe Nortb Star, Grass Valley, Cal.

THE General Metals Co., with offices in the Bowling Green Building, 11 Broadway, New York City, has recently been formed to take over the rights and property of tbe Telluride Reduction Co. of the same address, wbose specialty was the reduction of ores hy the hromide process. Tbe officers of the new company are as follows: C. E. Finney, president; J. H. Hanan, vice-president; H. B. Halgh, treasurer, and A. D. Keep, secretary. Mr. Finney was for years connected witb the American S. & R. Co., and later with the Loomis-Pettibone Gas Machinery Co., and is widely known throughout the mining field. The General Metals Co. expects sbortly to begin the erection of plants in several important mining camps in this country and Mexico.

SITUATIONS WANTED.

ASSAYER AND METALLURGICAL CHEMIST with best of references desires position. Address C. W. L., this office.

ASSAYER, EXPERIENCED IN CYANIDING, desires position. References. Address "Assayer," care of Mining and Scientific Press.

BY EXPERIENCED ALL AROUND MINE SUPERINTENDENT who is also a PRACTICAL UNDERGROUND FOREMAN, and will act as both in a small mine or in either capacity in a large property Expert in timbering and mining large ore bodies and catching up badly caved workings. Can mine from the grass roots to any depth; erect and repair buildings, boilers, mine and mill machinery, and make estimates. *No fancy salary asked.* Have good references. Address "Confidence," care of Mining and Scientific Press.

COPPER SMELTERMAN IS OPEN FOR ENgagement. Experienced blast furnaceman, metallurgist, assayer, sampler, etc. Good references. Address "Furnace," care of this office.

CYANIDER DIRECT FROM THE WAIHI G. M. Co Ltd., N. Z., wants position. Latest cyanide practice Holds certificates, references, etc. Address B. Dawson, Bank of British N. America, San Francisco, Cal.

MINE SUPERINTENDENT WANTS POSITION with a substantial company that has a mill on property. A qualified mining engineer who can run a mine or mill, cyanide plant, assaying and surveying. Address "Mining," this office.

POSITION DESIRED AS DRAUGHTSMAN, Surveyor, Assayer or Bookkeeper. Good references. Address H.W.K., Box 74, Long Beach, Wash.

WANTED BY AN EXPERIENCED MINING Engineer and Manager, a position as mine manager in gold, silver or copper proposition, with a first-class corporation. Have had 25 years' experience in U. S. and Mexico; prefer Mexico. Speak Spanish, German, French and English. Am well acquainted with Mexico, and am employed now. Desire a change between November and January 1st, 1904. Salary expected not less than $5000 per annum Can furnish the best of reference. Address "Mine Mansger," care of Mining and Scientific Press, San Francisco, Cal.

WANTED—POSITION BY A MINE SUPT. OR manager of 20 years' experience in practical mining and milling; past 17 years spent in superintending, managing and examining mines. Profitable handling of low grade ores a specialty. Climate no object. References from first-class companies. Address "Utility," this office.

YOUNG MAN DESIRES POSITION AS MILL Man. Has had six years' practical experience in amalgamating and concentrating, and a fair knowledge of the operation of engines. Will give best of references upon application. Address C. L. B., care this office.

HELP WANTED.

WANTED—A FIRST-CLASS ASSAYER AND Chemist, one with a practical cyanide experience, for position with a company owning its own property and 50-ton mill. Address C. B. L., this office, stating salary wanted, experience and age.

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NOTICE

of Receiver's Sale of the Electric Plant, Apparatus, and Other Property of the Cochiti Gold Mining Company.

Notice is hereby given that the Receiver, by appointment of the District Court of the Second Judicial District of the Territory of New Mexico, for the County of Bernalillo, in that certain cause pending thereln whereln Raymond P. Ripley and others are defendants, will, under and by virtue of an order of said court made August 20, 1903, receive bids for the purchase and sale of all the property of the said Cochiti Gold Mining Company, now in his possession as such receiver. Said property consists of a complete cyanide mill of two hundred and fifty tons capacity, built of structural iron, various other buildings such as stores, boarding house, store house, bunk houses, etc., etc. The machinery consists of dry crushing apparatus, Davis and Allis finishing rolls, twenty steel leaching tanks of two hundred and two hundred and thirty tons capacity; also sixteen thousand dollars worth of mining and mill supplies; office furniture, etc. And also, situated at Madrid, N. M., an electric power plant and structural steel building, one eight hundred horse power engine, one 600 K. W. generator, complete switches etc., etc., for a twenty-thousand-volt transmission, and other property such as is generally used in connection with such a mill run by electricity, including one hundred miles of copper transmission wire.

Also the Albemarle, Pamlico, Huron, Ontario patented mining properties, and the U. M. C. and three-fourths interest in the Red Cloud, containing in all almost one hundred acres and having five thousand feet on the strike of the vein. These mines and the mills are situated at Albemarle, Sandoval County, New Mexico, twenty-four miles from Thornton on the A. T. & S. F. Ry.—the other property at Madrid on said railway.

Bids will be received by the undersigned for the sale of said property, or any part thereof, for sixty days from the date of this notice. For the Madrid power plant property, and the electrical machinery, bids must be itemized, fixing the price to be paid upon each separate article; and, also, separate bids must be submitted for the wire, on account of conflicting interests in the property. The buildings and other property may be removed by purchasers from the premises on which they are located.

A reasonable deposit, certified check or cash, must accompany each bid as a guaranty of good faith and responsibility.

Lists of the property and all other information requested will be furnished upon application to the Receiver. WILLIAM SPENCER,
Receiver.

P. O. Address: Albuquerque, New Mexico.
August 21, 1903.

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ASSESSMENT NOTICES.

LARKIN MINING COMPANY.—LOCATION OF principal place of business, San Francisco, California; location of works, El Dorado County, near Placerville, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 2 st day of September, 1903, an assessment (No. 15) of two and one-half (2½) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 112 Main street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 26th day of October, 1903, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 16th day of November, 1903, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

N. F. REMINGTON, Secretary.

Office—112 Main street, San Francisco, California.

INYO MARBLE COMPANY OF CALIFORNIA.—Location of principal place of business, San Francisco, California; location of works, Inyo, Inyo County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 18th day of August, 1903, an assessment (No. 37) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 30, fifth floor, Mills Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of October, 1903, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 18th day of November, 1903, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES E. ANDERSON, Secretary.

Office—Room 30, fifth floor, Mills Building, San Francisco, California.

WILLIETTA MINING AND MILLING COMPANY.—Location of principal place of business, San Francisco, California; location of works, near Jacksonville, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 19th day of September, 1903, an assessment (No. 7) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 233, Crocker Building, corner Post and Market streets, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 27th day of October, 1903, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on TUESDAY, the 17th day of November, 1903, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. McALLISTER, Secretary.

Office—Room 233, Crocker Building, corner Post and Market streets, San Francisco, California.

☞ Prompt payment is requested.

GOLDEN WEST MINING AND MILLING COMPANY.—Location of general place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of September, 1903, an assessment (No. 1) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 123 California St., Room 423, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 24th day of October, 1903, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 18th day of November, 1903, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHAS. BOVONE, Secretary.

Office—123 California St., Room 423, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING Company.—Location of principal place of business San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 15th day of September, 1903, an assessment (No. 38) of one-half (½) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, Room 31, 214 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 17th day of October, 1903, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 7th day of November, 1903, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

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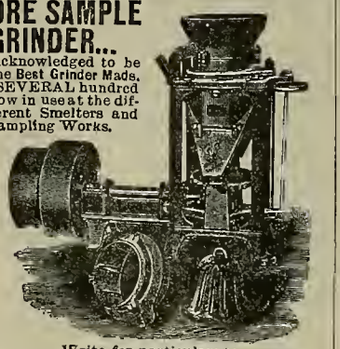
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MINING AND SCIENTIFIC PRESS

Whole No. 2254.—VOLUME LXXXVII. Number 14. SAN FRANCISCO, CAL., SATURDAY, OCTOBER 3, 1903. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Percentage of Extraction in Ore Treatment.

The endeavor of every mill and smelter man is to secure as high a percentage of extraction from the ore he treats as he can possibly obtain economically. In former years the gold saved from, what was considered at that time, free-milling ore, was often not in excess of 60% to 70%, reminders of which are seen in the tailings dumps throughout the mining regions, which have in more recent time been retreated by the cyanide process, yielding usually from 80% to over 90% of the values formerly lost. In smelting much the same thing has occurred. Smelter dumps are not usually worked over, but better results are now obtained in smelting operations because of superior furnaces and advanced methods in ore treatment.

Concentration, which has been a pronounced feature in ore treatment in Europe for many years, has really only lately been given the widespread attention in the United States that its importance deserves, and to concentration is due much of the increased percentage of saving. There has been no very material change in recent years in methods of amalgamation or in the construction of stamp mills, though the arrangement of mills has been improved, their action becoming automatic in the several stages of ore crushing, from rock breaker to concentrators. The mills are also built more substantially in most cases that formerly, but these factors influence the cost of treatment rather than the percentage of values saved.

After amalgamation, whether inside the batteries, or on the outside plates, the object is to save that which escapes amalgamation. The modern mill man is more flexible than formerly. If his values are high after amalgamation he does not hesitate to experiment with a view to making a better saving by some other method. In former years he had fixed ideas concerning almost everything about the mill. He used a given amount of water in the battery, regardless of any change in character of the ore; the stamps were given a stated height of drop and maintained at that whether, according to modern ideas, it was the drop best suited to the ore or not. He employed a high or low discharge and nothing could induce him to change it. Screens were a "hobby" and but one kind was good—the kind he used. The result of these "rule of thumb" arrangements was usually high-grade tailings. And the higher grade the ore the greater was not only the amount but the percentage of loss.

In these days of modern ideas, and practice, thought and careful experiment, the result is very different. Often we find a larger tonnage being crushed than formerly, and the percentage of loss much lower, even in the battery. Concentrating machines have been greatly improved and many devices to secure the highest possible results have been introduced—among them hydraulic sizers, which make the saving of the valuable contents of the ore, usually sulphide minerals of high specific gravity, a matter of easy accomplishment, the machines and auxiliary devices working automatically. Each of these mechanical contrivances, whether a form of Spitzkasten or a concentrating machine, are subject to adjustment, and this feature adapts them to many variations in the ore.

After amalgamation and concentration, although over 80% of the values have been extracted, there still remains in many cases sufficient value to justify additional treatment by cyanidation, and this branch of metallurgy has added largely to the output of the gold mines within recent years. Not only are additional values saved from the ore as it comes from the mills from day to day, but the old tailings dumps, which for many years possessed no available value, have been successfully treated.

In every branch of ore reduction the same constant effort is being made to save a higher and still higher percentage of values; but there is a limit beyond which the mill man can not go with satisfactory economic results. Wherever the cost of securing a higher percentage of extraction exceeds the value of the result obtained, the limit of economy has been reached, and this principle is equally applicable, whether it be in reducing the cost of smelting, of saving the ultimate atom of free gold in the battery, in an attempt to extract a few additional cents per ton by the cyanide process or by any other method.



Derrick Operated by Water Power, Southern Oregon Hydraulic Mine. (See Page 216.)



Hydraulic Mine in Operation.



Pipe Line Crossing Stream, Southern Oregon.

(See Page 216.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

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ANNUAL SUBSCRIPTION.

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J. F. HALLORAN.....Publisher

San Francisco, October 3, 1903.

TABLE OF CONTENTS.

ILLUSTRATIONS: Page.

Derrick Operated by Water Power, Southern Oregon Hydraulic Mine.....213
Hydraulic Mine in Operation.....213
Pipe Line Crossing Stream, Southern Oregon.....213
Section Vandalia Mine, El Dorado County, Cal.....217
Ingersoll-Sergeant Pile Driver.....217
Mining and Metallurgical Patents.....218
Drift Timbering.....219
Oil Fuel Melting Furnace.....221
Automatic Pulp Sampler.....222

EDITORIAL:

The Percentage of Extraction in Ore Treatment.....213
Parsimonious Economy.....214
Mining in Mexico.....214
Cheap Mining and Milling.....214
The Cripple Creek Strike.....214

LATEST MARKET REPORTS.....228

MINING SUMMARY.....223-224-225-226-227

MISCELLANEOUS:

Concentrates.....215
Hydraulic Mining in Southern Oregon.....216
Knocking in Steam Engines.....216
Some Structural Features of the California Gold Belt.....216
Cost of Shaft Sinking on the Rand.....217
Improved Method of Pile Driving.....217
The Metallurgy of the Homestake Ore.....217
Mining and Metallurgical Patents.....218
Drift Timbering.....219
Testing Methods in the Physical Examination of Portland Cements.....220
Some Notes on the Use of Fuel Oil.....221
Copper Production in 1902.....221
Ore Deposits of the Northern Black Hills.....221
An Automatic Pulp Sampler.....222
Prices Paid for Silver-Lead Ores.....222
Personal.....227
Catalogues Received.....228
Commercial Paragraphs.....228
Books Received.....228
Obituary.....228
New Patents.....228
Notices of Recent Patents.....228

Parsimonious Economy.

The policy pursued by some mine superintendents, and often by explicit order of the board of directors, that of keeping the mill running at all hazards, is almost suicidal in an undeveloped mine. The mine being unable to promptly and continuously supply ore to the mill to its full capacity, any attempt to run the mill necessitates a method of operating the mine entirely at variance with the best practice. The mine should be opened systematically in order that the best and most economical methods may be employed. Drifts must be run to determine the extent of the ore bodies; raises must be driven to render the ore bodies easily and cheaply available; ventilation must be provided; chutes built and much other preparatory work done, that the stoping which follows may be carried on as rapidly as possible and at the least cost. This same demand for immediate dividends from ore blocked out, without expending any portion of the money gained from it, in the further development of the mine, usually results in the early closing of the mine upon the ore in sight being exhausted. There are numerous instances of the unfortunate result of this short-sighted policy in almost every mining district. It should be the endeavor of the management to so work and develop the mine that for each ton of ore extracted at least one other should be exposed in the reserves. Of course where no ore exists none can be developed by any amount of dead work, but too often no development is done where it is subsequently shown there was abundance of ore, and the mine is closed in consequence, it remaining for some other manager or superintendent to discover it through the medium of practical methods and a system of exploration which must produce results, good or bad. Economy which is parsimonious and short-sighted is extravagance, and is as much to be censured as any other wasteful use of available funds.

Mining in Mexico.

The production of gold in Mexico has risen with the introduction of American capital. In 1877–78 it was about $746,000, and in 1880–81 had increased to over $1,000,000. From that date up to 1890–91 it ranged between $650,000 and $1,000,000, but in 1892 it began to show a material increase, being that year $1,075,637. Since then a large amount of American capital has gone into Mexico, and the output has increased steadily until the present. In 1901–02 it was reported by the treasury department of the republic to have been $9,932,676. It is thought the output for the year 1902–03 will exceed $11,000,000. The silver production during the same period, 1877 to 1902, has steadily increased from $24,836,903 in 1877–78 to $72,530,983 in the years 1901–02. Statistics for 1903 are not yet available, but in 1902 Mexico imported copper ore and matte to the value of $10,000,000. A decade earlier the importation of copper was less than $100,000. During this period Mexico's shipments into the United States of bar and ingot copper has risen from $84,000 to nearly $3,750,000.

Exports of iron and steel from the United States into Mexico have increased very largely, machinery alone increasing from $1,500,000 in 1892 to over $7,000,000 in 1902.

The mineral resources of Mexico are very extensive, and although her mines have been worked for nearly 400 years, there still remains a large extent of territory almost unknown. The Mexicans have always worked the silver ores successfully, and also the high-grade gold ores, but the large masses of low-grade ores have waited for centuries for the advent of American miners, with modern methods of mining and milling to make them available at a profit. Deep mining, too, has been practically confined to the operations of foreign companies. It is true there are great shafts in Mexico, sunk to a depth of 2000 feet or more by native labor, under the direction of native engineers, but these mines are almost dry. A large inflow of water has always stopped native mining operations, no matter how rich the ore. Small quantities of water they could take care of by bailing, or even packing the water out as they do ore, but beyond a few hundred gallons daily their means of combatting it did not extend. There are many opportunities in Mexico to-day in mining, but it must not be supposed that really good mines are more numerous there than they have been or are still in the mining regions of the United States. There are many poor mines in Mexico, as there are in every other mining region, but capital has been looking in the direction of Mexico for some time past, and a large number of American enterprises are stated to be on a secure and profitable basis in that republic, more so than at any time in the past.

One of the causes which has led to this exodus of capital from the United States to Mexico is the long-continued labor troubles which have disturbed mining investments in the United States. There are neither labor unions nor strikes in Mexico, and it is doubtful if that republic will permit labor organizations to tie up the mining industry as it has done and is doing at present in the United States. Probably the government would take no cognizance of the unionizing of the workmen, nor would it endeavor to prevent the miners when organized from quitting work singly or in a body, but the test would come when the strikers undertook to prevent others from working. All are familiar with the summary punishment of offenders against the government in that country, and it is not likely that belligerent strikers would succeed in carrying out their plans in Mexico without a conflict with the government, and that would mean defeat.

Cheap Mining and Milling.

The annual report of the Consolidated Mercur Gold Mines Co. of Salt Lake City, Utah, for the fiscal year ended June 30, 1903, shows that satisfactory progress has been made in reducing the cost of the treatment of their ore. A slimes plant is being installed, and the cost of ore treatment, which was reduced from $3.50 during the previous year to $2.88, will probably be still further reduced. The new process will also be employed in the treatment of the old tailings dumps. During the year 346,359 tons of ore were treated at a cost for mining and milling of $2.88 per ton; the expense of mining being $1.30 per ton and of milling $1.58, showing that as cheap mining and milling can be accomplished in Utah as in some other States where costs are generally believed to have reached a bedrock figure. In one of the company's mills 55,099 tons of tailings were treated by cyanidation for 49 cents per ton, which is also a low cost for this method of treatment. The cost at the large plant of the Homestake at Lead City, S. D., where about 1200 tons are treated daily, is stated to be $0 353. The costs in the large plants of the Rand, South Africa, range from $0 55 to $0.72 per ton.

The Cripple Creek Strike.

While the Cripple Creek, Colo., region is not under martial law, the military authorities have found it necessary to handle the strike situation there in a vigorous manner, owing to the apparent apathy of the civil authorities in that district. Many have objected strenuously to Governor Peabody's sending the militia to Cripple Creek, claiming that there was no disorder there, and consequently no necessity for troops. It is true there had been but small show of violence in the district prior to the arrival of the militia, and but little since.

The mine operators were anxious to continue work in the mines, as many of them would sustain great loss individually, and nearly the entire district would be seriously damaged if the water were permitted to raise in the workings. Anticipating by past experience the result of any attempt on their part to resume work in any of the mines where the union men had been called out, by filling the places of the strikers with non-union miners, the mine operators called upon the chief executive of the State for the protection they had reason to believe would be denied by the civil authorities. Under military protection non-union men from the Cripple Creek district, Minnesota iron districts, from Joplin, Mo., and from other places are now at work to the number of nearly 1000.

The radical and arbitrary methods of the Western Federation are not at all in favor with the mine owners and operators of Cripple Creek district, and notice has been issued that hereafter no Western Federation man can find employment in any of the mines where they have called out their men. In line with this sentiment and action, the Gold Coin Co., employing 260 Western Federation men, on the 30th ult. notified the miners that they must leave the Western Federation. A strike was immediately called, all of the men promptly responding. There appears to be no good reason for the present strike in Cripple Creek district. The mines were paying the wages, and working the hours demanded by the Western Federation of Miners. The trouble began several weeks ago when the mill men at Colorado City struck. As the Cripple Creek mines were sending ore to these mills, the miners undertook to support the cause of the striking mill men by declaring a strike at all of the mines shipping ore to the mills at Colorado City. The strike for some weeks was effective, but gradually the operators have been able to secure a force sufficient to keep the mines clear of water, and a large tonnage of ore is going out daily.

In this strike, as in most others, the minority is dominant. A large percentage of members of the union do not favor the strike, but loyalty to their organization causes them to accept the ultimatum, and join the minority. It is said that many of the miners out on strike actually do not know why the strike was called, but supposing it to be for the "good of the cause," blindly follow their leaders. The ultimate outcome of this strike is already in sight; the Western Federation will lose, not only the strike but also opportunity to work in Cripple Creek district again. Many of the men as individuals may possibly be taken back, but only after they have forsaken the banners of the Western Federation.

In Arizona, California and southern Nevada the strike situation is practically unchanged. Many mines are still idle owing to these difficulties, and a few which had been closed down are again in operation with non-union men. The most prominent of these is the Yellow Aster mine, near Randsburg, Cal., where about 200 non-union men have been brought in by the management.

CONCENTRATES.

CHLORIDE OF GOLD is wholly an artificial product and so far as known does not exist in nature.

THE green scaly mineral on the rock from Columbia, Cal., is neither nickel nor copper, but a variety of chrome mica.

IT REQUIRES about sixteen sacks of ordinary size of clean iron sulphurets to weigh one ton. This will vary with the amount of moisture present.

THE suction hose of mine pumps are wound with strong steel flat wire to prevent collapse of the hose by reason of atmospheric pressure when the pump is in operation.

BOTH band and post brakes are efficient on hoisting engines, but most engineers prefer the post brake. Brakes of this type are found on nearly all large hoisting engines.

OIL concentration is being practiced at a number of localities, but all of these plants are not working by the same process, as there are several processes which claim to be efficient.

MANY copper mines of value show little or no trace of copper in the surface outcrop. Some of the largest iron gossans under which lie great masses of copper ore show no copper at the surface.

THE white lime-like mineral from Borate, Cal., is a silicate of alumina (clay) with some lime and magnesia, and a small amount of iron. It also contains sodium chloride; no borax mineral.

HOISTING ROPES should be kept well lubricated, and occasionally cleaned and carefully examined to see that the rope is in good condition. Crude petroleum has been used with satisfactory results at some California mines.

THE pump rod of a jackhead or Cornish pump may be made to operate in a shaft where the angle of inclination changes, if the angle be not too great, but an angle not too sharp for skips to travel will probably not be found too great for angle pump rods.

THE exhaust of a steam mine pump need not be carried to the surface. It can be condensed in the suction hose. The open exhaust of steam into mine workings where there are timbers is detrimental to the timbers, causing them to rot quickly. Poorly ventilated workings also cause timbers to rot quickly.

A CROSSHEAD is useful in shaft sinking where a bucket is used in hoisting. It keeps the bucket from swinging and makes it possible to run more rapidly than would be safe without its use. The crosshead should be at least twice as long as its width between the guides, to prevent becoming jammed in a shaft.

THE chemical symbol for potassium cyanide is KCN, or KCy. Potassium cyanide is prepared by fusing in an iron crucible a mixture of eight parts dry potassium ferro-cyanide with three parts dry potassium carbonate. When the evolution of carbon dioxide ceases the fused mixture is poured into an iron mould. This produces the commercial cyanide of potassium.

SILVER-LEAD ores are those in which lead, either as galena or carbonate of lead, are an important constituent, together with silver values. These ores often also contain iron and zinc and sometimes copper. In many instances the zinc content increases with depth, replacing the lead, and the copper values often disappear to a greater or less extent, iron sulphide taking its place.

ORES are not being commercially reduced by electricity so far as Concentrates knows, though mineral substances not recognized, popularly speaking, as ores, are treated in electric furnaces, and various substances manufactured. Among these are the metal aluminum and the abrasive mineral carborundum. The cost of producing power in San Francisco, Cal., in large plants has been estimated at $20 per year per horse power.

ORES of copper contain as high as 82% metallic copper —this being cuprite, the red oxide, but copper ores representing the run of mine—not selected, seldom exceed an average of 25%, and in fact rarely reach it in large amount. There are more copper mines working on ore running less than 10% copper than there are over it. Some copper mines are profitably worked on a very low percentage of metal owing to favorable conditions for mining and reduction of the ores.

THE small pebbles from Greaterville, Arizona, are of two kinds. The black, hard pebbles are iron ore, and probably of no value where found. The others consist of galena with sulphate and carbonate of lead, and, if they can be saved separately, probably constitute a valuable ore. The lead ore is of higher specific gravity than the iron ore, and should be separated without difficulty. Possibly the two kinds of ore may be shipped together at a profit, as the iron would make a valuable flux for smelters. If there is enough of this material obtained in sluicing, samples should be sent to smelters with inquiry as to what they will pay for the ore in quantity.

IT is more expensive to stope and handle ore in a vein having a dip of less than 35° than in one where the dip is 40° or over, for the reason that the rock will not run by gravity on a rock slope of less than 35°, and much shoveling becomes necessary. In such a mine it is economy to drive the levels rather closer than in a steep vein. In some veins of high angle of dip, the levels are run 150 to 200 feet apart. In a flat vein, such as above referred to, the levels should not be over 60 to 75 feet apart.

A DIRECT-ACTING hoisting engine, sometimes called first-motion hoist, is one in which the piston rod is connected directly with the main shaft of the hoisting reel, by means of a crank. In a machine of this type each stroke and return of the piston makes one complete revolution of the hoisting reel. Other types of steam hoist are those run by gearing, and those operated by means of friction wheels. Water hoists are either geared or of the friction type. Hoisting reels are not driven by belts.

THE open-sight compass is an instrument by means of which fairly accurate land surveying may be done by any one who has the necessary experience in this work. The magnetic needle is of little use under ground, owing to the numerous objects, natural and artificial, which deflect the needle. In view of this all underground surveying is done by means of the plate and vernier, the magnetic needle being employed occasionally as a check, though for the reasons above stated it is not reliable even for that purpose.

WHEN steam is turned into a pipe line containing water, the temperature of which is lower than that of steam, some of the steam may be condensed, forming a partial vacuum. This causes the water to be forced violently in the direction of the reduced pressure, and a loud hammering of the pipe (water hammer) is heard. This may proceed to such an extent as to do material damage to the line. To prevent water hammer the steam line should be well drained, and when the steam is turned off the engineer should see that the vents are open, that no water may condense and accumulate in the pipes.

THE telluride contents of ores are not easily concentrated by any simple process of hydraulic classification. However, after crushing the ore and passing it over belt or table concentrators, it should be run through spitzkasten (hydraulic classifiers) and the separate products retreated on special belt machines. The tailings might then be run over carefully constructed canvas tables. But with all of these precautions the loss is considerable. Telluride ores are generally rich enough to be shipped at a profit, or treated by some modification of the cyanide process.

WHERE two shafts on a mine are nearly at the same level at the surface, natural ventilation is likely to be unsatisfactory. It may be improved by building over one of the compartments of a shaft an air-tight structure extending upward 30 feet or more. The condition can be still further improved if the compartments of the shafts be bratticed—made air tight. In some mines the direction of the air currents change with the seasons, an upcast shaft during the summer becoming a downcast during the winter season. In some instances the direction of air currents have been known to change daily, being a different direction during the day from that at night.

NATURAL SAND weighs more per given volume than sifted sand from the same material, because in natural sand the grains vary in size, and the smaller grains fill the interstitial spaces between the larger grains. To find the percentage of voids in sand or other fine material, take a graduated glass cylinder and pour into it 100 measures of sand. Pour this into another vessel, and in its place pour 60 measures of water. Then slowly pour into the water the 100 measures of sand. It will be noticed that the sand now only occupies 94 measures, having lost 6% by more compactly settling, but the surface of the water will have risen to about 121 measures: Of this 121 — 94 = 27 measures of water will be above the top of the sand, which leaves 60 — 27 = 33 measures of filling the voids in 94 measures of wet sand, or 0 351 of the wet mass, or practically 35%.

IT HAS been stated repeatedly herein that gold nuggets do not "grow," regardless of the numerous "theories" to the contrary. There is no rational evidence to lead to the belief that a mass of gold once included in the loose material of a gulch, which represents the breaking down or disintegration of the neighboring hillsides, ever accumulates a single atom of gold to itself, or increases in any manner, either in weight or bulk. The oft repeated story that gold nuggets contain a little grain of sand or iron oxide as a nucleus, about which the nugget has been built up, is a myth. Gold is derived from veins or deposits in solid rock in place, and from the moment of its exposure to the powers of disintegration and erosion it begins to grow smaller in size and weight, and as gold in its original state in the rocks is universally rough, with sharp edges, or a generally ragged appearance; when a nugget is found smooth and rounded by the attrition of the rocks with which it has been associated in the stream bed, it is safe to say that such a nugget has lost a large portion of its original weight and size by the process. The theory that gold nuggets grow in placer or alluvial deposits of any kind is not susceptible of direct proof.

NO ARBITRARY FIGURES as to the relative cost of milling and smelting ores can be given, as the factors which influence both smelting and milling operations are so variable. Moreover, ore which is adapted to milling is often unsuited to smelting without the admixture of other ores, and smelting ore is seldom amenable to milling. In California, under favorable conditions, milling is accomplished at less than 50 cents per ton. This contemplates large capacity per stamp, a free milling ore and free water power. Smelting under favorable conditions has been accomplished at a cost of $1.35 per ton in British Columbia. While this shows that milling is less expensive than smelting, it is probable that the smelting ore yielded over 90% of its value by smelting, but that an attempt to mill it would result in greater percentage of loss with also a greatly increased cost over the figures given by reason of reduced capacity per stamp and the necessity for concentration.

WHEN the government issues a patent to a mining claim that patent secures to the holder of the claim the exclusive right to all veins apexing within his territory as defined by the lines of his claim. The question of extra-lateral right, however, has been a subject of litigation, and has not been positively determined by the United States Supreme Court. The question arose over priority of location as between a mining and an adjoining agricultural patent. Under the laws of 1866 the end lines of a mining claim need not of necessity be parallel, and claims located under that law where the end lines were not parallel have not been denied the privilege of taking the extralateral right, even though the diverging lines were in the direction of the dip of the vein, consequently giving to the claim owner an increasingly greater length of the vein with increasing depth. No precedent has as yet been established by the United States Supreme Court regarding the matter. As to claims having parallel end lines, whether located under the laws of 1866 or those of 1872, the claim owner has the extralateral right.

SADDLE REEFS are a form of vein or ore deposit occurring in the Bendigo region of Australia. In this form of deposit the quartz veins or lenses conform to the inclosing rocks and are contorted and folded with them, which has led some geologists to believe that the veins were formed prior to the tortion of the strata. Somewhat similar occurrences elsewhere, however, where the schists or slates have been silicified and contain gold and auriferous pyrite, do not lead to the belief that this mineralization was prior to the folding of the inclosing rocks, but subsequent to it. The form of the saddle reefs suggests that the folding of the strata produced open spaces, or, at any rate, zones of dis-cission in which the quartz masses were subsequently deposited by substitution in part for the original material of the rock and partly by deposition in open spaces. Veins in slate are not uncommon where little or no flexure has occurred, and these veins often show perfectly the structure of the original slates. It is quite possible that were a formation containing such veins subjected to folding, the veins would be found with much the same appearance as they now have, except for the curving dip due to folding. It is said that some of the veins of the Nova Scotia gold fields are also saddle reefs.

OFTEN in locating a claim, the prospector, having neither chain, tape nor other means of measuring the lines of his claim with even approximate accuracy, "steps off" the distances and locates accordingly. It rarely occurs that he appropriates too little, the reverse being usually the case. The courts have held that such a location, where made without injury to others at the time it is made, is only voidable as to the excess claimed, and not as to the whole claim. Upon application for patent, the monuments may be changed and the lines drawn in to cast off the excess. An excessive location can not be said to be a fraud upon others, as it can not take away rights already acquired by prior appropriation. Subsequent locators may measure the ground from the initial point of the excessive location—the discovery stake or monument—and this notice generally specifies the number of feet the locator claims in either direction along the lode; but where it does not, the locator can only claim 750 feet along the vein on each side of his discovery notice. Consequently, in the event of an excessive location having been made, and the locator having neglected to state in his discovery notice the number of feet he claims on each side of his discovery stake, he may hold 750 feet on one side of the stake; but should he have less than 750 feet on the opposite side, where a subsequent location has been made abutting upon his claim, he will be unable to secure his full 1500 feet, as he can not encroach upon the newer locator. On the other end of the claim he will lose all in excess of 750 feet. In the absence of State or local law requiring a preliminary notice of location, a locator may claim an area so greatly in excess of the statutory location as to indicate bad faith. There then being no guide to the subsequent locator, the entire claim may be held as useless for any purpose and wholly void. (Ledoux vs. Forester, 94 Fed., 600.) A 1500-foot claim can not be shifted from one end of a 2000 foot claim to the other to take in a discovery subsequently made by another within the excess end of the 2000-foot claim.

Hydraulic Mining in Southern Oregon.*

Written for the MINING AND SCIENTIFIC PRESS by DENNIS H. STOVALL, B S.

The little county of Josephine alone, in southern Oregon, contains nearly 100 hydraulic placer mines—placers they are that are husy from three to nine months in the year. Probably there is no other section of like area the world over that can claim such an acreage of placer ground. The story of the origin of this hig placer field is an interesting one, notwithstanding the fact of its heing geological in tone. A long time ago, before this part of old earth was torn upside down and made over again, there flowed northward from what is now Siskiyou county, Cal., a great river. This mighty stream was from ½ mile to 1 mile in width, and its ancient hed can he traced to-day from the Oregon–California line northward through the Waldo, Illinois, Galice, Grave and Cow Creek districts, disappearing entirely near Glendale, where the mountains of Cow Creek canyon have huried it from view. The formation of new mountains, rivers and streams have uncovered portions of the ancient stream's hed; at others they have buried it deep heneath towering crags and mountain peaks. But it is the auriferous filling, the conglomerate mass of gravel, clay and decomposed matter of this ancient river that makes the diggings of the placer mines of southern Oregon to-day. Streams and rivers cutting across this old channel have scattered the gold for miles and formed the smaller later channels along these waterways and gulches. A numher of the largest of the southern Oregon placer mines are located directly on this ancient channel, among them heing the Old Channel and Galice Creek hydraulic mines of Galice creek; the Deep Gravel, Simmons, Osgood and Wilson-Meredith of Waldo district, and the Columhia, Lewis and others of Grave Creek district. On the rocks and houlders of these diggings are found imprinted the forms of fishes and strange creatures that inhahited the waters of the ancient rivers in the long ago.

How this old channel came to be filled from rim to rim, heaped up in many places with an auriferous filling, is something the writer can not explain; as a matter of fact, the practical miner gives hut little time to a study of it, hut uses his "thinker" to the all-important matter of securing hetter and more economical methods of getting and saving the gold. The hanks in this old channel lie from 10 to 230 feet deep on the hedrock. The greatest hank throughout its whole extent is that being worked hy the Old Channel Mining Co. in the Galice district. This gravel hank has a height of 235 feet, and is heing operated upon at the present time by a hattery of two giants, working under a gravity pressure of 500 feet. To he safe, the piper is ohliged to play his giant on this bank from a distance of 450 feet. The great streams gnaw at the foot of the towering pile, and the gravel falls off in slahs of 10,000 tons. The dirt of this old channel yields easily to the giants, and there is a comparative ahsence of hig boulders.

All of the ground in this old channel carries gold. First, there is the coarse gold found with the boulders and the lower stratum next the hedrock. Ahove this is the stratum known as "pipe clay" hy the placer miners; and still ahove this is the capping of red clay, carrying its values in fine or flour gold, a large per cent of which is saved hy a system of undercurrents. This is a steel screen arrangement in the bottom of sluices through which the hlack sand and finer particles are drawn off and spread out over a hroad riffle tahle. This enahles the miner to catch hoth the flour gold and the platinum, which in late years has heen found to be a very valuahle part of the black sand of these diggings, but which in years past was thrown away as valueless.

In recent years there has been a general combination of minor or smaller placer holdings in southern Oregon into large properties under control of one management. It is found better for all concerned to combine the water rights and facilities, as one claim of twenty acres does not in many instances make sufficient territory to warrant the expenditure of a great sum in the construction of large ditches and of a length necessary to tap the main water course far enough up to give an elevation of 100 feet ahove the ground to he worked; and a pressure of less than 175 feet is not of high efficiency in working placer ground by hydraulicking. There are streams in southern Oregon on which placer bars and channels are located that have sufficient fall to allow a pressure of 275 feet with 1 mile of ditch hy running the ditch with a grade of 1 inch to the rod; but these favorahle conditions seldom prevail, and to get such a fall a ditch from 5 to 20 miles in length is necessary. There are a numher of ditches in southern Oregon of from 20 to 35 miles in length, constructed at great cost around the steep and rocky mountain sides, flumed across gulches and tunneled through solid rock. It is this feature of placer mining in southern Oregon that the miner must first consider, for it is the hig feature of the husiness. Where will I get my water supply; how many miles of ditch will it require to bring it to my ground; how much will it cost, and how much pressure will I have when I get it there? Ditches here have cost all the way from $2000 to $60,000; but, once built, they are there to stay, as slides and hreaks do not figure so materially in the running expense of a ditch in this country.

Another feature that figures prominently in the business of placer mining in southern Oregon, as in all other placer regions, is that of dumping grounds for the tailings. Fortunately, there are no laws in Oregon that prevent the miner from dumping his tailings into Rogue river or any of its trihutaries, and it is on these that all of the placer mines are located. It only remains for him to have plenty of fall from the end of his sluices to the river, stream or gulch helow. The greater part of this old channel in question lies far up on the mountain tops, or at sufficient elevation to allow the miner ample dump for mountains of tailings and refuse. At the Old Channel mines there is a sheer fall of nearly 500 feet from the end of the sluice to the hottom of the canyon helow. Yet there is much rich ground lying along gulches and streams that has not sufficient slope to carry away the tailings. For a long time this ground lay untouched. Then the "grizzly" and the "hydraulic elevator" were introduced and the way was easy. By these machines the tailings, houlders and refuse are lifted to a height of 35 and 40 feet, thus giving dump enough to last for a numher of years without the elevator being moved.

Taken all in all, placer mining in southern Oregon is a very conservative husiness—much more so, in fact, than quartz mining generally in this or any other country, for the reason that the placer miner has all of the elements of his business in sight, and he can compute heforehand just what it will cost to equip his property, how much it will require to operate it and how much he will realize, as the ground to he worked can he thoroughly tested and prospected before a shovel of dirt is moved for mining purposes. Mines here clean up from $2000 to $100,000 annually, depending upon the richness and amount of ground worked. It costs from 2 to 5 cents per yard to work the ground—ground that produces from 8 to 20 cents per yard, leaving a good margin of profit. Gravel that averages 20 cents per yard will pay the miner his money hack in two years with interest; if the ground pays 30 cents, it is considered a honanza. The average ground of the southern Oregon old channels runs from 6 to 8 cents a yard. Ground of this worth, where there is a water supply of 2000 inches for eight months in the year and good dumping grounds, forms the elements for the making of a paying placer mine—and it can he truthfully stated that there is much of this ground in the old channel placer fields of the southern Oregon districts.

*See illustrations front page.

Knocking in Steam Engines.

The most frequent causes of knocking in steam engines, writes D. B. Nixon to the American Manufacturer, are lost motion in the cross head, wrist and crank pin hoxes, looseness in the pillow hlock or main hearing hoxes, looseness of the piston rod or follower plate, the crank pin or crank shaft being out of line with the cylinder, or the wrist pin, crank pin, or main hearing journal being worn oval; the slide valve having too much lead or not enough; the exhaust opening heing too soon or too late; the valves heing hadly proportioned, or the exhaust passage outside of the cylinder heing contracted. Other causes are shoulders heing worn in each end of the cylinder, in consequence of piston packing rings not traveling over the counter hore at each end of the stroke; or shoulder heing worn on the guides, resulting from the cross head shoes not overlapping them when the crank is on the dead center; the piston not having sufficient clearance at either end of the cylinder, in consequence of its heing altered by taking up the lost motion in the hoxes; there not being sufficient draught in the keys to take up the lost motion in the connecting rod boxes; the packing heing screwed too tight round the piston rod, excessive cushioning, resulting from the leaky condition of the piston, which allows the steam to occupy the space between the cylinder and piston head, as the crank approaches its dead center therehy subjecting the engine to an enormous strain, as at this part of the stroke the flywheel is traveling very fast and the piston moving very slowly; lost motion in the connection by which the slide valve is attached to the rod. Engines out of line frequently knock sideways at the half stroke, but most generally at the outward and inward upper or lower dead center, as these are the points that the greatest strain is thrown on the bearings in consequence of the direction of the connecting rod having to be reversed.

The foregoing causes of knocking in engines constitute the principal ones. Knocks arising from lost motion in any of the revolving, reciprocating or vibrating parts of an engine may be located by placing the fingers on the part, while the cross head is heing moved hack and forth on the guides hy the starting har, but knocks induced hy the valve opening or closing too soon, by the contraction of the exhaust, or hy the valves heing improperly set, are the most difficult to discover, as they are different from those induced by lost motion, the sound heing a dull, heavy thud in many instances, causing the engines, huilding, and even the foundation to vibrate at each stroke. While an intelligent and careful search will in most cases result in successfully locating the knock, some will for a time haffle the most expert engineer. There are instances where the indicator has heen applied in order to determine the precise location of the knock or thud.

Some Structural Features of the California Gold Belt.

NUMBER VII.

Written for the MINING AND SCIENTIFIC PRESS by W. H. STORMS.

The line of that portion of the central gold helt of California, known as the mother lode, extending northward 5 miles from the village of Plymouth, is marked hy the canyon of Indian creek to the El Dorado county line, and northward, in El Dorado county for a farther distance of 10 miles by the canyon of the north fork of the Cosumnes river and a trihutary from the northward, as far as the German mine. This is a condition frequently ohservahle along the line of the lode in other counties. The great system of fissures occurring in the slates, which are naturally softer than the accompanying greenstones, has rendered their erosion more rapid, and the canyons are the natural physical result. The structural peculiarities of the lode generally have a marked influence on the topography of the region through which it passes. Huge outcroppings of quartz, though sometimes seen in the valleys, more frequently form prominent landmarks on the summits of the hills. Noted instances are found in Mount Ophir, the Virginia, Mary Harrison and Louisa mines, south of Coulterville, and the Pinon Blanco, 3 miles north of Coulterville, and the McAlpine hill in Mariposa county; the Eagle–Shawmut outcrop near Jacksonville; Golden Rule hill and Quartz mountain, and the heavy outcrop north from Whisky Hill to Table mountain, near Jamestown, in Tuolumne county; Carson hill in Calaveras county, and the great outcrops hetween Amador City and Plymouth, in Amador county.

The mines along the lode from south line of El Dorado county are opened on a series of outcrops, some of them of large size. The geology of the veins is comparatively simple, and as far as known have no unusual structural features.

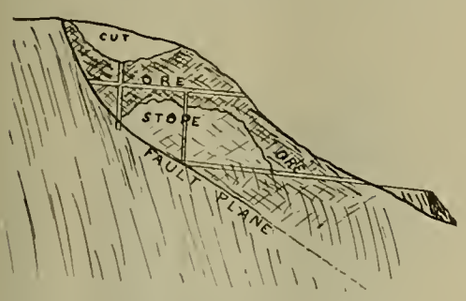
The German mine, ahout half way between Nashville and Mud Springs, is more interesting than some of the others of the vicinity, owing to the intrusion of granitic dikes in the lode. The rock formation in the vicinity of the German mine consists of the hlack clay slates, amphiholite schist and massive diahase tuffs and hreccias. The gold-hearing veins of the German mine are found partly in the slaty diahase tuffs, hlack in color and greatly resembling the clay slates. The latter are found both to the eastward and westward, hut as far as observed do not come into direct contact with the vein itself. The most interesting occurrence, however, is the intrusion of dike rocks of acid type into the ore-bearing zone. The dike rocks vary from a fine-grained quartz porphyry to a rather coarse-grained granite. The indications are that the several dikes were intruded at different times.

Although much later than the diahase of the vicinity, and also later than the gold-hearing veins, these granitic dike rocks have been crushed and sheared and suhjected to great alteration. In width they range from a few feet to more than 100 feet. In some instances zones of fracture are found, with the infiltration of much silica and the deposition of gold and pyrite, but as far as known none of these occurrences were rich enough to constitute a payable ore. The granitic intrusions sometimes assume unusual shapes. One instance was noted where a large mass had heen injected from the southward into the slates, and where exposed had somewhat the form of a segment of an inverted cone. Following around this was a gold-hearing quartz vein several feet in width. The concentric structure of the interior of the dike suggests that the dike was folded in the slates by subsequent movement, together with the accompanying vein.

Northward from the German mine granitic rocks become more and more abundant until they predominate in the region between Mud Springs and Placerville. These rocks are not, strictly speaking, granite, hut a rock of the granitic series, the presence of plagioclase in nearly all of them in greater or less amount giving to them a wide range from diorite to granite, and in some localities augite is ahundant and the rock inclines toward diabase. In these rocks near Logtown, ahout 2 miles northwest of the German mine, are found numerous veins of gold-bearing quartz. In some instances these occurrences are rather an impregnation of silica and other minerals, with pyrite and gold, than veins. Most of these zones, however, contain as an accompaniment what may be considered veins. In the

Minnehaha mine, which is a fair representative of the type of vein formation found here, the vein dips at about 10° below the horizon. There is no distinct line of demarkation between vein and wall—the silicification gradually disappearing, and with it the gold. In the porphyry near the vein were noticed a great number of veinlets of quartz leading toward the central zone. Some of these were found to be gold bearing.

Another type of vein unusual in this part of California is found at the Oro Fino, or Big Canyon mine, 5 miles south of Shingle Springs, in El Dorado county. This consists of a zone of fractured diabase, which has been impregnated and cemented by silica, forming a mass of dense and



Section Vandalia Mine, El Dorado County, Cal.

extremely hard breccia. It carries pyrite and gold. The pyrite is very finely disseminated throughout the mass, which is about 40 feet in width. Veinlets of calcite traverse the rock in every direction. The walls, both foot and hanging, are diabase, but little altered. In fact, the transition from ore to waste rock is often so gradual that only by sampling could the miners distinguish between them, there being no line of demarkation. About one-third of the values in the ore were stated to be free, and subject to amalgamation, the remainder being associated with the pyrite which was concentrated on belt machines and the sulphides treated by chlorination.

About ½ mile north of the Oro Fino mine is the Vandalia mine. Here the ore deposits occur in a siliceous rock having a schistose structure. It may have been either an intruded dike rock or possibly a sedimentary (quartzite), but it is found so greatly metamorphosed that the question of its origin is difficult of determination without making a microscopic examination, and this the writer did not do. However, the structural peculiarities incline to the belief that it is an altered felsite, or other similar intrusive rock. The ore shoots are extensive, but do not conform to the strike and dip of the schistose structure of the zone within which they occur. The schist is heavily impregnated with auriferous iron sulphide, which near the surface is oxidized, forming an iron gossan. The gold in the rock is extremely fine and difficult to amalgamate. In recent years the ore has been successfully treated by the cyanide process. The workings are extensive and the mine is opened through four tunnels—two on each of two levels. In the course of development a fault plane was encountered dipping from the west, which has cut off the ore bodies, and exploration on the under side of the fault has thus far failed to rediscover them. This fault plane has a dip to the eastward, being steeper near the surface than in depth, and it also has a curving strike. It is an unusual geological occurrence in the gold belt of California, and in this instance it is not impossible that the ore deposition may have occurred subsequent to the fault.

(TO BE CONTINUED.)

Cost of Shaft Sinking on the Rand.

The following detailed statement of sinking 858 feet of an inclined shaft at the Kleinfontein's new shaft is from the London Mining Journal, and shows that, although sunk largely with native labor, the cost does not vary so greatly from that of this class of work in the United States under conditions nearly similar, as concerns the hardness of rock, etc.; but, as no shaft has been sunk in a metal mine in the United States at a rate equaling that on the Rand, this slight difference in cost is the more notable. There are numerous instances in America where the cost of shaft sinking has been greatly in excess of $65 per foot, by reason of the great hardness of the rock or increased cost due to the large volume of water. It is not always the hard rock shaft that is the most expensive, however.

The shaft in question is 21 feet by 6 feet in the clear, and during the months of January, February, March, April and May of this year a progress of 858 feet was made. During the last month of working a total footage of 213 feet 6 inches was performed, and this we think constitutes a world's record for sinking a shaft of this size. The average monthly footage for the five months was 171.6 feet.

The statement gives details of all costs in connection with the work, which was carried out in the usual way on the Rand, viz., drilling machines and skilled work attended to by Europeans and all the manual work performed by natives.

Cost of sinking East shaft, from January 1, 1903, to May 31, 1903. Total footage sunk in that period, 858 feet. In May, 1903, 213 feet 6 inches were sunk. Cost, £11,836 19s 5d:

		Cost per Foot Sunk.
White wages	£3,292 16 0	£3 16 9
Salaries	276 8 5	0 6 5
Native wages	1,190 4 8	1 7 9
Compound	616 11 3	0 14 5
Workshops	108 13 2	0 2 6½
Steaming station	1,353 3 3	1 11 6
Rock drills	2 620 1 2	3 1 1
Surveying	40 10 11	0 0 11¾
Transport	13 10 0	0 0 3¾
Traveling expenses	3 0 0	0 0 1

STORES.

Description.	Quantity.	Value.					
Candles, boxes	207.2	£135	3	4	£0	3	1
Detonators, boxes	86	16	15	4	0	0	4¾
Fuse, coils	2,475	42	3	6	0	1	0
Gelatine, cases	418	1,463	0	0	3	14	1½
Iron bars, etc., lbs.	696	7	0	8	0	0	2
Steel bars, lbs.	2,528	45	1	9	0	1	0¾
Rails, lbs.	65,445	325	6	0	0	7	6½
Sleepers	259	18	1	7	0	0	5
Bolts and nuts	1,263	18	6	0	0	0	5
Dog spikes	563	7	2	4	0	0	2
Fish plates	3,011	35	19	4	0	0	10½
Nails, assorted, lbs.	432	4	15	10	0	0	1½
Coach screws	82	1	6	8	0	0	0½
Oils, Grease	....	7	2	4	0	0	2
Piping, feet	270	21	7	6	0	0	6
Tools	....	11	6	8	0	0	3¼
Timber, assorted, cu. feet	1,404	71	16	0	0	1	8
Sundries	....	89	5	9	0	2	1

Cost per foot sunk, £13 15s 11 04d. Total value, £11,836 19s 5d.

144 rounds were worked, during which 4032 holes were bored, equal to a total depth of 28 963 feet 2 4 inches, or an average depth per hole of 7 feet 2.2 inches.

Improved Method of Pile Driving.

The adaptability of rock drilling and air compressing machinery to various forms of mining is illustrated in a variety of economic instances, but the wide range of such engineering work is not so universally noted. Herewith is presented an instance wherein is in operation a method of using an Ingersoll-Sergeant pile driver. The work of driving sheet piles, especially where two or three courses are necessary, entails much difficulty, and the device illustrated is designed to do away with much of the



Ingersoll-Sergeant Pile Driver.

cost, annoyance and delay. The machine has some resemblance to the new Ingersoll rock drill, there being a striking anvil added, and can be worked with light or heavy blow, at any desired speed, with either compressed air or steam, and by means of the lifting staple at the upper end can be quickly changed from pile to pile.

One of these machines will do the work of fifteen to twenty men and takes but two men to operate it. In the one shown herewith the cylinder diameter is 4 inches; length over all, 5 feet 6 inches; size of jaw, 6 inches long, 2½ inches wide; clearance necessary, 3¾ inches. The machine is made and supplied by the Ingersoll-Sergeant Drill Co., 26 Cortlandt street, New York City.

The Metallurgy of the Homestake Ore.*

Written by C. W. MERRILL, B. S.

The Homestake M. Co. has acquired through consolidation the ground and equipment of the Father De Smet Con. G. M. Co., the Deadwood-Terra M. Co., the Caledonia G. M. Co. and the Highland M. Co., at and near Lead, Lawrence county, S. D., in the northern portion of the Black Hills. The company owns or controls 250 claims, comprising 2616 acres, and covering about 8000 feet along the strike of the lode.

At the surface there are several veins, of which three have united in depth, where the main vein ranges from 300 to 500 feet in width. The 1100-foot level is the lowest at present. The rock of both walls is, so far as known at present, carbonaceous slate, and the country is penetrated by a system of porphyry dikes, and in some places capped with porphyry.

The output of the company uo to January, 1903, has been, approximately, $70,000,000.

THE ORE.—The oxidized, open-cut ore is nearly all treated in the three mills on the northern part of the property, which are as follows: The Mineral Point (formerly the De Smet), of 100 stamps; the Monroe (formerly Caledonia), of 100 stamps, and the Pocahontas (formerly the Deadwood-Terra), of 160 stamps. A cyanide plant, to treat the leachable portion of the tailings from these North End mills, has recently been installed and put into operation at Gayville, or Blacktail, as it is now known.

The Homestake lower level ore, which comprises the greater part of that being milled at Lead, may be described as a hornblende, garnetiferous schist or slate, which has been crushed and infiltrated with free silica and pyrites, the latter being about 7% or 8% of the ore, and comprising pyrite, pyrrhotite and traces only of chalcopyrite and arsenopyrite.

The standards used in this discussion are: The United States gold dollar, the United States short ton of 2000 pounds avoirdupois, and the value of an ounce of fine gold, $20.67. Percentages are given by weight, and not by volume. Sizings are classed as coarse (that portion of the sample which will remain on a 100-mesh screen; diameter of wire, 0.00433 inches; size of opening, 0.00575 square inches); middles (the material finer than the opening of the above 100-mesh screen, und coarser than the opening of the commercial 200-mesh screen as given below); and fines (the material which will pass a 200-mesh screen; diameter of wire, 0.00216 inches; size of opening, 0.00312 square inches). A further subdivision of fines is also mentioned, which is based upon the granular, or angular, condition of one portion and the flocculent, or amorphous, condition of the remaining portion of these fines.

MILLING.—The ore receives its first crushing in rotary breakers at the hoists, and this product varies in size from that of a sea sand up to rock having an extreme dimension of 4 inches. From bins at the hoists at Lead the broken ore is trammed to the three mills, i. e., the Homestake and Golden Star, containing 200 stamps each, and the Amicus (formerly the Highland), in which there are 140 heads, making a total of 540.

From the mill bins the ore passes to the mortar, which is of the now celebrated Homestake narrow pattern, where it is crushed between cast iron shoes and dies, the weight of the stamp when equipped with new iron being 900 pounds, the drop 10½ inches and falling eighty-eight times per minute.

The screen is of the steel needle slot type No. 8, and the bottom of the screen opening averages 10 inches above the top of the dies.

The long drop, high discharge and small area of screen openings produce an extremely fine pulp, about 80% passing a 100-mesh screen, and it is to the writer a most remarkable fact that under these conditions such a high stamp duty is maintained, it being fully four tons per stamp per twenty-four hours.

This duty is possible only because, first, of the very favorable nature of the ore, the slate and pyrite crushing readily and the quartz being an excellent medium of attrition; secondly, of the large proportion of water used, being from eight to ten times the weight of ore crushed; and, thirdly, of the narrow mortar, which is only 12 inches wide at the lip.

This very fine and thin pulp is in the most excellent condition for amalgamating, which process is conducted both inside the mortar and outside, on full-size plates in series (each 54x144x⅛ inch) to each mortar. The first of these is a copper plate and the other three are silver-plated copper, the weight of plating being two ounces per square foot, and all silver plating being done at the works. The addition of the three silver plates to each stamp battery by Mr. Grier has proven one of the most valuable steps in the treatment of this ore and has brought about an additional profit amounting to, approximately, $250,000 during the year 1902, over and above what would have been realized from amalgamation had the outside plate surface been only that of the one copper plate, which, by the way, is considered ample in many of the large modern plants of the day.

In connection with amalgamation, the practice at

*Read at Trans. Am. Min. Congress, Lead City, S. D., and to be read at Oct. meeting Am. Inst. Min. Eng., New York City.

the Homestake conforms, as far as conditions will permit, to the theory that the maximum results are obtained when the temperature of the water used in the batteries is low enough to exert the minimum influence on the minerals of the ore, and it is contended that the plate yield proves the correctness of this theory.

It would be interesting to investigate the question of amalgamation and finer crushing in other gold-producing sections, particularly in South Africa, where the yield from this source is reported to be from 55% to 60%, as compared with 70% to 75% at the Homestake. Perhaps finer crushing would not only greatly increase their amalgam yield, but also reduce the values lost in their cyanide residues. This seems the more likely for that country, because their slimes have been proved to have value sufficient for secondary treatment, whereas this has not yet been proved at the Homestake, where the advisability of sliming such a large proportion of the ore has been a debatable point, because the slimes here contain only 85 cents to $1.10 in value per ton. But of this more will be said later.

The cost of milling in the 200-stamp mills at Lead is, approximately, 40 cents per ton.

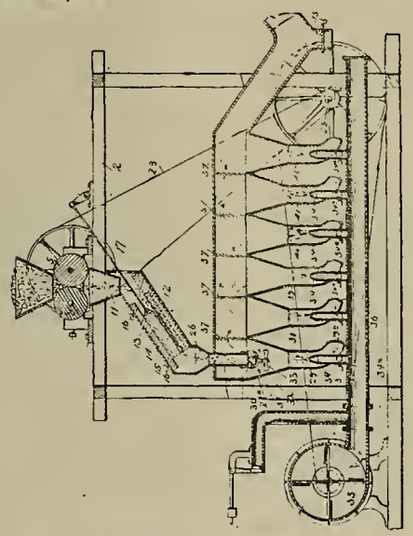
(TO BE CONTINUED.)

Mining and Metallurgical Patents.

PATENTS ISSUED SEPTEMBER 22, 1903.

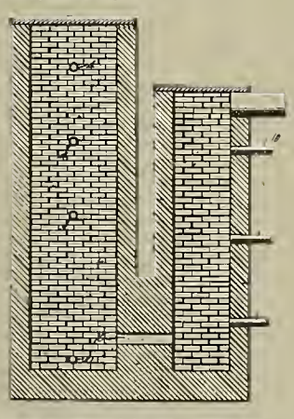
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

GOLD SEPARATOR.—No. 739,231; W. Snee, West Elizabeth, Pa.



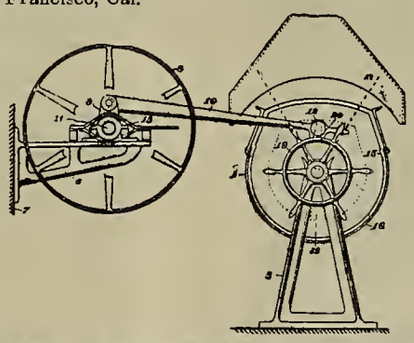
In pneumatic separator, combination of casing having closed hopper shaped upper portion and reduced lower body portion open at bottom, screen mounted in opening in side walls of hopper shaped portion, feed spout extending into upper portion of casing to point below bottom of screen, and nozzle extending into reduced portion in alinement with feed spout to direct blast of air against powdered ore entering through spout.

BLAST FURNACE.—No. 739,281; M. Blanchard and C. D. Williams, Dillard, Or.



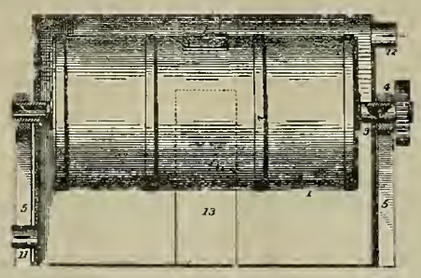
An apparatus comprising a primary furnace and secondary furnace, flue connecting lower portions of furnaces and constituting slag pit, tap pipes communicating with slag pit, tuyeres arranged at intervals in height of primary furnace, blast pipe communicating with upper portion of primary furnace, and escape pipe communicating with upper portion of secondary furnace.

MELTING FURNACE.—No. 739,340; J. B. Orbison, San Francisco, Cal.



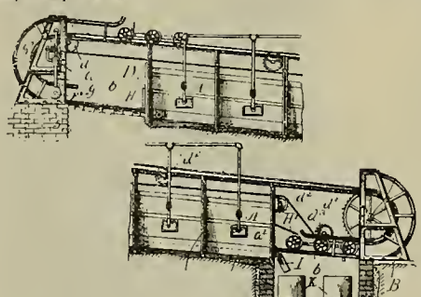
A melting furnace mounted on trunnions, means to oscillate said furnace, and a longitudinally disposed barrier or dam at the bottom of the furnace, to cause mixing of alloys as the furnace is oscillated. Melting furnace mounted on trunnions, having longitudinally disposed barrier at bottom of furnace, in combination with rotatory gear and crank for operating furnace, crank pin connected with furnace, and pitman provided with hook for detachably connecting rotatory crank with crank pin, whereby furnace is mechanically oscillated.

PROCESS OF TREATING REFRACTORY COMPLEX ORES OF GOLD AND SILVER.—No. 739,374; C. E. Baker and A. W. Burwell, Cleveland, Ohio.



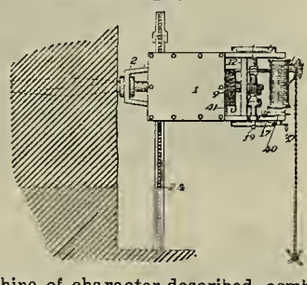
Process of treating ores of gold and silver containing base metal or metals and metalloid, which consists of combining metalloid with chlorine, vaporizing and separating metalloid chloride from base metals in ore.

ORE ROASTING FURNACE.—No. 739,485; C. A. Fontaine, Iola, Kans.



The combination with ore roasting furnace, of inclined guiding rails extending therethrough, and gravity rake car adapted to be propelled through furnace by gravity, and provided with stirring devices.

COAL MINING MACHINE.—No. 739,335; G. Muschweck and J. Tudas, Carnegie, Pa.



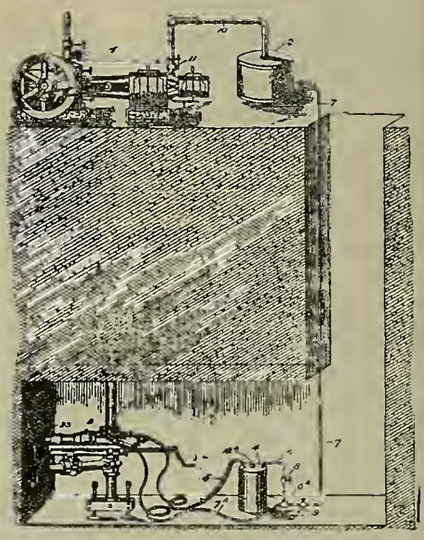
In machine of character described, combination of frame mounted on suitable truck, boring shaft rotatably mounted in frame and carrying series of adjustable cutters, shaft mounted in frame having at one end a toothed wheel adapted to engage some fixed surface for purpose of moving machine when shaft is revolved, other end of shaft having sprocket connected therewith through ratchet and pawl, chain adapted to be passed over sprocket, one end of same being anchored, thereby to retard movement of machine, motor mounted in frame and suitably geared to boring shaft, shaft for moving entire machine laterally and axle of truck.

SCORIFIER TONGS.—No. 739,419; J. M. Hyde, San Francisco, Cal.



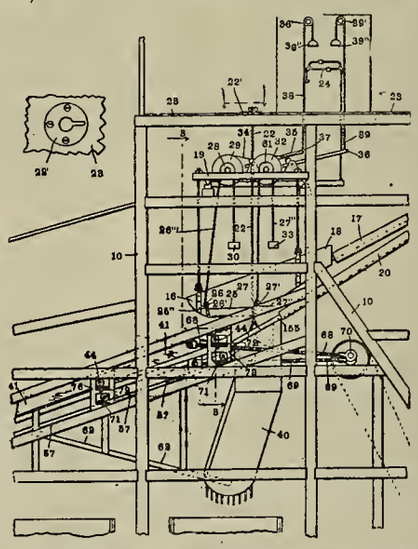
Tongs comprising two limbs moving toward and from each other in determined plane, and furnished with holders on limbs, each extending from plane of movement of its limb to engage vessel, holder on one of limbs being furnished with opening through which material may be poured from vessel held by tongs.

ROCK DRILLING SYSTEM.—No. 739,551; J. G. Leyner, Denver, Colo.



In rock drilling system, combination with operative air compressor, air receiver or reservoir, air supply system and rock cutting drill bit, compressed air actuated rock drilling engine, operatively connected to compressed air supply pipe system, and containing water passage to cutting point of rock cutting drill bit, water passage being arranged to communicate with compressed air passages through rock drilling engine, portable water supply tank provided with a supply of water connected by flexible tube or hose to water passage through rock drilling engine, and provided with flexible tube or hose connection with compressed air supply system, and water inlet to tank, whereby compressed air actuates rock drilling engine, and forces water from tank through rock drilling engine, and air and water is commingled together and discharged from drill bit into bottom of hole being drilled.

MINE TIPPLE.—No. 739,341; G. W. Parker, Terre Haute, Ind.



Mine tipple, with retaining hopper and means for discharging material into hopper, of separating screens, mine run chute, bottom for hopper, and means for swinging bottom to discharge either upon screens or into mine run chute.

EXTRACTION OF PRECIOUS METALS FROM THEIR ORES.—No. 738,758; J. B. de Alzugaray, London, England.

The process of extracting precious metals from ores, consisting in first moistening crushed ore with alkaline solution, afterwards agitating it in solvent solution and blowing through it oxidizing agent of gaseous bromine and its acid and oxyacide compounds dissolved in air, and recovering metals from solvent.

Drift Timbering.

Written for the MINING AND SCIENTIFIC PRESS.

The requirements of drift timbering vary to a greater or less extent with the character of the ground to be timbered. Heavy ground, as well as that which swells upon exposure to the atmosphere, requires the most substantial kind of timbering, and experience has demonstrated that in many instances the heaviest timbers employed in such places are insufficient to sustain the pressure for long periods—several months—without reinforcement or renewal.

There is a material difference between ground which is simply heavy, dead weight and that which is known as swelling ground. The former is of somewhat local occurrence, and particularly in the case of drift timbering, for as the ground undercut in drifting has a tendency to fall, owing to the natural force of gravity, the timbers placed support a greater or less load, and the surrounding mass affords what may be termed lateral or adjacent support, and the timbers are thus relieved of much of the load. In the case of swelling ground, however, it is very different. Here the pressure is not wholly due to gravity, for it may be exerted from either side as well as from the top, and in some instances even from the bottom of the gangway, as in many drift mines, and also in quartz mines. In each case swelling ground must be timbered as the requirements demand. It is not infrequently the case that in slate a drift may show little or no evidence of swelling at the time the excavation is made, but in a few weeks this pressure, due wholly to swelling of the rocks, is very much in evidence, and reinforcement or renewal of timbers is necessary.

In many places where drifting top weight only has to be provided for, there being little or no tendency on the part of the walls to cave. The accompanying sketches will illustrate some of the principles of drift timbering under the conditions most usually encountered in mining.

Fig. 1 illustrates the framing and placing of a

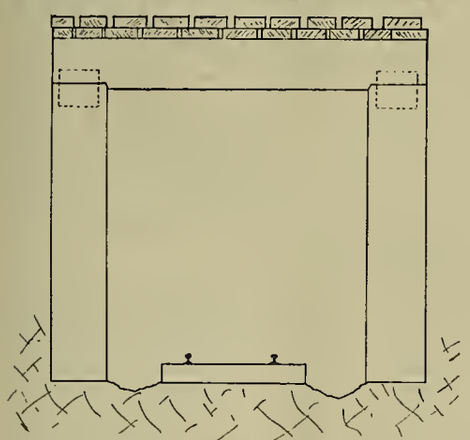


Fig. 1.

drift set of simplest construction, in which top weight only is contemplated. It will be observed that the lagging is driven under no unusual difficulties, no "bridge" being used. In the case of "bad standing" ground, where the back of the drift caves as fast as the cutting is made, it is often absolutely necessary to employ the bridge.

The framing of the timbers shown in Fig. 1 is of the simplest sort. The cap has a shallow "dap" ¾ inch deep—more or less, depending on the size of the timbers—cut in both ends on the under side. The right-angled cut along the inner edge of the dap is beveled, as shown in the cut. The function of this bevel is to reduce the tendency of the cap to split under pressure at the line where the cap rests upon the posts. The posts are also beveled on the upper inner edges to fit the bevels of the cap. The dotted squares indicate the position of the sprags, which extend from set to set, to keep them from "riding." These sprags are placed so as to catch both cap and post.

In Fig. 2 is shown a set intended for conditions somewhat similar to those just described. There are, however, two important differences in these sets. The cap is without framing of any sort, and the full strength of the timber is thus secured. To prevent the incrowding of the posts, a piece of plank of proper length is spiked to the under side of the cap before setting up. This resists any pressure from the sides. Its cost can readily be figured, the price of lumber being known. The posts set upon a sill, as shown. The object of the sill is to sustain the entire set from downward movement, and is used when the floor of the level is soft and offers poor support to the posts, as is often the case in wet ground. It will be noticed that the sill has daps cut at the end, similar to those in the cap shown in Fig. 1. It might be considered good practice to employ a spiked plank on the sill, as beneath the cap. In some instances this might be permissible, but if T rails are to be used for track the spikes would have a tendency to split the planks and thus render the track

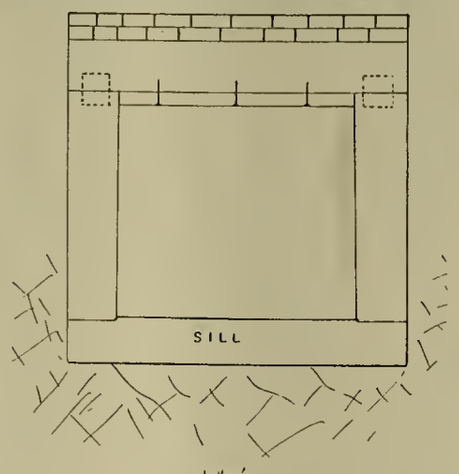


Fig. 2.

insecure. If a track be made of scantling, surfaced with strap iron, the plank may be used.

Concerning the sprags, some timber men cut daps for them in the posts and cap, and others simply secure them with a couple of wire spikes. The method adopted should be determined by the size of timbers necessary and the character of the ground. Where round timbers are used, suitable flat surfaces may be quickly made on the sides of posts and caps for the sprags at the time of framing.

Fig. 3 illustrates the manner in which some inex-

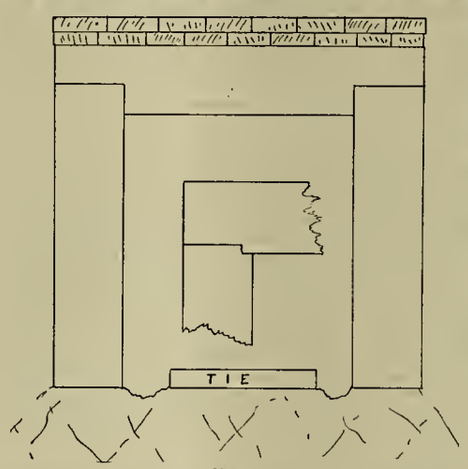


Fig. 3.

perienced miners frame drift sets. It will be noticed that nearly one-half of the strength of the cap is lost by this method, and if the top pressure be heavy the cap will certainly split horizontally along a line flush with the top of the post. The spiked plank is in every way superior to it and more economical in the end.

The small sketch occupying the center of Fig. 3 shows another method of framing the inner corner of post and cap, and is much employed. The tendency of either post or cap to split is checked by the shoulders on both timbers.

Fig. 4 illustrates the placing of a single stull, and

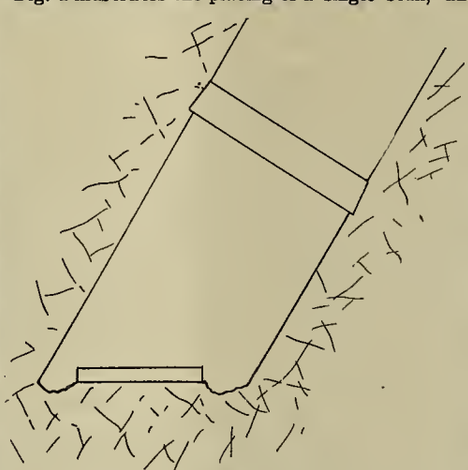


Fig. 4.

may be utilized where both walls are good. It is adapted more particularly to drifts on veins having more or less inclination than to drifts run through country rock. It is sometimes necessary to place a line of stulls in this manner, upon which may be laid poles for stoping above. In some mines stopes are started from raises, leaving a solid block of ore between the drift or gangway and the stope, but this is not always desirable, for financial reasons.

Fig. 5 illustrates another method of placing and

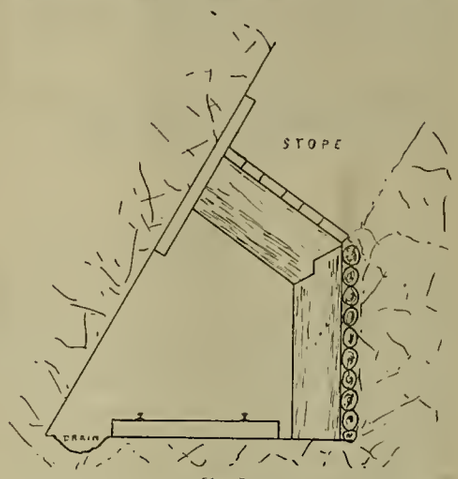


Fig. 5

supporting stulls where the foot wall is too soft to afford permanent support to a line of stulls. This method can be employed in drifts of considerable width. The poles placed behind the post will permanently hold either the soft wall or any filling which may be thrown behind them. It is a method of placing drift sets not commonly seen, but it answers admirably in places suited to the method. This scheme is not advised for swelling ground, as the post could not resist the thrust, and it would be promptly pushed into the drift. It can be made of large timbers and will be found enduring when properly placed in ground suited to it.

The question of drainage is always important, and should be provided for when running all level cuttings in wet mines, whether the quantity of water be great or small. The grade should be sufficient to permit the water to flow freely. It is obvious that a drain which is kept clear of debris admits of a lighter grade than one obstructed by muck, chips and other mine trash. The position of the drain should be determined by the character of the walls. In some cases it is advisable to construct the drain beneath the track, instead of at one or both sides, as is usually done. It is desirable to drain the water from soft walls, and the water drain should be placed as far from such walls as possible.

In Fig. 6 is shown a type of drift set which is, per-

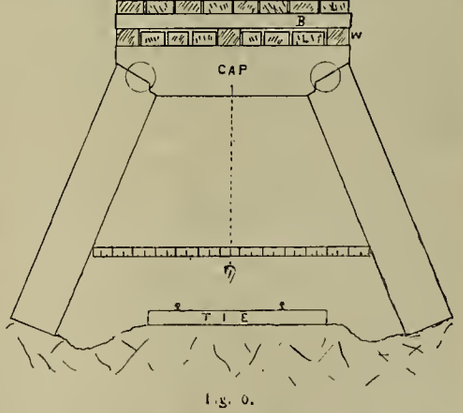


Fig. 6.

haps, in more common use than those above shown, for the reason that in most cases it is found necessary to meet more or less side pressure, as well as that from the top. Sets framed in the manner of Fig. 5 are the only ones which can be made to successfully resist swelling ground—that is, where simple drift sets are employed. In some cases a different form of drift set is used in large veins where the walls are heavy or the ground swells. One of these forms is that known as the square and half set. Where the post is set upright in the center of the drift and a cap reaches from the center post to the adjacent wall, sets of this kind permit of relieving the ground, which is the best way to maintain timbers in position in ground of this character. Fig. 5 illustrates the use of the bridge in driving lagging. This is a very useful method where the ground has a tendency to cave from the back as fast as cut out at the face. The position of the bridge is indicated by B. It is temporarily supported on the wedges W. As the cutting proceeds beyond the set in place, the ends of lagging are inserted between the top of the cap and the bridge and driven forward to the

face, keeping the ends pointed well upward. The upward direction of the lagging may be maintained by inserting a block of wood between the tail end of the lagging and the lagging already in place overhead. As the lagging is driven forward the front ends will gradually work down. It is almost impossible to keep them up, and when they have been driven as far forward as their length will admit the ends should rest on top of the bridge of the next set which has been placed in position to receive them.

(TO BE CONTINUED.)

Testing Methods in the Physical Examination of Portland Cements.*

NUMBER I.

Written for the MINING AND SCIENTIFIC PRESS by A. H. CEDERBERG.

This article has been prepared, not for the purpose of criticising co-laborers in this so very interesting field, but merely to give the public and the profession the result of methods pursued and observations, as they have appeared to me, in the 6238 tests of Portland cement samples that has been carried on more or less directly under my personal supervision for a period of four years. The domestic brands examined have been as follows: Atlas, Alpha, Dragon, Vulcanite, Lehigh, Medusa, Golden Gate, Standard, Whitehall, American Alsen, Star, A. A., Giant, etc. The foreign brands examined have been Alsen, Hemmoor, Condor, Schifferdecker, Josson and Germania. About 70% of the tests of the domestic brands were of unseasoned cement, and balance of tests of domestic, as well as foreign cements, were of seasoned cement, that is, a cement that has been stored thirty days or longer.

Numerous statements have been made from time to time by "would-be experts" on the West coast that no unseasoned Portland cement can stand boiling tests. If such experts would take the trouble and visit some of the laboratories of the big cement works in Pennsylvania, they would no doubt open their eyes and acknowledge their ignorance on the subject and return a good deal wiser. They would find that the manufactured product is submitted to testing as soon as it has left the pulverizing machines, and so up to date and self-reliant is the manufacturer that he refuses to even put on the market a "non-boiling" unseasoned cement and sell it as a Portland cement.

In the progress report of the special committee on uniform tests of Portland cement, appointed by the American Society of Civil Engineers, and which report is published in this year's January proceedings of the society, the order in which the tests are enumerated is as follows:

1. Specific gravity. 2. Fineness. 3. Normal consistency. 4. Time of setting. 5. Tensile strength. 6. Constancy of volume divided into: a. Normal or cold water test. b. Accelerated or boiling test.

As the last named is the most severe, as well as the quickest and most unerring in detecting any unsoundness in a sample, I prefer in this article to enumerate the tests in the same order as is found on page 154 in "Portland Cement; Its Manufacture, Testing and Use," by D. B. Butler, and which is as follows:

1. Constancy of volume or "test for soundness," as Mr. Butler very pointedly calls it, divided into—(a) cold water test; (b) boiling test. 2. Fineness of grinding. 3. Tensile strength. 4. Time of setting. 5. Specific gravity.

I believe that this order of testing admirably answers in proportion to the various tests relative importance which will henceforth be apparent.

SOUNDNESS TEST—COLD WATER TEST.—This test is the oldest test for soundness used and consists in making pats (neat cement and water + 65° @ + 75° F. in proper proportions), about 3″ @ 3½″ square and ½″ thick, with slightly beveled edges on a piece of glass 4″ x 4″. As soon as the pat is set hard it is immersed in water (+ 65° @ + 75° F.) for a limited period. The old rule was that if at the end of seven days the pat showed no signs of cracking or warping, or alteration from its original form, the cement from which the pat was made was pronounced sound. This test is nowadays applied to both natural and Portland cements, but it is in many laboratories dispensed with entirely, as being too slow to conclusively prove the good or bad qualities of the cement to be tested. Very often it has been found to be unreliable, inasmuch as pats of same cement, while showing sound qualities on, say, thirty days immersion, would at longer periods of immersion disintegrate. As a rule a cold water test is of benefit to the tester only in case the cement is very bad, and even then this test will not discover the fault unless a comparatively long period has elapsed. Of the domestic brands tested by me I have generally made one cold water test to every twenty-four of the boiling test.

BOILING TEST.—The test I have used has been the Michaelis boiling test, which in brief is as follows: On a 4″ x 4″ glass a pat of neat cement is made, about 3″ in diameter and tapering from ½″ or ¼″ in thickness in center to writing-paper thickness at the edge or periphery. The pat is generally allowed to remain under a damp cloth until it has obtained its final setting, when it is removed to a copper tank or suitable chamber containing two compartments, one upper and one lower. The lower compartment is partly filled with water in which a temperature of + 212° F. is maintained. The upper compartment is separated from the lower by means of wire netting in the form of a basket, and steam from the boiling water in the lower compartment is allowed to rise through this wire basket into the upper compartment, thus allowing a continuous testing operation. The cement pat, having obtained its final setting, can be immersed in either compartment first, as I have failed to notice any difference in the behavior of the pats, whether boiled and steamed or steamed and boiled. The general practice is to steam the pats first and boil them afterwards. They remain in either compartment generally five hours each, although some manufacturers keep the pats in for ten hours in each compartment before "letting them go." If after the end of ten hours or more of boiling and steaming the pat shows no sign of blowing, warping, cracking or alteration from its original form the cement from which the pat was made is pronounced sound.

As above stated, the pats are allowed to set hard, that is obtain final set, before being put into the boiling tank, and while for the sake of fair uniformity, this is but proper, I will state, however, that on numerous occasions I have, in order to save time, allowed the pats to obtain only initial set before being subjected to steam or boiling water, and without having noticed any difference in the behavior of the pat that was allowed to set hard. These tests have been with unseasoned cement with the exception of two, in which the cement was about eight months old and of foreign brand. If a cement is in any way unsound it will soon be discovered in this + 212° F. test, and from three to five hours is generally sufficient to develop even a very slight discrepancy. In a number of tests made of a domestic brand recently put on the market even thirty minutes boiling in + 180° F. water broke up the pat entirely, while seven days immersion in cold water had only succeeded in loosening the pat from the glass, and first after thirty-three days immersion did cracks commence to appear in the cold water pat. In conjunction with this I will state that whenever the boiling test was satisfactory no cold water pat showed any sign of alteration from original form even after having been observed for over sixteen months.

Great stress is laid upon the assertion that the pat should stick to the glass. While a pat in a perfect cement generally sticks hard, the fact that the pat loosens from the glass is no cause for worry. A perfect cement loosens from the glass only when not being put on properly by the tester. Too much air, more or less locally and mechanically compressed during the pressing of the cement dough against the glass, will naturally expand when subjected to heat, and being unable to force its way through the hard set cement, chooses the easier way of just lifting the pat bodily from the glass. If a pat loosened from the glass shows alteration in any form from the original then there is cause for worry. A small straight edge set against the bottom side of the pat will soon discover if the pat has warped or blown. If on the other hand the glass upon which the pat was laid did not have a perfect level, then the straight edge is less reliable, and another "trick" can be resorted to. Try and break off small pieces from the thin edges of the pat. If the sound produced by the cracking is sharp it is a good sign; if the sound is dull the cement is suspicious. Cracks as they appear in pats are either hair fine or very large, or both, and in each instance the cement is not safe in its present condition. The defects, such as described, which come to light by this excellent test are the result of the following causes, either singly or collectively:

First—Incorrect analyses of raw materials, resulting in incorrectly proportioned raw mixtures, i. e., overlimed and undersilicised, underlimed and oversilicised. This is the analytical chemist's fault entirely and should never be tolerated. The operation in the analyzing of raw materials is so concise and clear that only carelessness or ignorance can err against same. The resultant cement from such mixture is and will always be unreliable.

Second—Incorrect proportions of raw materials that have been properly analyzed. The fault is then purely mechanical and it is up to the man in charge of automatic scales or platform scales to give an account of himself. A chemist can easily check these mixtures by resorting to the so-called calcimeter test, which here is accurate enough for all practical purposes.

Third—Too coarse grinding of an otherwise perfect raw material mixture. The fault is due to overfeeding of the pulverizing machines, and hence is purely mechanical. Can easily be overcome if the fineness of the raw material was checked regularly during the operation of the plant.

Fourth—Underburned clinkers. The cause for this is, providing conditions in cases Nos. 1, 2 and 3 are complied with, carelessness on the part of the burner and should never be allowed. Underburned clinkers cause the falling down of Portland cement on the boiling test more often than any other defect.

Fifth—An overdose of plaster of paris or gypsum, due to carelessness entirely.

Sixth—Too coarse ground clinkers, thus preventing necessary chemical changes during the setting of the cement. Due to overfeeding or pulverizing machines.

The question may arise, What is to be done with a cement that refuses to stand the boiling test? My answer is, "Throw it out," or store it away and sell it for what it is. Don't call it Portland cement. If a cement is overlimed the chances are that seasoning—for which, however, no time limit can be set—will prove an effective cure in connection with extreme fine grinding. If, however, even finest of grinding, say 98% through a 100 mesh, would not in conjunction with due seasoning, say two or three months, accomplish the desired result, such cement is more or less unsound and should be sold as such.

Taking all in all, this boiling test, simple and effective as it is, may justly be called the forerunner of all other tests, and if this test shows a defective cement, a good deal of time, labor and money can be saved in as much as to the engineer or contractor, all other tests are and should be of no value, consequently useless.

Again I state that never in any of the 6238 tests have I record of an instance where a boiling test, if satisfactory, did not act as a safe guarantee for a sound cement, and of all the tests not conducted by me, but which have been brought to my notice, I know of only two instances when a guaranteed perfect boiling test resulted in disintegrated briquettes after several months. One of these two I traced and found as follows: The cement sample of which the tests were made was a "laboratory product." In the pat for boiling test no plaster paris was used, while the cement in the briquettes showed an overdose of Ca So_4. Hence the cause here was plain enough. In the other instance I was never allowed to get at the truth. I was only showed the disintegrated briquettes, but not the boiled pat, which, I was told, was perfect. A brand recently put on the market was tested under my direction on boiling and fell to pieces entirely. First four and a half months later did the same cement show any inclination to stand up on the boiling test, and only after thorough sieving. In the meantime some cement of the same shipment had been used in two engineering works, and in one of them, where the thickness of the concrete was about 12″, it resulted in complete disintegration, whereas in the other, where it was put in a heavy foundation wall, there is at this date no outward sign of cracking. This cement, although very fine, was heavily overlimed. Another brand also recently put on the market has shown the same troublesome symyptoms.

FINENESS OF GRINDING TEST.—While this test may be readily omitted if the sample stands up well on the boiling test, it is nevertheless of great interest to the experienced tester or engineer, and will often serve as a guide in estimating the value of the "cementing properties" of the sample submitted. The testing method in itself is very simple and consists in sieving a portion of the cement in a rather easy fashion through a 100 or 200 mesh sieve, with wire gauges of 0.0045 and 0.0024 respectively. Care should be taken that only dried cement is used, and in case of well seasoned cements (over three months old) the test sample should be evaporated before tested. The present commercial standard for fineness of Portland cement varies in various countries, with a slightly higher percentage in favor of the United States. Here the fineness of all first-class Portland cements are from 90% to 96% through a 100-mesh sieve and 74% to 86% through a 200-mesh sieve. If a cement not previously submitted to boiling test is ground finer than the maximum figures above quoted, one has in many cases reason to be a little suspicious, because no cement manufacturer, who has dollars and cents at heart, can deny the truth that the cost of increasing the fineness above 96% and 86% is so excessive that profits are materially reduced, and consequently there must be some reason for such excessive fine grinding (see causes for non-boiling cement). Any Portland cement that in its fineness corresponds to the figures above quoted is more than fine for all practical purposes. On the other hand, if a sample registers 98% on 100 mesh and at the same time stands up satisfactory on the boiling test, such cement is naturally of a superior quality, and which will generally display itself in an increased tensile strength on the sand test. Portland cements registering below 90% fineness on 100 mesh are also satisfactory for all ordinary purposes, and ten years ago even 88% fine was considered an unusually fine cement. The great number of cement plants, however, that have recently been erected all over the country, have created a spirited rivalry in the production of a higher grade of product, which chemically consisted in an increased percentage of lime and resulting physically in a necessitated increase of fineness. While these changes are not only satisfactory, but beneficial as well, and especially so to the engineer, the fact remains that we are getting closer to the danger limit (i. e., the maximum proportion of lime that a sound

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cement can carry), than ever before, and in conjunction with this I may state that only in such plants where the most detailed care is observed in the manufacture of Portland cement, can gratifying results he obtained. From the above we find that extreme fine grinding (above 96% or 86%) is generally the result of two different causes:

First—A new manufacturer's desire to put on the market a superior product.

Second—A manufacturer's desire to shield as much as possible an overlimed or underburned product.

The first cause is very quickly abandoned owing to its being too expensive.

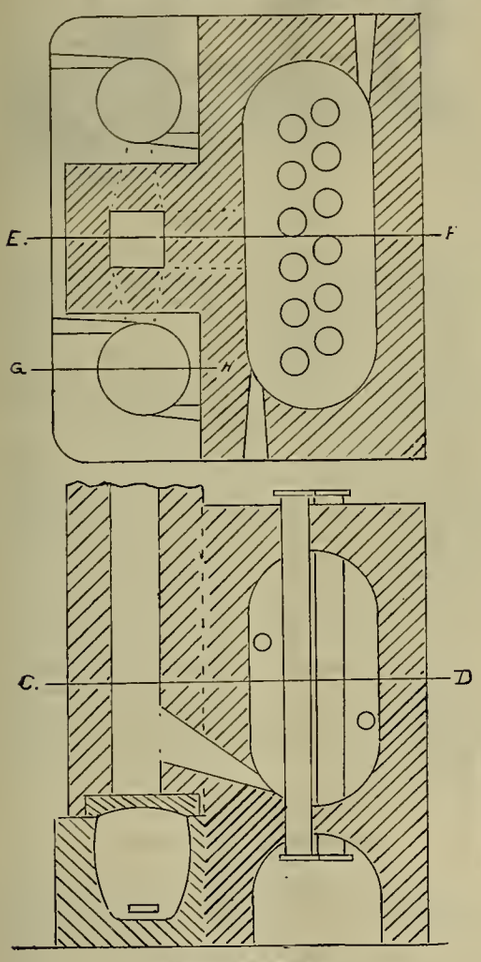
The second cause is a matter of necessity in order to save a product which is only the result of gross carelessness on the part of the heads in charge of the plant. The boiling test will soon set all doubts at rest on that score, hence its value.

(TO BE CONTINUED.)

Some Notes on the Use of Fuel Oil.

Written for the MINING AND SCIENTIFIC PRESS by SIDNEY ORVILLE BROWN.

Having had my attention called to an article, written by Mr. A. D. Barnhardt, of Prescott, A. T., in the MINING AND SCIENTIFIC PRESS of May 30, 1903, the writer has thought that some further observations along those lines might be of public interest. In the year 1888 the writer built, in Los Angeles, a circular crucible furnace, and applied an oil burner in



Oil Fuel Melting Furnace.

the reverse manner from that shown in Mr. Barnhardt's illustration; and in 1901 built, in Philadelphia, a combination furnace of much larger size, and wherein were incorporated some novel features. As shown in the drawings herewith, there were three furnaces leading into one stack, the larger one, "A," being for the production of nitrogen. But the purpose of the others it is not necessary to disclose. The furnace, "A," had a double row of thin wrought tubing, connected together, and having the capacity to hold 3000 pounds of cast-iron borings. It was ellipsoidal in shape, both vertically and horizontally, and the flue led out from the bottom, as it should always do, in oil furnaces, if due regard be had for economy in fuel. The burner, "a," was placed one-third, and the burner, "b," two-thirds of the distance up from the bottom; and it was remarkable how little fuel was required to maintain a most uniform and adequate degree of temperature. In twenty minutes from the time of firing up, the cast-iron could be melted—as was once actually done, owing to the inexperience of the attendant.

The other furnaces were circular in plan, and conoidal through their vertical sections. In furnace "B" was used the largest sized graphite crucible, capable of holding 1000 pounds of steel; and this was subjected to a very high degree of heat. One burner was placed 4 inches below and the other 8 inches above the center of the crucible; and the swirl of flame, which completely enveloped the crucible, heated it very uniformly throughout. In the construction of such furnaces, the avoidance of all angles is a matter of first importance. The melting furnaces, wherein the flames are made to impinge directly against the crucibles, are about as crude and irrational contrivances for the application of heat as could well be devised. Mr. Barnhardt's sketch suggests the remark that the burners should always be placed so that the flame may be deflected to the right. Under boilers, of the return-tubular type, at least three burners should be placed—concentrically to the boiler—instead of one; and if the owners would do this, they would find the life of the boilers to be materially lengthened.

In the locomotive firebox it is, of course, highly important to obtain the most diffusive flame. Desiring to accomplish this in a chemical apparatus of similar shape to a firebox, the writer arranged a burner at the four lower corners, and the flames were directed nearly to a common center, with the result that a perfect uniformity of heat was secured. Dependent upon the relative proportions of the firebox, the front burners should be placed at an angle of about 50°, and the rear burners at an angle of about 30°, or in such a way as to fix the common center of impact, at a point about three-fifths of the distance from the fire door to the tube sheet. If the burners be deflected slightly to the left of the lines of a common center, a swirl of flame will be induced and there will be no greater necessity for lining the firebox than if solid fuel were used.

Copper Production in 1902.

The recently issued bulletin of the United States Geological Survey on the production of copper in 1902, by C. Kirchhoff, shows that the manipulation of the market resulted to the disadvantage of the producers. The copper interests are too widely dissociated to make it possible to maintain copper at an artificially high price for any considerable period. The production during 1902 was heavier than in 1901, but the end of the year 1901 found many producers with contracts for large amounts of metal at low prices, the delivery of which covered a long period of time. During the greater part of 1902 most of the larger producers were in full operation and a number of new enterprises which had been a year or more in the preparatory stage entered the producing list. It is estimated that the production during 1903 will exceed that of 1902, unless stoppages due to labor troubles and other causes interfere. An increased production is anticipated from nearly all producing sections. The total production of copper in the United States during 1902 is stated to have been 294,423 long tons, of which the Lake Superior region furnished 25.9%, Montana 43.8% and Arizona 18.2%. It is estimated that during 1902 there were consumed in the United States 551,688,131 pounds of refined copper. The marked fluctuations of the market are largely due to the fact that the marketing of the metal is not under control. When prices are low large producers hoard their copper and accumulate large stocks, and when prices go up they unload great amounts of the metal, the rush to realize usually resulting in breaking down the price, which generally checks the sales. Small producers are in the market all the time, endeavoring to convert copper into cash as rapidly as it is produced, and in the aggregate the small producers are no small factor in the market. Owing to this unorganized manner of marketing copper, prices fluctuated during 1902 from 12 cents early in January to as low as 10⅞ cents later for Lake, and a still lower price for electrolytic. After a period of heavy buying prices were stimulated under it and rose to 13 cents, which resulted in large offerings, and this immediately checked the rising market and even depreciated it to 12 cents. During the latter part of the year prices ranged between 11 and 12 cents. The present year has seen an improvement on these prices, but the same influences are still at work, and there can be no hope that copper will ever have even an approximately fixed price so long as all the large producers act independently. Numerous attempts have been made at various times in the past to control the copper market, but no syndicate has yet been organized that has been sufficiently strong financially to accomplish this. Any attempt to secure this control must prove abortive that has not sufficient capital back of it to practically own all the great copper mines of the world. When the enormous value placed upon the copper mines of the United States alone is taken as a basis of estimate, the magnitude of a controlling power may be conceived from the following figures. All of North America produced 355,280 long tons of copper in 1902 (of which the United States produced 294,423 tons). All of Europe produced 88,407 tons, South America 39,020 tons, Africa 4450 tons, Asia 29,775 tons, Australasia 27,934 tons, a total of 544,866 tons. Of this total amount the United States produced about 54%.

Ore Deposits of the Northern Black Hills.*

NUMBER IV.—CONCLUDED.

Written by J. D. IRVING.

PRODUCTIVE AREAS.—The productive areas of refractory siliceous ore are five in number and have been severally designated Bald Mountain area, Yellow Creek area, Lead City area, Garden City area, and Squaw Creek area. The last-named area was at the time of survey little more than a prospect, but has since become an important producer. The Bald Mountain area is the most extensive and important. It is a northwest-southeast belt of about 1 mile in width and 4½ miles in length, and the width is limited by the annular exposure of Cambrian rocks that surrounds the Algonkian nucleus of the region. The ore-bearing strata dip to the southeast and pass beneath the Silurian and Carboniferous limestone, while they have been eroded from the Algonkian hills to the northeast, with one or two exceptions. Hence, on the north the ore bodies are exposed at the surface, but to the south shafts are necessary to reach them. At the southeast end this area is cut off from the Yellow Creek area by Whitewood creek. At the northern end the Cambrian rocks are present in nearly their full thickness. With relation to the ore bodies, the area may be divided into two portions, the Ruby Basin district and the Portland district. In the former the shoots are larger on the lower ore-bearing beds, in the latter larger in the upper.

The Garden City area is situated at the head of Blacktail and Sheeptail gulches and an east tributary of False Bottom creek. It is located on the northern—as the Bald Mountain area is on the southern—rim of the Cambrian outcrop. The beds dip to the northeast and the shoots so far mined have been on the lower contact. A rhyolite cap of great thickness and extent covers the country to the north and the Cambrian beds pass beneath it. The average trend of the ore bodies here is about north 55° east, much more nearly east and west than in any of the other areas.

The Lead City area is located on one of the Cambrian outliers that caps the hill south of Deadwood, and the ore bodies extend over the gold lode of the Homestake mine. A heavy sill of fine-grained rhyolite lies above the Cambrian on the tops of the hills. The ore bodies are exposed at the surface on the westernmost edge of this area, but lie beneath the shales in an easterly direction. The ore from this district was richer than that elsewhere mined and contained great quantities of barite, wolframite, and in several instances large amounts of free gold. The Hidden Fortune mine is an instance of this kind.

The Yellow Creek area is situated a little more than 2 miles, slightly east of south, from the city of Lead. The ore shoots are in a thin capping of Cambrian strata on the divide between Whitewood creek on the west and Yellow creek on the east. The shoots lie on the basal quartzite about 15 to 26 feet above the Algonkian. Much wolframite and barite are also found in the ore from this area.

The Squaw Creek area lies near the mouth of Squaw creek. Workings have been run upon some ore bearing beds which pass rapidly beneath the Carboniferous limestones that cover the country to the north. The horizon is just beneath the scolithus of "worm-eaten" sandstone. Ore bodies of considerable size have recently been opened here and the district has become a productive one.

VALUE OF THE ORES.—The gold contents of the ores in the Bald Mountain area run from $3 to $4 per ton to, in rare instances, $100. The general average for the ores in this district is about $17, and those containing from $10 to $20 are of the most common occurrence. Ore carrying $35 per ton is considened high grade. Some of the ore mined from the Ben Hur mine yielded upwards of $60 per ton in gold. As compared with the ores of the lower beds, those from the upper contact are slightly lower in grade, so that much of the ore is often left in the mines. They have also been reported to carry a higher relative proportion of silver, but, although this is true in individual instances, in general silver ores are as frequent in the lower as in the upper beds.

The three smaller areas of siliceous ore—Yellow Creek, Lead City and Garden City—lying over or to the west of the Homestake ore body or its continuation, produce ores of uniformly higher grade than those from the Bald Mountain country. The mineralization is probably later than the igneous activity, for the verticals which supplied the ores often cut all varieties of eruptive rocks.

As igneous rocks cut strata of the Fort Benton Cretaceous and pebbles of the same rock have been found in the basal conglomerates of the Neocene, it would seem, then, that the mineralization occurred somewhere between the Fort Benton and the Neocene, and it probably represents the final phase of vulcanism that was concomitant with the elevation of the Black Hills. This occurred while the Cambrian was still deeply buried beneath its covering of later formation.

ORIGIN OF THE ORES.—The refractory siliceous ores have been formed by a process which involved the

*Trans. Am. Min. Congress, Deadwood, S.D.; (Condensed.)

gradual removal of the original rock substances and the simultaneous substitution of the ore minerals. This is commonly known as replacement or metasomatic alteration, and has often proceeded with so little disturbance of the original rock material that both stratigraphic character and microscopic structure are preserved in the ore, although the original rock was carbonate and the ore is chiefly silica. The mineral which has been altered to form ore seems to have been exclusively dolomite, for where verticals pass through rocks of varying decomposition it is found that dolomite also has been appreciably affected. The ore minerals substituted are chiefly silica and pyrite, with which there are minute amounts of gold and silver. Smaller quantities of fluorite, barite, gypsum and several other accessory minerals are also of frequent occurrence. To the dolomite, whether present as comparatively pure beds or as cementing material of sandy and shaly rocks, the ore minerals have been transported by circulating waters. Such waters have found in the fractures trunk channels, by means of which they have been enabled to penetrate the encompassing and comparatively insoluble rocks and reach the more readily replaced material. The mass of evidence seems to show that these waters have ascended.

LEAD-SILVER ORES OF GALENA AND VICINITY.—The ores belonging to the fourth division of Cambrian ore deposits are similar in form and mode of occurrence to the refractory siliceous ores. They occur in the vicinity of the town of Galena.

At one time these ores filled an important place in the mineral production of the Black Hills. About twenty years ago a smelter was in operation and several mines were producing quite heavily, the Richmond or Sitting Bull mine especially having figured quite prominently in the silver production. After a brief period of activity, however, operations were rather abruptly discontinued and the district was idle until 1886, when operations were resumed, although upon a somewhat smaller scale. Work is now being conducted in a rather desultory manner. Mines that produced this character of ore are situated in and about the town of Galena. Most, if not all, of the ore bodies are in strata of Cambrian age. Some of the principal producing mines are the Richmond, Florence, Hester A, Coletta, Merritt No. 2, Cora, Carpenter, Alexander, Romeo and El Refugio.

The ore is of a more basic character than that found in the more westerly ore deposits, heretofore described. When unoxidized it consists chiefly of pyrite, which is either massive or disseminated more or less thickly through the body of the country rock. With the pyrite is associated argentiferous galena, and not infrequently small quantities of sphalerite. In many cases the galena occurs in seams in the pyrite, or as druses of minute crystals lining the interior of cavities. In all cases where they had not been oxidized those two minerals have been found associated in this manner. The galena is, therefore, of later origin than the pyrite. Occasionally the latter carries low values in gold, but these are unimportant. The values that render the mines workable are contained in the argentiferous galena. In most cases there is but little silica associated with the ores, but in the Florence and Richmond very considerable amounts of secondary silica are found in intimate association with the deposits.

ORES IN CARBONIFEROUS ROCKS.—In the heavy, gray limestones of the Carboniferous are found two distinct varieties of ore:

1. Gold and silver ores of a refractory siliceous type.
2. Lead-silver ores.

In general, the Carboniferous rocks have not figured largely in the mineral production of the region.

The refractory siliceous ores are in bodies of comparatively small size and are of less importance than those which occur in other formations. Two districts have been important as producers, the Ragged Top district and the Carbonate district.

The Ragged Top district comprises the country which lies to the northwest of the large mountain of phonolite known as Ragged Top. There is here a series of seven nearly equally spaced vertical fissures or veins, which have been termed the Ragged Top verticals. These are fractures or crevices in the heavy, massive limestone, which show at the surface a maximum width of about 10 feet. From this they range, as they pass downward, to extremely minute crevices. In the lower portions, where the surface alteration has not been extensive, the ore can be observed to pass laterally into the limestone walls without disturbance of the structure of the latter rock. It is of a light, uniform buff tint, which is so nearly the color of the surrounding limestone that it is difficult to distinguish it from the mineralized rock. It differs in its superior hardness and slight yellow color. Much of the ore is composed of angular brecciated fragments of what was once limestone, but now is completely altered to silica. Traces of tellurium have been detected in these ores. At some points in the limestone area about Ragged Top mountain flat, blanket-like beds of ore are found. These are either without distinct connection with the verticals or seem to have spread out from them. Some of the ore from these verticals was quite rich, and in general it carries higher values than the siliceous ores found in the Cambrian rocks.

The Carboniferous siliceous ores have not at any time been very heavy producers, but have yielded small amounts of ore for some years. The cyanide process has been used in their treatment with much success.

LEAD-SILVER ORES.—Lead-silver ores were in the earlier days of mining in the Black Hills a very important factor in the production of precious metals. They were found in the vicinity of the town of Carbonate. In 1886 this was a flourishing camp and produced considerable silver and lead. The product was almost exclusively that of the Iron Hill mine, but other mines in the neighborhood added a little to the total.†

The country rock that carries the ore is the gray Carboniferous limestone, in which sills, dikes and irregular masses of porphyry have been intruded. The ore bodies are of two kinds—large, irregular bodies of lead carbonate, which pass in places into more or less unaltered galena, and generally in close contact with porphyry masses, and partially filled crevices, which resemble in a general way the verticals of Ragged Top.

The first type of deposit is that which has formed the chief source of silver in the district, and this, as shown above, was largely obtained from the Iron Hill mine. In this mine the ore was a large mass of argentiferous lead carbonate, which extended down for 300 feet on the east side of a thick dike of fine-grained white porphyry. Much galena, also, was found, together with the carbonates, and after the ore was worked out a seam or vertical was detected extending downward from the main mass. Other pockets of ore were also found at different points, and in one place a pocket of vanadinite containing some four or five tons was encountered. Mr. Fowler reports the occurrence of the following minerals: Galena, cerrusite, cerargyrite, matlockite, wulfenite, pyromorphite, plattnerite, atacamite and vanadinite. This type of ore resembles in its general character and in its association with porphyry bodies the deposits described by S. F. Emmons from Leadville, Colo. Too little is known, however, regarding the details of the ore occurrence to afford any more definite idea of the manner in which it originated than the simple fact that it is probably a replacement of the limestone.

Of the second type of occurrence the most important case is that at the Seabury mine. This consisted of an irregular crevice striking south 85° west and running through the Seabury, Iron Hill, Segregated Iron Hill and Adelphi mines, with a possible continuation in the Spanish R, a mine in which some ore was obtained, but at too great a distance for its relation to the others to be clearly made out. This crevice varies from 1 to 20 feet in width. The sides consist of a ferruginous, jasperoid material, which replaces the limestone, often for 2 or 3 feet from the crevice, and contains at times galena, lead carbonate and horn silver in sufficient amount to be profitably worked. The latter mineral most frequently occurs as a thin film covering druses of fine quartz crystals which form linings to cavities.

The center of the crevices was loosely filled by a soft, ferruginous, gouge-like matter of a pinkish red color and containing gold. A large quantity of this ore is reported to have been mined from the Seabury, and also from the west side of the porphyry dike, in the Iron Hill.

Since 1891 there seems to have been but little work done in this district, no output being recorded for that period. Within the last year, however, a small (35-ton) cyanide plant has been erected to treat the tailings from the old smelter.

In concluding this brief review of the ore deposits of the northern Black Hills—a subject which it is difficult to treat satisfactorily in the space allowed—one seems warranted in dwelling a little on the future prospects of the region.

Mining communities are, from the limited nature of the deposits upon which their activity is based, generally short lived. That this is true one needs only to glance at the history of many Western mining camps. A few, it is true, have, like Leadville, been productive for many years, and will probably continue to be so in the future, but there are few, if any, which, if based wholly upon mineral production, will not in time cease to thrive as their economic resources become exhausted.

If the production of the region be prolonged sufficiently for the community's activities to be directed along other lines, what was once a mining camp may become a permanent settlement. In the Black Hills there are, perhaps, two features which may operate to give to the region a greater permanency than that which is generally seen in communities which are held together by mining interests. The first is the unusual size and the presumably long life of the Homestake belt. The second is the gradual decrease in the cost of treatment of other grades of ore and the consequent opening of the market to material previously known, but hitherto unworkable. The introduction of the cyanide process and the quantities of ore which may be treated by its use have done much to extend the life of Black Hills mining. It is not improbable that these two factors, working together, may so prolong the mineral production of the region that the population may never be less than it is. The other interests which grow side by side with the mining industry may then have become so important, and so little dependent on the mineral wealth of the country, that their existence alone will be sufficient to support the cities which have grown up in this mining country.

†The Sitting Bull mine at Galena also produced considerable lead and silver about 1879-81.

An Automatic Pulp Sampler.*

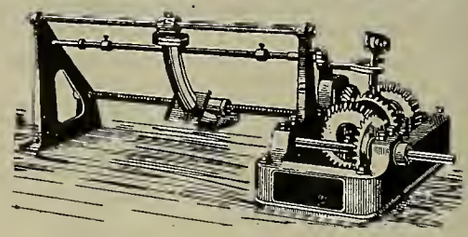
Written by JAMES HIGHAM.

Following is the description of a machine invented by myself, for the purpose of automatically sampling mill pulp and tailings. The accompanying drawing will convey an idea of the manner in which the device operates.

The sampler crosses transversely to and fro through the pulp stream, the direction of travel not being reversed until the sample pipe has passed out of the stream and clear of the sides of the launder. It can be given any travel up to a width of 30 inches to suit the width of launder.

The pulp is shot into the receiver from the upper launder and flows to the launder under sample pipe. The sample is delivered through the end of the pipe and conveyed to the sample tank.

If no running shaft is available for driving the sampler, it can be driven by a small electric motor, or by a small water wheel placed in the stream of pulp. The power required to run the sampler will



Automatic Pulp Sampler.

compare favorably with machines depending on a water supply for their operations, and particularly in cases where water has to be specially pumped. The speed is as nearly positive as possible and the sampler runs continuously.

In the case of a machine operated by falling weights or water boxes there is always a tendency to speed acceleration (if only slight), while the receiver is crossing through the stream of pulp.

The obtaining of an accurate sample is generally a more difficult matter than determining accurately the value by assay, and for this reason the sampler is kept running continuously. It will be evident that the sample taken running continuously will be large, though more reliable. This may be quartered down, or, if more convenient, a second sampler (smaller) may be introduced to automatically reduce the bulk taken by the first machine.

I have found the size of sample taken by this sampler from 100 stamps to be about 2000 pounds per diem.

The main objection so far raised to this machine is that the sample taken is too large for convenient handling. I have just (July 31st) been able to overcome this by a very simple dividing box that will reduce the bulk of the first sample to any required percentage.

*Journal Chemical, Met. and Mine Society, S. A.

Prices Paid for Silver-Lead Ores.

An interesting comparison is made by the Georgetown, Colo., Courier between the prices paid for silver-lead ore when silver was worth $1.18 per ounce and the quotations of the present time. The table was compiled by Manager J. H. Robeson of the Pelican-Dives mine at Georgetown, and was taken from shipping receipts of the Atlantic mine in the '70s.

It would seem from this statement that the treatment charges and the prices paid per ounce for silver were arbitrary, and that there was no fixed rule in either case. The prices paid for like ores to-day are not only much higher, but the cost of mining is at least 25% less than it was in the '70s. The attention of investors is called to these facts, and to the additional fact that ore that could not be mined twenty-five years ago yields a good profit to-day:

Date.	Ounces Silver Per Ton.	Per Cent Lead.	Price of Silver.	Treatment Charges per Ton.	Net Price Per Ton.	Net Price Per Ton, Sept., 1903 — Silver 57 Cents.
May 4, 1875..	683...40...	$1 19...	$23..	$374 69...	$379 35
Aug. 4, 1875.	258...25...	1 19...	81...	105 19...	139 21
Dec. 10, 1875.	373...30...	1 19...	45...	181 95...	204 48
July 3, 1876..	312...30...	1 18...	97...	126 34...	171 45
Dec. 20, 1876.	273...25...	1 18...	46...	130 31...	147 33
Dec. 22, 1877.	600...44..	1 17...	78...	294 40...	340 38
Jan. 22, 1878.	1159...30...	1 16...	41...	567 89...	630 10

Mining Summary.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

The Juneau Record-Miner says the Juallu mines, near Juneau, have closed down temporarily on account of low water. Not only is southeastern Alaska dry, but Rampart, Circle and Forty-mile all report "no water." Miners from the Forty-mile say the river is so low that boats can not be poled up it. Transportation companies report the Yukon is so low that it is feared thousands of tons of freight that are waiting will not go down the river to Dawson before navigation closes.

C. R. Parmele, president of the York-Alaskan Tin Corporation, reports making shipment to New York of their first clean-up of tin. The result of the first two days of sluicing was a ton of clean tin ore. He says the ground in and about York prospects well. There has been little development. His company owns claims 18, 19 and 20 and the entire right fork of Butte creek, but can do little this year except to open up the mines.

ARIZONA.

GRAHAM COUNTY.

The Sierra del Oro Co., having taken over a number of claims in Greenlee district, between the Frisco river and the Clifton Con. Co. property, near Clifton, has begun a tunnel which will cut the first vein in 1000 feet at depth of 600 feet, and the second at 1000. The veins are prospected by open cuts for 6000 feet. The tunnel starts 2200 feet above the river, on which the company owns a patented millsite, to which the ore will be trammed. The tunnel is being run near the center of the claims, so that drifts can be run either way. D. M. Potter is manager and G. Reed of Cripple Creek, Colo., superintendent.

Two additional seven-ton converters have been set up at the smelter of the Arizona C. Co. at Clifton. They occupy the place of the old five-ton converters which were worn out. The A. C. smelter consists of three stands, each being supplied with seven-ton converters, and the output will average sixty-five tons of 90% copper per day, says the Clifton Copper Era.

MOHAVE COUNTY.

The Sorpresa M. Co. has men at work on the Granite Wonder mine, south of Kingman, and is opening up ore. The shaft is being sunk and drifting done. A mill is proposed.

PIMA COUNTY.

Near Arivaca D. Ball is developing the Columbus and Longarino claims. At the Oceanic mine the 3-stamp mill of 1000-pound stamps is running steadily, says Superintendent F. H. Veeder. Twenty-five men are employed. The ore is showing well at a depth of 500 feet.

PINAL COUNTY.

The Troy-Manhattan C. Co.'s smelter at Troy is again in full operation and shipments of copper bullion have been resumed. It was intended not to restart the smelter till the Phœnix & Eastern Railroad reached Riverside, but ore accumulated so fast they found it necessary to begin reduction to make room for the ore coming out of the mines daily in course of development work. A larger plant will be put in when the railroad is finished, says Superintendent T. Kavanaugh.

SANTA CRUZ COUNTY.

At the Old Oro Blanco mine at Oro Blanco men are developing a body of gold ore. At the Tres Amigos mine there are forty-five men working and a 10-stamp mill is being built by the company.

YAVAPAI COUNTY.

In Turkey Creek section, at the foot of the Bradshaw mountains, southeast of Prescott, Manager E. S. Campbell of the Hidden Treasure mine says the foundations are being made for machinery to be set up, including a 10-stamp mill, a hoist with capacity for 1000 feet depth, two 60 H. P. boilers, engine and a thirty-ton cyanide plant. Surveys have been made for a pipe line from a spring 4 miles distant.

The Oro M. Co., at Minnehaha, is putting in machinery, including a fifteen-drill air compressor and a compound engine. More men will be put on and the shaft sunk to depth of 1000 feet.

The International & Onyx Marble Co. of Denver, Colo., and London, England, men, have bought the Big Bug onyx fields, and made payment of $5000 on total of $150,000.

The Monte Cristo mine at Groom creek has been unwatered and more men are being put on. They are down 400 feet and running a crosscut to the ledge.

CALIFORNIA.

AMADOR COUNTY.

(Special Correspondence) — Arrangements were made by Manager John Ross Jr., while in the East a short time since, to resume operations at the Wildman-Maboney mine at Sutter Creek, which has been closed down for several months. It is the intention to explore the Wildman-Mahoney from the 1950-level of the Lincoln mine, which adjoins the Maboney on the north. The 1950-level of the Lincoln is about 600 feet deeper than the lowest level of the Wildman. The vein formation of both the Wildman and Maboney is much broken and disturbed between the 800 and 1400 levels of these mines, and it is thought that this region of disturbance may not have extended to the depth of the contemplated development.

Sutter Creek, Cal., Sept. 29th.

Drifting is in progress on the 2300 and 2400-foot levels of the South Eureka mine, near Sutter Creek. The drift is being driven north and south on the 2300 level and northward only on the 2400 level.

CALAVERAS COUNTY.

At the Royal mine at Hodson Manager Kemp Van Ee has the 120 stamp mill running steadily.

COLUSA COUNTY.

The lease of the Minor Oil Co., in Bear valley, has been absorbed by the Bear Creek Oil Co., with headquarters at Corning. A hole has been drilled 900 feet and is reported to be in oil sand. Drilling has been resumed.

CONTRA COSTA COUNTY.

R., H. & G. Mitchell, who own the Mitchell Con. copper mine at Cananea, Sonora, Mexico, are reported negotiating for the Copper King smelter at Bay Point, and it is said if they do not succeed in acquiring the property from the creditors of the Copper King Co. they will build a smelter on a site already secured near Antioch. The smelter will be operated in connection with the development of a number of Mexican copper mines owned by the Mitchells and their associates. All will be reached by the Kansas City and Orient railroad, being built to Topolobampo on the Gulf of California.

EL DORADO COUNTY.

(Special Correspondence).—The Lucero M. Co. at the Alpine mine, S. Collins foreman, is keeping the water out of the shaft, but no other work is being done at present. Water power is used, and a separate wheel for each drives the hoist, pump and mill. The mill contains a crusher, 5-foot Huntington, amalgamation tables and two concentrating tables. Internal troubles in company affairs is said to be the cause of shutdown.

The Oro Fino M. Co.'s California Jack mine has transferred all its holdings to S. L. Mitchell, of Los Angeles. The mine is idle. They have the main drift in 700 feet, with stopes and crosscuts showing ore. A 10-stamp mill is on the property, equipped with water power. This is the south extension of the Alpine mine.

Scher Bros. have put on a windlass, cleaned out the 80-foot shaft on the O. K. mine, east of Georgetown, and have ores in the bottom of the shaft. They propose to increase development during the winter.

Georgetown, Sept. 30.

Men are at work on the Cash Rock mine on the river below Josephine.——The El Dorado C. M. Co. will increase development work on its gold mines in Georgetown.

Duffy & Vestal of Forest Hill are reported to have leased the Daggett ditch and bonded the Phillips' gravel claim near Josephine. Preparations are being made for the winter's run.

FRESNO COUNTY.

The Esperanza Oil Co., near Coalinga, J. A. Bunting of San Francisco, president, has finished No. 3 well and started on No. 4. Development work will be continued on the Coalinga lease.

The production of Section Seven Oil Co.'s well necessitated the laying of a separate 6-inch line connecting it with the P. C. O. tank at Coalinga, says the Reporter. Thus far the production of the well has been increasing, and has yielded up to 2500 barrels in twenty-four hours. Grading for two 1200-barrel tanks is completed and as soon as they are up No. 2 well will be perforated.

INYO COUNTY.

G. Vornberg of Mt. Spring canyon, near Independence, has his 3-stamp mill, triple discharge, completed and began dropping the stamps this week. The mill is expected to handle eighteen tons per day.

KERN COUNTY.

(Special Correspondence).—The last carload of thirty-two men for the Yellow Aster arrived at Randsburg to-day. They now have about 200 men and have had the 100-stamp mill running since the 23d. They will start the 30-stamp mill this week. They will make their second shipment of bullion October 2d. There has been no violence and no damage done to the property.

Randsburg, Sept. 29.

The Gold Coin mine near Randsburg is in operation.——N. Johnson and P. Jensen have a lease on the Minnehaha mine and have begun work.

The Merced mine, near Randsburg, has been incorporated, and R. L. Owens of Saticoy, Ventura county, is president. The company will sink a shaft to open the Santa Ana lead.

The Baltic mine in Stringer district, near Randsburg, has started work.

The Lackawanna Oil Co. has been organized to operate in the Kern River fields, near Bakersfield, by T. Spellacy, E. E. Jones, J. E. Haworthy and A. H. Liscomb, all of Bakersfield.——The Teck Oil Co. has been incorporated with headquarters in San Francisco by H. & L. Rosenfeld, W. Walker, I. S. Lillich, of San Francisco, and A. H. McKay, of Santa Barbara.

The Bakersfield Californian says the number of new companies entering the Kern county fields within the last month show plans for increased development work. Those companies are the Lackawanna and Veteran, on Kern river; the Transport, at Sunset; the Argentine and the Teck, and several others preparing to incorporate. The amount of development work to be done by the old companies will also be increased.

The Exposed Treasure M. Co. at Mojave is enlarging its milling plant by putting in ten more stamps.

LAKE COUNTY.

Work is reported progressing at the Black Bear quicksilver mine, owned by Brush, Pinschower, Caldwell & Furber of Cloverdale. The Black Bear is 20 miles from Cloverdale, Sonoma county, and 1½ mile from the Culver-Baer quicksilver mines. During the past year they have tunneled in 400 feet and last week struck a ledge 14 feet wide carrying promising quicksilver values.——The Socrates quicksilver mine has bought the property of the Mercury mine and ore is being opened up.

MARIPOSA COUNTY.

L. De Perhacs, of the American Gold Eagle Co., Con., of New York, has bonded several mines in Bull Creek district, east of Coulterville. Besides the claims which they have bought in Bull Creek district, they have a bond on the Ontario, Clawhammer, Minnepah, Two-thirty and Gold Bank, and also a bond on the Democrat and Compromise claims. They also have an option on the Marble Springs and Eubanks patented claims. The claims are all adjacent. Machinery will be put in and development work started. Later, a mill will be built.

The Diana G. M. Co., operating on the North Fork of the Merced river near Coulterville, report development work progressing and showing high-grade milling ore. Sinking has been discontinued and Superintendent Soderberg has started drifting on the vein.

MONO COUNTY.

A tunnel is being run by Bell & Annear on the lignite deposit at Cottonwood, says the Bodie Miner-Index. The coal is 11 feet in width.

NEVADA COUNTY.

The New York-Grass Valley M. Co. is preparing to increase the capacity of the milling plant on its group near Grass Valley.

The work of laying 8000 feet of 24-inch pipe to connect the Empire mine at Union hill, near Grass Valley, with the South Yuba W. Co. reservoir on Banner hill was finished last week and connected with the reservoir. Heretofore the Empire has depended on the 22-inch pipe line of the Brunswick mine for its water supply.

Manager H. G. Brunnier, of the Conlin mine, Grass Valley, says it is proposed to build a mill. The mine will be run by electric power.

C. Gressweil and A. G. Harvey, of San Francisco, have bonded the Alta and Bingham mining properties at Washington. They adjoin those operated by the Yuba D. Co.

C. A. Poage, for Chicago men, has bonded the Independence mine, between Nevada City and Omega, and says he will start development work next week.

Manager G. Lezinsky of the Gold Tunnel M. Co. put men at work last week at the East Orleans mine on Gold Flat, near Nevada City, sinking a new shaft 150 feet east of the incline shaft. Work is going ahead in drifting east and west along the ledge from the incline at a depth of 100 feet. From the east drift a raise will be made to connect with the shaft.

At the Central mine of the North Star Co., 2 miles south of Grass Valley, a body of ore 6 feet in width was struck in the 3900-foot level last week. The ledge shows free gold. The raise which will put the Central in direct connection with the North Star will be completed this month. The work on the mill is in full blast, says Manager A. D. Foote.

The Rosey mine, near Grass Valley, has its 10-stamp mill in operation, says W. H. Bray, manager.

An electric cable, encased in lead, 2700 feet in length and weighing five and one-half tons, is being put in at the California mine at Gaston Ridge, having been hauled in from Emigrant Gap. The cable is for use in the tunnel and will transmit power to an underground hoist.

H. Huckins, manager of the Quartz Quarry gold mine, near North San Juan, says they are preparing to build a mill and also to put a bridge across the South Yuba river. Work is progressing at the mine.

At the Le Compton mine in Willow valley, near Nevada City, Superintendent Dunlap is wiring the incline shafts and the drifts for electric lights.

Superintendent Kaler, of the Grey Eagle mine, near Washington, is putting in a 5-drill compressor. Operations are temporarily suspended because of lack of water. During the shutdown, concentrators and an electric lighting plant will be put in. There is a 560-foot tunnel. The ledge has an average width of 3½ feet. The mill is of ten stamps. Superintendent Kaler proposes to enlarge the water system so as to give ample motor power the year around.

W. Wheeler says his locations on Big Canyon creek, 3 miles below Bowman's dam, including the Hawkeye, Ophir and Excelsior, will be consolidated and the Hawkeye Con. M. Co. incorporated. By extending the tunnel, from 1200 to 1500 feet of backs can be secured. The North Bloomfield ditch is high enough above the mouth of the tunnel to give ample power for machinery. The property is 10 miles from Emigrant Gap, on the main line of the C. P. railroad.

J. E. Poignedestre of Grass Valley, with San Francisco men, have incorporated the Western Pacific Mines Dev. Co. of California. They control the Gold Blossom mine on Union Hill, near Grass Valley, and will start operations this week.

The Phelps Hill mine near Nevada City has been sold to W. P. Ketcham and C. C. Poage of Chicago, Ill., and H. Benson of Reno, Nev. Besides operating the mine, the new owners will put up a sawmill and make use of the timber that covers the property.

PLACER COUNTY.

(Special Correspondence).—G. B. Knoff at the Eureka has ore for the Malmberg mill, Auburn ravine. This ore has averaged $11 per ton.

C. A. Reed is extracting ore on the St. Lawrence mine, cobbing the richest sulphurets for shipment to Selby's.

The Crandall has let a contract for a 100-foot shaft to A. Johnson and others.

A contract has been let by the Crater Co. for 100 feet of drift, to extend the 400-foot level.

The Boulder mine is unwatered and active operations are looked for.

The Bellevue mine owners contemplate sinking on and reopening the property.

Auburn, Sept. 30.

Superintendent E. C. Gaylord is putting in a Huntington mill at the Gaylord mine near Auburn, to be used in conjunction with the rotary mill now in use. As soon as the water company can furnish sufficient water, he expects to have forty men at work, says the Placer Herald.

PLUMAS COUNTY.

Superintendent Lawton of the Plumas G. M. Co. at Greenville says the machinery has been set up in the 15-stamp mill, and it is expected to be in full operation this month.

SHASTA COUNTY.

The Copper M. & S. Co. has a bond on the Graham group of claims, and the Allen & Alexon extension, on the western slope of Horse Creek mountain, 4 miles west of De Lamar. At one place a 75-foot shoot of ore is said to be blocked out. The bond is said to be for $30,000.

The Inca Treasure M. Co., operating a group of claims on Dog creek, near Delta, near Redding, is taking out ore and making shipments to the smelter. The returns show the ore averaged $37 in gold. The Inca Co. will build a milling plant on the property and the consolidation of several other adjacent claims is in contemplation.

SIERRA COUNTY.

Men have been put to work on the Kinselbach quartz mine, near Alleghany.

At the Sierra Reina mine, near Alleghany, twenty men are at work, and the stamp mill is in operation.

G. Rayburn, A. F. Kohlmeyer, W. W. Tiner, C. Fink and P. Berg, of San Jose, have bonded the Young America gravel mine near Forest City. They will begin development work.

SISKIYOU COUNTY.

C. W. Tyrer of the Tyrer & Co. quartz claim on Klamath river, below Klamathon, says the mine is working steadily and the mill is crushing ore.

The Siskiyou M. & Dev. Association of Etna is sinking a vertical shaft at the coal mine on the Herr ranch, 6 miles north of Moutague, between Yreka and Ager, which is down 150 feet. They expect to tap the coal vein that they followed for 800 feet with an incline shaft, by going into the valley and sinking this shaft, says Foreman L. S. Williams. At 150 feet they have cut several seams of coal but have not yet reached the main body.

TRINITY COUNTY.

The Trinity C. Co. is preparing to put in a 20-drill compressor at the Shasta King mine, near Kennett.

TUOLUMNE COUNTY.

L. J. Holland is reopening the mine on the Beardsley place below Sugar Pine, near Confidence, having bonded the half interest of W. T. Gurney, and will increase development work. The incline shaft will be sunk deeper and drifts run on the shoot. A whim will be used for hoisting until a steam hoist is put in.

The Kodak mine of W. Connelly and J. L. Gibbs on the North Fork of the Tuolumne river, near Carters, has been bonded to M. Walker of San Francisco for $30,000. A 10 stamp mill will be built this fall.

The mill on the Soulsby mine at Soulsbyville, is being run six hours per day on ore from No. 2 and No. levels. The drift north from the 200-foot level has been run 500 feet, and that from 300-foot level 360 feet. Another 300 feet from the face of the drift on the 300 level will connect the new works with the old. Considerable water has been struck in the mine, and Superintendent W. Sharwood thinks it is drained from the Platt mine on the south. An 8-inch Cornish pump with a 6-foot stroke is being put in to handle the water, and when finished a contract will be let to sink the shaft 100 feet deeper.

Work at the Mt. Jefferson mine at Groveland is going ahead, and ore is being opened up in the crosscuts. Sinking will be resumed as soon as a station pump is put in at the 500-foot level. The pump will lift 120 gallons per minute to 600 feet.

At the White Bear mine at Monte Cristo, near Downieville, they are in pay gravel, one week's cleanup amounting to 235 ounces gold, says the Messenger. Superintendent W. J. Belcher has thirty men at work.

Estey & Stanford, who hold the Doyle ranch gravel mine, near Columbia, under bond, last week made the second payment and will increase development work.

COLORADO.

BOULDER COUNTY.

At the Ragged Top mine, near Sugar Loaf, Superintendent C. Bonnell says heavier machinery will be put in and development work will be increased.

An air compressor will be put in by Manager C. F. Lake, of the Boulder County mine. A 100-stamp mill will be built on the site of the present mill. The mine will have a system of direct delivery to the mill from the mine at depth of 1000 feet. Work will be started on the crosscut tunnel this month, which will be started a short distance above the mill and will be driven 3000 feet to cut the 9-foot Cardinal vein at depth of 1000 feet below the present workings (1400 feet from the surface). The Boulder County mine is in Grand Island mining district, near Eldora, and is owned by T. F. Barnsdall, of Pittsburg, Pa.

A steam hoist will be put in at the Sparkling Jewel mine, near Wallstreet. The mine is 200 feet deep and has been worked with a whim. A pocket of ore showing free gold and tellurium has been opened in a crosscut. The whim will be used on the Florence mine.

The United States Gold Corporation at Arapahoe Mountain, near Eldora, is putting in machinery, consisting of boiler, compressor, etc., says Superintendent Rowell.

CHAFFEE COUNTY.

The Mary Murphy mine at Romley, near Buena Vista, has been closed for an indefinite period. The smelter has also closed temporarily. No action regarding resumption of operations at the mine will be taken until after the directors and stockholders meet. It is thought R. G. Hinkson will succeed Manager Morley, who died last week.

The smelter at Salida has completed its roasters, which will add largely to its sulphide capacity. The new stack is also completed.

CLEAR CREEK COUNTY.

C. Haselhine and A. W. Hille of Denver, with A. Anderson of Idaho Springs, have a lease and bond for $25,000 on the Ward and Ward Extension lodes, near Idaho Springs. The shaft is down 110 feet and sunk on the foot wall, and a crosscut started to get the hanging wall. Hoisting machinery will be put in and the shaft sunk deeper. The ore carries gold and silver.

The Continental Electric Power & Irrigation Co. of Idaho Springs will put in a 200-ton cyanide plant at Empire. The Continental Co. owns a damsite in Box canon above Empire, near Berthoud pass. The company has also located three reservoirs which will hold 60,000,000 gallons of water. A trench for the pipe line has been dug and the electric plant will be started this month.

A steady output of four loads (twenty tons) a day is being taken from the Shafter mine, near Idaho Springs, and milled. Fifteen men are employed. They are driving the fifth level east and stoping in the fifth and first levels. The mine is a wet one. It will be cut by the Central tunnel and the water problem then solved.

Boyd Bros, Straub & Huillet have a lease and bond on the Silver Ring tunnel and group of claims near Idaho Springs. They have sunk for 60 feet near the mouth of the tunnel and are drifting under the tunnel level, and have 20 inches of milling ore that will run $18 a ton. The property is owned by T. E. Schwartz of Denver.

T. J. Johnson, manager of the Specie Payment mine, near Idaho Springs, is arranging to put in a power plant and drive the tunnel ahead.

Eight men are remodeling the Alpine mill, near Idaho Springs, under Manager T. B. Craw. Additional machinery will go in. Pending completion of the mill no work is being done at the Con. Alpine mines.

Corundum is reported found by F. A. Maxwell on Saxon mountain, near Georgetown.

It is reported operations will be resumed at the Marshall tunnel at Empire station (Marshall Park postoffice). The company has been reorganized.

CUSTER COUNTY.

Work has been resumed by G. White on the group of the Grand Rapids M. Co., near the Baseick mine, near Silver Cliff. Work continues on the Dolomite shaft, which is 40 feet deep, at the bottom of which a 4-foot vein is showing. The Toledo mine has struck a large amount of water, which is being handled. A crosscut is being driven southward.——The Boulder mill of the Valley M. Co. is undergoing repairs and more concentrators are being added.——The striking of water in the First Colorado claim, near Custer City, has necessitated pumps.——The shaft of the Bull-Domingo mine is being unwatered.

The Bismuth mine of Querida, in which a strike of silver ore has been made, is sending out ore to the Salida smelter. The property has been absorbed by the Preston G. M. Co.

DOLORES COUNTY.

The Erickson-Holzner et al. lease on a block of the United Rico M. Co.'s ground (the Contention) is shipping high-grade gold-silver ore to the Durango smelter.

EL PASO COUNTY.

Work was resumed this week at the Standard plant of the United States R & R. Co. at Colorado City. The company uses 500 tons of ore daily when it is running full force, and ore is coming in at rate of over 200 tons per day.

FREMONT COUNTY.

Smith & Sons of Williamsburg, having opened a 5-foot vein of lignite coal at a depth of 80 feet by driving a 280-foot slope with an incline of 30°, have equipped the mine with coal chutes, tipples and rails. They have begun taking out coal for shipment.

GILPIN COUNTY.

The Quartz Hill M. Co. has been incorporated at Idaho Springs by J. A. Wright, J. F. Lilly et al. Contracts have been let for work on the Golden Dollar mine and timbering on the 100-foot vertical shaft started.

The Electric Spark G. M. Co. reports work of cleaning out and retimbering its Shamrock shaft at Russell Gulch finished. The shaft is down 350 feet. The 100 and 200-foot levels have also been cleaned out and retimbered, says Superintendent G. N. Rogers. W. A. Rogers of Omaha, Neb., is manager.

J. Lyng, R. Tresize and C. Hauser are working the east Missouri mine on Quartz hill, near Central City, under a lease, and they are down 180 feet and hoisting ore. Their milling ores are running one-half ounce gold per ton and their smelting ores $65 per ton. They expect to sink the shaft and will put in additional machinery.

GUNNISON COUNTY.

The West Gold Hill M. Co. has been incorporated by Eastern men to operate near Gold Hill, Tin Cup district. The company's main office is in Denver, with L. Cavnah president and manager. The holdings of the company cover 100 acres of mineral land, including the J. B. Sellers group, Queen of the West and Iron Hat lodes. Development will be increased. Tunnel No. 1 is in 160 feet and shows a vein 4 feet wide, carrying $12 per ton. Tunnel No. 2 is now in 140 feet. Three hundred feet north a shaft has been sunk on the vein. The company is planning to build a 50-ton milling plant, with a cyaniding and concentrating equipment.

The air line leading to the Yankee Blade tunnel, near Crested Butte, has been repaired and work resumed. This tunnel has reached the main Yankee Blade-Excelsior vein and cut a body of shipping ore. The larger ore shoots are said to lie nearer the crest of Caecade mountain, which the tunnel will reach at 500 feet farther in. The largest ore bodies of the Excelsior are under Baxter basin, which the vein crosses, and the Yankee Blade tunnel will cut these at depth of 600 feet below the lowest point of the basin, says the Elk Mountain Pilot.

The Augusta mine's sawmill is cutting lumber for buildings at the Yankee Blade tunnel. The drift is started on the main Augusta vein. A body of quartz is showing in this drift, which is being driven on the vein extending toward the Dark Canyon side. It is estimated it will require 1500 feet to reach Dark canyon, and several ore shoots will be cut along the line.

JEFFERSON COUNTY.

F. R. Carpenter, head of the Golden Smelter, says the smelter has closed down for lack of ore and will resume when the supply is up to the mark necessary to warrant operation. The company operates the Saratoga mine, in Gilpin county, but it does not produce enough ore for their purpose, as it requires 200 tons a day. He will not start up again until he has between 4000 and 6000 tons in the yard.

LAKE COUNTY.

There is no work being done on the R. A. M. shaft of the Small Hopes M. Co., near Leadville. The dry sulphide dump is being shipped to the smelter. It is not high grade, but the lead and silver contents are sufficient to make it pay. There are a few lessees working on the Small Hopes property north of the gulch.

The Bug G. M. Co. has resumed operations on the Mint mine in Lincoln gulch, near Leadville, says J. Robinson, superintendent. —— The Eclipse group on Breece hill has resumed operations, says Superintendent Hoskins. Development work will be increased.

The Keystone M. Co., composed of Denver, Leadville and Eastern men, has started by Superintendent J. A. Weber further development on the Keystone group in the north end of Leadville district. An engine and a hoisting plant are being put in, and it is intended to sink the shaft to the lime-porphyry contact.

SAN MIGUEL COUNTY.

The Butterfly-Terrible mine at Ophir was closed the 24th ult., and the miners and millmen are leaving the camp. The employes of the mine and most of those in the mill refused to obey the orders of the Miners' Union to strike, and would have continued to work had the company desired. No official explanation of the order to close has been made, but it is supposed the company was unwilling to risk the possibilities of trouble by continuing operations. Refusing to strike, the miners themselves posted an armed guard on the trail and refused to allow the union committee to approach the mine. F. J. Hobbs, secretary of the Butterfly-Terrible G. M. Co., says the mine and mill will remain closed indefinitely.

SUMMIT COUNTY.

Schauer & Co. have cleared out the third level on the Margaret mine, near Georgetown, and will sink on the ore streak to find the dip of the ore shoot. They have also let a contract on the No. 4 level to drive ahead. The ore in this property mills 240 ounces in silver per ton.

TELLER COUNTY.

Manager Parfet of the Streetor & Cripple Creek G. M. Co., operating on the Snowshoe claim, on Sheep mountain, near Gillett, is arranging to build a 50-ton cyanide plant. Men are timbering the shaft from the 200 foot level. A station will be cut and drifting on the vein started. On No. 2 shaft timbering has been done for 20 feet and sinking the shaft will be resumed.

A hoist and engine will be added to the equipment at the Findley mine on Bull hill, Cripple Creek. It will have capacity of hoisting ore from depth of 2000 feet. The property has one shift of forty men at work, says Manager Murphy.

The Gold Coin mine at Victor was closed down on Sept. 30, involving the closing of the Economic mill and throwing out of work 260 union miners. The properties belong to the Wood Bros., who have heretofore not been involved in the labor troublee in Cripple Creek district. Wood Bros. notified their employes that they must leave the Western Federation of Miners, and a strike on the properties was at once ordered.——Water is flowing from the portal of the Cripple Creek drainage tunnel at the rate of 1800 gallons a minute. In the meantime the main tunnel heading is being forwarded northeast from the El Paso workings. It is 500 feet from the El Paso workings. In addition to this bore, a drift is being run on the C. K. & N. vein, where more water is being released. The water is receding most noticeably in the Elkton mine and in the Mary McKinney workings. Several other properties also show a lowering of the water level.——W. Swanson, manager of the Abe Lincoln mine in Poverty gulch, near Cripple Creek, resumed operations last week with forty-three men on one shift. Shipments to the smelter have also been resumed.

There are at work in Cripple Creek camp, in disregard of the orders of the strike committee of the Western Federation of Miners, nineteen mines, three samplers and one electric plant. The total number of tons of ore being shipped out of the camp daily amounts to 360. There are nearly 1000 men at work in the so-called "unfair" mines and plants.

The output of ore from Cripple Creek district for month of September, while being less than at any time since the history of the camp, was greater than looked for, says the Cripple Creek Times, reaching 13 000 tons.

G. Jordan, who is treating the tailings of the Summit mill at Gillett, is cyaniding twenty tons per day. The ore is said to be yielding average returns of $7 in gold per ton.

O B. Finn, manager of the Cripple Creek & Colorado M. & M Co. at Cripple Creek (the Rittenhouse) has granted a lease on the White Elephant claim to R. O. Hanley for two years, with royalties of 20% and 25%. He will start work in shaft B, the most westerly one, at a depth of 300 feet.

The Cripple Creek Gold Temple G. M. Co., working a lease on the Gold Sovereign mine at Cripple Creek through the Lovett shaft, is again in operation with twenty-two men, after a temporary shutdown. Considerable lateral work will be done in the bottom of the 625-foot shaft. The vein averages 15 feet in width.

IDAHO.

BOISE COUNTY.

The Gold Hill mine at Quartzburg will be reopend by G. W. Grayson and W. C. Ralston of San Francisco, Cal. The ore is said to be a black quartz, carrying gold. The mine has been idle for six years, and the lower workings are flooded.

The Summit group of four quartz claims, the hoisting plant, pump, houses, etc., of the Colorado & Idaho M. Co., near Idaho City, were sold last week at Sheriff's sale to E. Strauss, says the Idaho World.

A larger hoist is being put in at the Washington mine, near Idaho City. The old hoist will be set up on the 400-foot level, and an incline sunk on the ledge from the drift that was run on this level to cut the ore shoot.

ELMORE COUNTY.

The Jericho mine at Atlanta has been bonded by C. D. Spaulding, manager of the Chink mine. A contract will be let for a 160-foot raise and continuous work in the drifts. This makes seven mines in operation at Atlanta.

R. P. Chattin, who has owned a two-thirds interest in the Franklin mine at Pine, has bought the remaining one-third interest for $100,000.

IDAHO COUNTY.

Last week the Jumbo mill at Hump again started dropping its fourteen stamps. The lower tunnel has been started and will give access to the mill directly from the mine, only 100 feet distant. Three hundred feet additional depth will also be gained. Electricity will be used for lighting purposes in all the buildings and also underground.

SHOSHONE COUNTY.

The Elgin M. Co. has been organized at Wallace by W. J. Bracking, J. L. Ragenovich, L. J. Columbus of Wallace and W. J. Herring and S. M. Mitrovich of Wardner, to operate a mine 7 miles west of Wallace and ½ mile from the O. R. & N. track.

The North Franklin M. Co. has been incorporated by J. F. and H. W. Ingalls of Mullan, J. P. Daily of Great Falls, Mont., L. J. Columbus and W. J. Bracking of Wallace, to operate a group of claims adjoining the Morning mine, near Mullan.

J. M. Jamieson and C. L. Mathews of Spokane, Wash., have an option on the Gold Hill mine, between the Mammoth and Standard mines, at Wallace, for $300,000.

KANSAS.

CHEROKEE COUNTY.

C. Bryan of Carthage, Mo., has a lease on 40 acres of the Clary & Shultz mine at Empire City, near Galena, and has begun prospecting with a drill.

MICHIGAN.

HOUGHTON COUNTY.

Fire was started in the new furnace at the Dollar Bay smelter last week. It is expected to take three weeks to make the sand and copper bottom ready for actual service. This will give the Lake Superior Smelting Co. four of these furnaces, all having been put up during the last three years.

The Tamarack mine at Calumet has bought 6000 acres of timber land in Ontonagon county, carrying mixed hemlock and hardwood and some pine, from the St. Mary's Mineral Canal Co. for $70,000. The mineral rights were reserved by the Canal Co.

The Osceola M. Co., near Calumet, reports the thirty-eighth and thirty-ninth levels of the old mine in good copper ground, and down to the fiftieth level in No. 6 shaft north and south the showing is also good. The company is shipping 4000 tons of rock daily to the mill.

An electric generator is being put in at the Quincy mine at Hancock, to be in operation by Oct. 15th, when four of the twelve additional electric locomotives ordered will supplant manual labor in tramming at some of the lower levels, and the others as soon as possible thereafter. The Champion mine management at Palmesdale is considering a similar introduction at the south end of the mine, where it may obviate the necessity of sinking at least one shaft. At the stamp mills several changes and improvements have been completed toward reducing the cost of stamping and the saving of copper in the waste tailings. The heads have been equipped with the coarse stamping appliances and improved mortar discharges, with the result that six stamps are now treating the entire output, says the News.

The new system of hoisting at the Red Jacket shaft of the Calumet & Hecla, near Calumet, has been adjusted and went into commission last week.

The Wolverine mine stope on the west vein, 80 feet west of the Kearsarge lode, is reported showing copper ground both in stamp and mass. Drifting south is in progress. The Kearsarge lode openings on the Wolverine, near Calumet, continue favorable. The run of mass is not as heavy as formerly, but stamp rock holds up. The deepest workings are at the twenty-fourth level of No. 3 shaft.

KEWEENAW COUNTY.

Ground was broken last week for a permanent inclined shaft on the Miskawabik mine, near Allonez. The air compressor and steam hoist are being set up. The shaft is 300 feet north of the northerly prospecting pit. Work in both pits has been suspended. Thirty men are employed, says Superintendent Scott.

The test pit at the Cliff mine, north of Calumet, is down 16 feet in the overburden. Fifteen men are at work.

MISSOURI.

JASPER COUNTY.

W. E. Newkirk, Statler Bros, J. Montgomery and W. A. Dumbauld have completed their mill on the McKinley lease, south of Carterville. They have nine lots and four shafts down into ore. Three of the shafts show a run of sheet ground with a face of 20 feet of lead and zinc ore, says the Joplin News-Herald.

Ford, Cowan & Co. of Joplin have sold a one-half interest in their mine on the Center Creek lease to Indiana men for $4000. They have been making eight tons of ore per shift, run on the custom mill since January. It is the intention of the company to build a mill.

J. W. Ellis, J. B. Gibson, A. B. Rawlings and Sours & Son have a 10 acre lease one-half mile west of Joplin, and in sinking their shaft at 55 feet cut a body of jack. Their lease runs for ten years at 10% royalty.

The Holy Smoke mine on the Aylor land, south of Carterville, reports putting out 300 tons of jack per week. J. Luke, B. Ash, J. Brown et al are owners.

The Williamsport Z. & L. Co., on the Creller & Young land at Sherwood, near Joplin, has unwatered the ground and put men to work in the drifts. They will sink the pump shaft from its depth of 125 feet to the 170-foot point.

VERNON COUNTY.

To the increasing lead and zinc mining interests in southwest Missouri is being added asphalt, says the Joplin News-Herald. In the southern part of Vernon county J. W. Layne of Carthage, of the Barton & Vernon County Oil & M. Co., says they have a lease on the ground where asphalt is being developed in paying quantities. In drilling for oil the asphalt was struck and it ranges from the surface down to 50 feet and in thickness from 6 to 24 feet. The earth above is soft, making it possible to strip the asphalt. The deposit has been shown by drilling to extend over a territory 2 miles in diameter.

MONTANA.

DEER LODGE COUNTY.

Reports from the Gold Coin mine, west of Anaconda, say a strike has been made. It is being worked under Superintendent J. R. Boarman, after having been closed down on account of litigation.

Since the new flues and the 300-foot smokestack have been in operation at the Washoe smelter there is a decided change in the color and variety of the smoke that issues from the top of the stack, and although all of the furnaces at the smelter have not been fired up as yet the draft is so great that it carries the smoke to a distance of 200 feet after it leaves the top of the stack, and then it floats away in the air instead of hanging to the ground, as it formerly did, says the Butte Miner. Tests have been made of the smoke as it comes from the stack and flues, and it is said not to contain anything of an injurious nature. The system was built with the idea of saving all of the arsenic and sulphur that were formerly carried away with the smoke, and which settled on the lands of the Deer Lodge ranchers. There are 1600 men employed in the works and this number will be increased.

FERGUS COUNTY.

J. C. Bates, of New York, has bought the Curran one-half interest in the Big Four, Wild Cat, Golden Crown and Snowflake claims in North Moccasin mountains. Gudgell Bros., of Lewiston, own the other half interest, says the Argus.

R. E. L. Townsend, of Colorado, has bought the Fields' one-third interest in the Reliance, Tom Boy, Wonder and Climber claims in Warm Springs district, near Kendall. Townsend has also bought the Stephens two-thirds interest in the Millsite and Columbia claims in Cone Butte district.——F. H. Hazard has bought the Stephens one-half interest in the Katherine, Marion, Little Hazel, Little Edna and Glendive claims in Cone Butte district.

The Mint and Yellow claims and the Norman group in Warm Springs district, near the Kendall group, near Kendall, have been bonded to W. G. Moore of Colorado Springs, Colo.

FLATHEAD COUNTY.

The Batcheler group of claims in West Fisher gold belt, 35 miles south of Libby, has been sold for $15,000 to the Michigan men who had an option on it, says Manager Burlingham. The group comprises eight claims.

JEFFERSON COUNTY.

The Minnesota, near Wickes, has resumed operations, says O. M. Holmes, who has bonded the mine. He will sink a new shaft and a tunnel will be driven at the foot of the mountain.

At the Crystal mine, being operated by the Cataract C. M. Co, near Basin, work is progressing. Smelting ore is being blocked out. The drift has been continued on the lead. The ore shows native copper, with values in gold and silver, says Superintendent Buckley. Work at the Bullion is progressing. The raise has been connected with the upper tunnel and a shoot of ore exposed. Work on the smelter of the Cataract C. M. Co. is going ahead and it is expected to be in operation in January, says smelter Superintendent Evans.

LEWIS AND CLARKE COUNTY.

The East Helena plant of the American S. & R Co. will be enlarged. Another stack has been blown in, and an independent copper stack is to be put in operation this month, because of the increased copper production in the district.

MADISON COUNTY.

Foreman T. G. Port, of the Hungry Hollw group, near Virginia City, under bond to a North Dakota company, says work is progressing. He has uncovered a vein of 7 feet of sulphide ore of good grade. Some water was struck. Manager Feetham of Grand Forks, N. D., has applied for a permit to build a road on the forest reserve, and as soon as it is completed and buildings put up, a 200-foot shaft will be sunk.

F. B Heardt, foreman at the Big Indian M. Co. plant near Helena, says work is being resumed on the Mohawk mine at Washington Bar, near Pony, and owned by the Big Indian Co.

SILVER BOW COUNTY.

The Boston & Montana C. Co. last week ceased operating a portion of its concentrator at Great Falls and will not start it again until the injunction granted by Judge Clancy, preventing the working of the Picalo mine, has been set aside. The section of the concentrator closed down was treating 500 tons of ore a day. One hundred and seventy-five men in Butte and Great Falls will be thrown out of work, also about 200 Butte miners, says the News.

NEVADA.

Articles of incorporation of the following companies have been filed with the Secretary of State: Tonopah Eagle M. Co., Tonopah; Bonancita G. & C. M. Co., Reno; Madelaine Tonopah M. Co, Carson; Mitchell Bros. S. & R. Co., Carson; Keyes-Grassler M. Co, Reno; F. E. & A. M. Co., Tonopah; Tonopah Reduction Co, Tonopah.

ESMERALDA COUNTY.

Arrangements are being made to begin work on the McNamara group near Tonopah next week, says Manager C. Peters. It is intended to crosscut from the 500 foot station for the ledges.

J. Dopp, manager, has begun operations on a group of three claims owned by the Tonopah Superior G. M. Co., 1 mile southwest of the Mizpah mine at Tonopah. The work being done consists of a tunnel, which is being driven to tap four ledges which show on the surface and which will be cut at depth of from 150 to 200 feet. A shaft 40 feet deep has been sunk on another ledge, 2 feet wide. The property is on one of the hills west of Brougher mountain.

C. Smith has a working bond on the A. Weber group of mines on Cat creek, 8 miles from Hawthorne. Smith says they are surrounded by timber and water sufficient for milling purposes can be obtained. The Nevada claim shows a 3 foot ledge of $10 ore, the Golden Nugget 2 feet of $12 ore and the Lakeview also pay ore.

EUREKA COUNTY.

J. P. Raine reports work progressing on his group, the Gray Eagle and Bald Eagle, 16 miles from Palisade, and in the Railroad mining district. On the Gray Eagle, a tunnel 250 feet has been run and winze sunk 50 feet on the vein in limestone, from which assays run 20 ounces silver and 20% lead. On the Bald Eagle a 30-foot shaft has been sunk on a ledge of copper ore, assaying 9% copper and 50 ounces silver. The ledge has a northeast strike with westerly dip, and is 3 feet in width, of sulphides. Near the shaft, an incline run 200 feet to tap the ledge struck a soft carbonate ore assaying 17 ounces in silver. There is wood and water within a mile of the mine.

LINCOLN COUNTY.

A strike is reported made in the Badger mine, which adjoins the Ida May, near Pioche. The Badger is owned and operated by the E. & F. Mining Co., A. Murphy manager. The company is driving a tunnel of 190 feet on the Ida May. Blower and air pipe have been put in, and it is expected to tap the ore body in the Ida May at more depth than was practical by sinking.

LYON COUNTY.

Manager E Boyle of the North Rapidan group of mines at Como, near Dayton, says the mill built by his company will start crushing ore from the Congress claims this week. The mill consists of two three-stamp batteries, the stamps weighing 1200 pounds each.

Manager Rae says work has resumed in the Como-Eureka mine at Como, and the stamps will be dropping on ore next week, as there will be ample supply of water in the Carson river now that the irrigation season is over, to keep the dynamo plant at Dayton running, which supplies power for the hoist and mill plants. Including work in other locations in Como and Palmyra, there are forty men at work in those districts, the monthly payrolls of which aggregate $4000.

The Brunswick mill on the Carson river, near Dayton, is ready for operations with the advent of water, says the Territorial Enterprise. Ore will be shipped from the Gold Hill mines.

NYE COUNTY.

The Tonopah Extension M. Co. at Tonopah, is putting in a 50 H. P. steam hoisting plant.

H. Crawford and M. Orvis of Buffalo, N. Y., of the Douglas-Lacey Co., have bought a group of six claims adjoining the Ray & O'Brien and the Ray Tonopah properties at Ray for $9000 cash and stock.

STOREY COUNTY.

The capacity of the C. Butters cyanide plant in Six-Mile Canyon, near Virginia, will be increased by the addition of several tanks 30 feet in diameter.

The work of retimbering the Forman shaft at Gold Hill on the Comstock, down to connection with the south lateral branch of the Sutro tunnel, is reported progressing and it will be put in condition for installing an air lift elevator and auxiliary electric plant to unwater the flooded levels of the Gold Hill mines. This, with proposed similar plant in the Ward shaft, will permit of recovery of all the submerged levels of the Comstock down to the 3300, and it is expected to make it possible to sink to the 5000-foot level, says the Virginia Report.

WASHOE COUNTY.

Sinking continues in the double-compartment shaft of the Desert King mine in Wedekind, near Reno, with three shifts at work. It is down 300 feet. The pumps are handling the water easily.

J. H. Sheehan, at Olinghouse, proposes to build a mill for treatment of Crown Point ore.

NEW MEXICO.

DONA ANA COUNTY.

The Continental M & D. Co. has been incorporated at Las Cruces by J. R. & S. V. Fulkerson, L H. Heil and J. Franklin, of El Paso, and A. B. Fall, of Las Cruces.

GRANT COUNTY.

The Santa Rita M. Co. is increasing development work on its properties at Santa Rita. It is crosscutting on the 400-foot level of the Hearst mine and cutting in three directions from shaft No. 7. The concentrating plant has resumed, four slimes tables having been set up. The monthly output of the company is 60,000 pounds of refined copper. Eighty men are employed. B. B. Thayer is manager.——There are 150 men at work on the ground leased from the Santa Rita M. Co. at Santa Rita.

Bean & Good of El Paso, Tex., say that they will have a smelter in operation on their group in Shakespeare district, south of Lordsburg, before next spring.

The E. C. Belt group of claims, near the Miser's Chest mine, in Virginia district, near Lordsburg, has been sold to S. W. Maltbie, who has put men to work to continue shipments.

The Shamrock M. & M. Co. has decided to put up another 40-ton furnace at its smelting plant at Pinos Altos. One furnace is in use with a capacity of 35 tons a day, while shipments received amount to 50 tons a day. The company has a lease on the Philadelphia, a copper-iron property at Hanover, and is receiving ore from this mine, which is owned by F. Bell. This is in addition to its Pacific lease from the Hearst estate, which is giving it 10 to 15 tons a day. The St. Louis, Samson and Alesandro groups in the Burros are also shipping to the Shamrock. The Shamrock mine was closed down temporarily, owing to an accident to the air compressor.

It is the intention of Manager C. R. Luton, of the Michigan-New Mexico C. Co., at Lordsburg, to go down 800 feet on the Dakotah-Pearl mine. A sinking pump with a capacity of 100,000 gallons daily has been set up. A contract to sink 125 feet from the 260-foot level has been let. The company will put up a 60-ton smelting furnace and a 50-ton concentrator and leacher. The Dakotah Pearl group comprises three claims, 4 miles from Lordsburg.

The Gold Gulch M. Co. has been organized at El Paso, Texas, to operate the Pactolus group, in Gold Gulch district, near Silver City, by O H. Baum, J. Ashcroft, L. C. Ryan, J. S. Dodge, J. S. Allen, J. S. Akin, W. G. Roe and E. L. Hawes. The company has started development work.

RIO ARRIBA COUNTY.

J. E. Scully, of Chicago, Ill, president of the Jaw Bone M. Co, operating in Bromide district, near Tres Piedras, says prospect work is going ahead with a diamond drill on the Jaw Bone.

Southwest of Tres Piedras 14 miles is a deposit of mica, three claims having been located, the Cribbenville, the Sandoval and the Petaca, and an option on these three claims has been given to L. G. Carpenter.

SANDOVAL COUNTY.

The Santa Fe Central railway will resume its work this month on the branch into the Hagan coal fields from Moriarty via Frost station. These coal fields, as well as the Pino Viltitas and Coyote fields, which lie between Hagan and San Felipe, are to be worked. Strikes of good cooking coal are also reported 2 miles north of Cerrillos, in Santa Fe county. A. Neis has found coal on the east side of San Marcos canyon and has driven a 50-foot tunnel which exposes a 3-foot bed. The Shaw Gibson M. Co. is developing a vein of coking coal on the other side of the canyon, and at depth of 40 feet has opened a 4-foot vein. These veins are thought to be continuations of veins that are being developed 2 miles north of Santa Fe and can be traced into the Hagan, O'Mara, Pino Viltitas and Coyote fields in Sandoval county, 35 miles to the south, says the Herald.

OREGON.

BAKER COUNTY.

(Special Correspondence).—In Cracker

Creek district, near Sumpter, a strike has been made on the Tahor Fraction mine. This fraction consists of 230 feet between the Excelsior & Eureka (E. & E.) and Columbia claims on the main lode. The ledge is 70 feet in width, and the pay shoot in this ledge has a width of 2 feet. One shipment of 100 sacks is reported to have yielded $1000 per ton. The work of overhauling and cleaning out the workings of the E. & E. is showing a high-grade ore body in the upper tunnel on the Eureka and is being shipped from this strike. The E. & E. has been idle for several yeare.

In the Greenhorn district, in the I. X. L. mine a shoot 6 inches wide has been cut, showing high values in gold. The producing mines on the so-called North Pole ledge are working full handed, from the Golconda on the south, the Columbia, E. & E., to the North Pole on the north, and the Cracker - Oregon on the east—300 men being employed. In the other sections near Sumpter, the Bonanza, Badger, Red Boy, Gold Pan, California and Midway are in operation.

Sumpter, Sept. 29.

A 93-ounce gold bar was shipped last week from the White Swan mine, near Baker City, says Superintendent W. O. Reynolds, the result of a ten days' run of ten stamps.

Operations at the Cornucopia mine, near Sumpter, are to be resumed with B. McDonald of Spokane, Wash, as superintendent, says the Blue Mt. American. The Cornucopia mine is equipped with a 20-stamp mill, concentrating tables, canvas tables, and has both water power and a steam plant. It has not been operated since Superintendent Dobler was killed by an avalanche last winter.

The North Pole mill, near Sumpter, has received four more concentrating tables, which are to receive the pulp after it passes from the plates.

The I. X. L. mine, near Greenhorn, is preparing to build a cyanide plant with a daily capacity of twenty-five tons.

H. B Compson of Portland, president of the Rockefeller G. M. Co., whose property is near Greenhorn, has arranged for reopening the mine, with F. Barker as superintendent.

The Cornucopia mines, near Baker City, formerly owned by J. E. Searles of New York, are reported sold to a New Jersey company for $600,000. The deal includes the Last Chance and Union Companion mines.

GRANT COUNTY.

A strike is reported made in the Copperopolis group, 6 miles from Prairie City. The company owns two claims of forty-two acres and a millsite. The main tunnel is in 675 feet where the ledge was crosscut, showing a width of 72 feet of ore. At this point a drift was run on the vein to the end line. The ore shows 15% copper, with gold values. The mine is equipped with air compressor and drills, and electric lighting plant.

W. C. Rutter of Seattle, Wash., president and manager of the Kittaning M. Co., says work is being resumed on their Big Four group, near Granite. The Big Four is composed of eight claims and a millsite ¾ of a mile west of the Cougar mine. In the past two years 700 feet of work has been done in the tunnels and shafts. The new development will be an 800 foot crosscut which will cut the veins at greater depth and be driven for a working tunnel, and will be driven to cut the contact hetween slate and granite which shows on the surface.

JOSEPHINE COUNTY.

The New York & Western M. Co. of Grant's Pass has bought a number of quartz properties in southern Oregon, and has made final payment on the Oregon Belle mine, honded last winter for $30,000. The Oregon Belle mine is on Forest creek. It is intended to open it up farther and put in more machinery. The ledges carry free gold and sulphides.

A Colorado company, under Manager J P. Murphy, is preparing to work the Queen of Bronze copper mine near Waldo. The same parties are interested in the mines of the Waldo S. & M. Co. A steam hoist is being set up at the Queen of Bronze, and will sink the main shaft to depth of 600 feet. The ledges of this mine are from 4 to 11 feet wide, carrying 12% copper, with gold. The Queen of Bronze is near the mines of tbe Waldo S. & M. Co.

Development work will be increased on the Wolf Creek group, near Grant's Pass, starting this month. It is expected water will be plentiful for working the placer properties in connection with the quartz ledge that cuts through the ledge, says M. B. Bozarth of Portland, secretary of the company. There is sufficient water for five to seven months in the year to work the placer, hut it is intended to work the quartz ledge hy tunnel. A 700-foot tunnel will he run.

WALLOWA COUNTY.

The Camp Carson placers on the Grand Ronde river, near La Grande, have been sold to the Carson Hydraulic M. Co., which had an option on the property, says W. H. Hazel, manager for the purchasing company. The high bars will he worked by hydraulic giants and the low ground by dredgers or hydraulic elevators. The company acquires 5 miles of ground along the stream, and they have men at work laying the pipes, etc.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The shaft of the Oro Hondo M. Co., south of Lead City, is down 600 feet, and a station has been opened. The pump has been placed, and work of driving out from the shaft in the direction of the ore hodies started.

The Capital G. M. & M. Co. has been organized at Deadwood by R. W. McGinnis, R. J. Freeman, J. W. Wolf, J. Harrap, W. Lawlor and C. Nelson. The company owns a tract of ground near Texana station on the Northwestern narrow gauge, on which ore has been exposed in a railroad cut, the vein showing 70 feet in width and assaying $5 gold. They will sink a shaft. J. Harrap is manager.

UTAH.

BEAVER COUNTY.

The grading of foundations for two gasoline hoists on the Montreal mine, one of the groups of the Royal M. Co. of Milford, has been done, says J. Forgle, superintendent, and as soon as they are set up sinking will begin.

W. Thompson, who has a bond on the Jumbo mine, near the Cave mine, near Milford, put men to work last week.

BOX ELDER COUNTY.

The holdings of the Brooklyn M. Co. at Park Valley bave been sold to Monroe Bros. et al. of Pittsburg, Pa., and will be equipped with a stamp mill. Several hundred feet of work have heen done upon the 20-foot gold-bearing ledge, the ores showing $5 per ton.

Development work has been started by the Iona M. Co. on its group of twenty-one claims near Park Valley. The shaft, which is 40 feet deep, will he sunk another 100 feet before drifting.

The Century M. Co., operating near Park Valley, has bought a number of water rights, says P. W. Madsen of Salt Lake City, manager. The water rights involved are those of the Campbell ranch, which includes the streams flowing down Twin, Lone Tree and Carney canyons. Suit had been brought against the company for damages alleged to have been done to lands hy reason of tailings from the mill running on to tbe land and also for the befouling of the waters of one of the streams mentioned. The ranch, consisting of 290 acres, has been taken over.

EMERY COUNTY.

E. T. Merritt, at Green River, reports having secured 30,000 acres of land in that section which contain oil prospects, and has sunk a well to depth of 1700 feet, striking the oil shale. There are some producing wells in the vicinity, and more wells are heing driven at several points.

GRAND COUNTY.

Near Basin, in La Sal mining district, the Interstate M. Co. is preparing to build a mill at Gold Basin. The Interstate Co. is owned by Iowa men.

JUAB COUNTY.

The shaft at the Black Jack mine, near Eureka, is completed to depth of 1240 feet. Sixty feet farther will place the hottom even with the 1100 foot level of the Lower Mammoth mine.

The Signal Peak M. Co. has been incorporated hy D. I. Hanks et al. of Eureka, to operate on Gold mountain.

La Reine M. Co., in Tintic district, is preparing to resume. Their group is on Godiva mountain, near Eureka.

Excavation being finished, work is under way on the building for the concentrator at the Uncle Sam mine, near Eureka. It is thought a cyanide plant may also be added.

PIUTE COUNTY.

The Gold Vein M. Co., operating the Wedge group at Marysvale, put the Dalton mill in operation last week. The ore's values are in free gold and sulphides. The mill is under the superintendency of S. Colhath.

Salt Lake City and Eastern men have a nine months' lease and hond on the Advocate group of claims on Gold mountain, near Marysvale, says President A. J. Moore. There are six claims in the group, which is near the Miller mine, over the hill from the Sevier and on the Fish creek side of the Gold mountaln range.

SALT LAKE COUNTY.

Through an arrangement made with the management of the Mystic Shrine mine at Bingham, the development of the Erie group will be conducted through the Mystic Shrine tunnel, says J. W. Cairns of Salt Lake City, manager of the Erie. The Mystic Shrine tunnel cuts a fissure within 16 feet of the Erie side lines, and at this point drifting will be started.

The Fourth of March claim, near Bingham, has been sold to the Butler-Liberal M. Co. for $5000. This claim is said to present the most favorable millsite for the Butler-Lliberal group.

It is reported the Taylor & Brunton sampler at Salt Lake City will be enlarged, as consignments are daily increasing.

Tbe Superior-Alta M. Co. has been incorporated at Salt Lake City, Utah, to operate the Hellgate group of eight claims at Alta; the directors are J. A. Jacobson, W. L. Maas, T. Jacobson and L. A. Jeffs. The Hellgate group adjoins the Old Frederich mine on the north. Development work has shown two ledges, both carrying copper, with gold and silver, one being 10 feet in width and the other 8 feet. It is intended to sink a double-compartment shaft, says Manager Maas. A hoisting plant and pumps will he put in and arrangements have been made with the Columbus Con. M. Co. for power, to be supplied by its Little Cottonwood plant when completed.

SUMMIT COUNTY.

Superintendent J. Keetley of the Silver King Con. mine at Park City says the hoist is in place and three shifts are at work in the shaft pumping water. Sinking will be resumed.

At the Kearns-Keith mill, near Park City, preparations are going ahead for putting in the machinery. The pipe line has been laid from the tunnel, the hollers are in place and bricked up. The engine is being set up.

TOOELE COUNTY.

The annual report of the Con. Mercur G. M. Co., at Mercur, for the fiscal year, just issued, shows: Gross value of gold bullion produced from Golden Gate mill, $1,285,556 73, and from the Manning mill, $35,452 90. The operating expenses were: Mine, $450,298 52; Golden Gate mill, $547,-048.37; Manning mill, $27,064.42. The total number of tons milled during the year was 346,359; but of this 335,163 tons is represented by the bullion yield given above for the Golden Gate mill. Tbe tailings for the year averaged $1.21 per ton and the extraction $3 84 per ton. Tbe total operating costs for mining and milling 346,359 tons of ore were $997,346.89, or $2 88 per ton. (This includes all of the company's expenses, except the Manning mill costs, which come under another head.) The expense of mining was $1.30 and of milling $1 58 per ton. The Manning mill was operated on old Mercur tailings. The tonnage treated was 55,009, with extraction of 64 cents per ton and expenses 49 cents per ton. Operations were suspended for the winter season and have not heen resumed this year, pending completion of the slimes plant at the Golden Gate mill. The company's previous reports show the tailings for 1901 averaged 95 cents and for 1902 $1.19. For six months preceding May 1, 1903, they averaged $1.30. Since then they have been running on reduced tonnage and have used more care in mining, with view to keep out the more slimy ores. G. H. Dern of Salt Lake City is treasurer and manager.

At the Sacramento mine at Mercur, Superintendent of the Mill G. W. Cochler reports an average of 140 tons of ore going daily through the crushers and into the leaching tanks, while the retorts are producing mercury from 2400 to 3000 pounds daily of ore that averages 10% mercury, without reference to $8 in gold which is contained in each ton of slag. The capacity of the retorting plant will be increased next spring.

UTAH COUNTY.

At the Silver Dipper mine, at the head of American Fork canyon, near American Fork, Manager L. G. Hardy says a concentrator will he huilt in the spring. For 500 feet the tunnel has been driven on the strike of the ledge, showing 3½ feet of ore, carrying 15% lead, fifteen ounces silver and $1.50 gold per ton.

The Colton Wax mines Nos. 4, 5, 6 and 7 of D. B. Higgins et al., near Provo, have been sold to the Colton Wax M. & Oil Co.

WEBER COUNTY.

A milling plant will be built in the Sierra Madre mining district hy the Southern Pacific M. Co, of which J. W. Burnham of Salt Lake City is secretary and manager. In the meantime development will he increased. They are driving a tunnel which is to tap the ledges at depth. The company owns the Last Chance group of seven claims, four of which are located along the contact hetween quartzite and granite, says Burnham. Assays show values in copper and gold, with a little silver. The tunnel will have to be driven to a length of 700 feet, attaining a depth of 550 feet. The Sierra Madre district is north of Ogden.

——Manager D. Maguire is developing the El Dorado group, in the same district, and Burnham says it is already a big mine and says he has sufficient ore blocked out to justify the erection of a smelter.

WASHINGTON.

FERRY COUNTY.

C. Bolkin, J. O'Donnell and W. Hoffstedter are developing the Copper Key vein at Belcher camp, near Republic, and are negotiating with the smelter for treatment.

The Trade Dollar mine, near Republic, was closed temporarily last week, pending setting up a stationary pump on tbe 200-foot level.——The Curlew M. Co. will put in a compound duplex pump at the pumping station on Granite creek to supply their reservoirs and tanks with 20,000 gallons of water per hour, and the pump now in use at the station on Granite creek will be removed to the Trade Dollar mine.

W. H. Kells has men at work on tbe Nob Hill mine, near Republic, opening up the vein.

The Mountain Lion mine, at Republic, under control of A. E. Palmer, continues shipments of 150 tons of ore which is averaging $12 gold per ton. The ore goes to the smelters. It is expected to remodel the mill and resume treatment, crushing 120 tons of ore daily.

OKANOGAN COUNTY.

The W. O'Neill interests in the Pinnacle group of claims, near Loomis, have been sold to the Pinnacle G. M. Co. The company is working twenty-five men and intends building either an aerial or gravity tramway for taking ore down tbe mountain, and it will he 2000 feet in length. On the Bunker Hill claims of the group a vein 6 feet wide is shown on the surface. A tunnel on the ledge, 400 feet in length, is all in ore A crosscut on the Nevada claim is in 300 feet and has 150 feet farther to go to tap the vein at depth of 750 feet.

SNOHOMISH COUNTY.

The Federal M. & S. Co. is reported to have sold the Everett smelter, with $300,-000 worth of ore on hand, and the Monte Cristo mines, at Monte Cristo, to tbe American S. & R. Co. at over $1,000,000. The Wallace Sampling Works have been bought for $10,000 by the Federal Co. from the American S. & R. Co., which bought them a year ago from the Cœur d'Alene Mine Owners' Association. The Everett smelter was formerly owned hy the Puget Sound Reduction Co.

FOREIGN.

AFRICA.

TRANSVAAL.

The U. S. Consular reports show imports of cyanide of potassium into the Transvaal for the first five months of 1903 aggregated $560,000 value. Machinery imports (principally mining machinery) for the same period amounted to $5,000,000 value; and mineral oil, $135,000.

The Transvaal Chamber of Mines, Johannesburg, report the gold output for the month of August of the mines which have so far resumed working amounted to 262,569 fine ounces, value £1.115,325 for the Witwatersrand, being an increase of 20,499 ounces, as compared with the previous month, and 9349 ounces for the outside districts (i. e., outside the Rand proper), value £39,714, being a decrease of 224 ounces as compared with the previous month. The following table gives the output for 1903 to date as compared with 1902:

	Rand. Ozs.	Outside. Ozs.	Total. Ozs.	1902.
Jan...	192 934	6,345	199,279	70,341
Feh...	187,977	8,536	196 513	81,405
March	208,456	9,009	217,465	104,127
April.	218,900	8.971	227,871	116,589
May..	224,409	9,716	234 125	138,602
June..	228,161	10,153	238,320	142,780
July..	242,070	9,573	251,643	149.179
Aug..	262,569	9,349	271,918	162,750
Total.	1,765,482	71,452	1,837,134	969,773

The Transvaal Chamber of Mines, Johannesburg, under date of Sept. 10, report on native lahor on the Rand:

Natives distrihuted to mines during August by Native Lahor Association	6,649
Time expired and other wastage	5,083
Net gain during July	1,566
Total number employed at end of July	68,228

AUSTRALIA.

NEW SOUTH WALES.

Sydney reports of Sept. 5 show the New South Wales gold yield for month of August amounted to 14,636 ounces, valued at £53,149. The yield for the first eight months of the year was 176,441 ounces, valued at £647,087.

WESTERN AUSTRALIA.

The Great Boulder Proprietary G. Co., Kalgoorlie, report returns for month of August: At sulphide mill, 9349 tons of ore crushed; gold yield, 13,739 ounces; tailings (old), 2330 tons of ore crushed; gold, 764 ounces. Total estimated value, £47,759. —— Great Fingall Southern Blocks—September 16 report, will start diamond drill October 1st.

Kalgurli Gold report, Sept. 18: On 1050-foot level, at 100 feet, the north drive is in ore worth 26 dwts. per ton; 1000 foot level, at 220 feet, the north drive is in ore worth 19 dwts. per ton; in both places the width of the ore is 12 feet.

The Sons of Gwalia mine at Leonora report Sept. 12: No. 12 level, 203 feet from shaft, samples from face assay 2 ozs. 10 dwts gold per ton for width of 8 feet.

BRITISH COLUMBIA.

CARIBOO DISTRICT.

H. Jones, manager of the Gold Gravel & Drainage Co., owning ground at the Wingdam, near Barkerville, says he is arranging to resume on a larger scale, after a year's suspension.

EAST KOOTENAY DISTRICT.

The Silver-Lead Mine Owners' Association has been formed at Sandon and includes twenty-nine incorporated companies, being all the silver-lead producers in the Slocan, Lardo and Ainsworth districts. The purpose of the association is to pool the product so as to get the best rates available from the smelters, says the Fort Steele Prospector.

Fifty coke ovens are completed at the coal mines at Morrissey, twenty-five of which are in operation.

C. Kleinsmith, A. W. Bleasdell et al. of Fort Steele, have staked sixteen coal claims on Elk river.

Near Elko, two prospectors report finding a body of hematite on Sand creek. They are driving a tunnel on the vein, which is 6 feet wide.

Development at the Coal Creek coal mines of the Crow's Nest Pass Co. is progressing. At No. 4 the coal is being wasted on the dump as the tramway is incomplete, owing to delay in arrival of rails. In No. 5 three drifts have struck coal. Development work has been started on No. 9, which is near No. 1. Nos. 6, 7 and 8 will not be developed until next year. The haulage engines at the mines are being placed in position.

ROSSLAND DISTRICT.

The Elmore oil process plant at the Le Roi No. 2 mine at Rossland is in operation.

The Nickel Plate compressor, near Rossland, is in operation by the West Kootenay Power Co. The plant will supply air for forty drills and requires 600 electrical H. P. to run it. Le Roi mine will draw its compressed air from this source. It is expected the Spitzee Co. will arrange for air supply from the Nickel Plate compressor, laying a pipe line to the Spitzee head works.

SLOCAN DISTRICT.

Preparations are being made to put in a second tramway at the Idaho mine, near Sandon.

A. Cameron et al. have a lease on the Conductor, near the Idaho mine, near Sandon, and are driving on the lead.

A strike has been made on the Riverside mine, Ten-Mile, showing a 6-inch stringer containing argentite, ruby and native silver and sulphides.

J. Humphries, of the Rambler-Cariboo mine at McGulgan, says a body of good ore has been struck on the 700-foot level. Manager W. E. Zwickey, in drifting 200 feet on the 700-foot level, followed what appeared to be the top of a shoot of ore. It was cut in three places, has widened to 18 inches in drifting 20 feet. It carries 100 ounces of silver and 40% in lead. They will run a 4600-foot tunnel, starting half way between the mine workings and McGuigan. It will give depth of 1400 feet, and will be of two-track width. The mine is shipping eighteen cars of concentrates a month, which net $1300 a car from the smelter. The compressor is being moved to a point where more water will be available for power. The mine has seventy-five men at work.

VANCOUVER ISLAND.

The No. 4 coal mine at Extension, which has been closed for several months, has been reopened. This will give employment to 250 men and increase the output by several tons daily.

WEST KOOTENAY DISTRICT.

In Poplar creek section, near Lardeau, J. J. Young of Calgary and Cochrane Bros. of McLeod are reported to have bought for $3500 the E. Larsen claim, between the Swede group and the Lucky Jack.

The Lucky Jack claim on Poplar creek is under bond to J. J. Young and W. B. Pool of Calgary for $90,000. They are making arrangements to put in a stamp mill and are making other improvements. They have a tunnel in 60 feet.

J. L. Whitney & Co. of Rossland have bought the Home Run claim, adjoining the Lucky Jack to the south, on Poplar creek, in the Lardeau. They will equip and develop the property.

CANADA.

ALBERTA.

Mr. Bondonneau of Paris and M. Lefehre of Lisle, France, have men at work on their coal properties near Frank.

CUBA.

F. Steinhart, U. S. Consul General at Havana, in his annual report says the exports of mineral products (iron, manganese and asphalt) from the island for the four years, 1899-1902, inclusive, amounted to $3,909,300. The mineral resources of the island are represented by the following products: Gold, silver, iron, copper, manganese, lead, asphalt, petroleum, naphtha, graphite, amianthus, zinc, mercury and, it is stated, coal. These minerals are found in most of the provinces, but the richest mineral district is the Province of Santiago de Cuba, followed in importance by Santa Clara, Puerto Principe, Pinar del Rio, Matanzas and Habana. The following is a statement of the existing mining concessions in the different provinces:

PROVINCE.	MINES.	AREA.	
	Number.	Hectares.	Acres.
Santiago de Cuba	386	18,051	44,586
Santa Clara	59	1,736	4,288
Puerto Principe	27	2,106	5,202
Pinar del Rio	13	551	1,361
Matanzas	11	180	444
Habana	10	208	514
Total	506	22,832	56,395

Of this number of mines, very few of iron, manganese, and copper in the Province of Santiago de Cuba are in operation; and the others can be considered only as concessions waiting for funds for exploitation. The administration, according to the laws in force, can not compel the miners to operate their claims. The owner is in possession of his mine to perpetuity, and at his own will may work it or not. The only cause of forfeiture established by the law is the failure to pay the annual taxes. The applicants for mines can ask for one or several claims at the same time. A claim (pertenencia) is 300 meters (984 feet) long by 200 meters (656 feet) wide (6 hectares, or 14.8 acres), except when the mines are iron, coal, anthracite, lignite, turf, asphalt, or bituminous clays, when the pertenencia is 500 meters (1640 feet) long and 300 meters (984 feet) wide (15 hectares, or 37 acres). The taxes to be paid to the Government are $5 yearly per hectare (2 471 acres), when the mines are of precious stones or metalliferous substances. In the other cases the tax is $2 per hectare.

MEXICO.

CHIHUAHUA.

The Democrata mine in Santa Eulalia camp has been sold to A. C. Aiken et al. of San Francisco, Cal., who have also bought the O'Caliahan-McDermott group and the Inglaterra y Annexas of Dale Bros.

A bond has been given on the Inglaterra y Annexas group of thirty-eight pertenencias at Santa Eulalia to A. C. Aiken, Jackson et al. of San Francisco, Cal., for one year at $100,000 gold. A diamond drill will be put in operation. The group is between the Carolina and San Antonio mines, all of which adjoin the Potosi. It is understood a series of diamond drill holes are to be put down on the three properties named and near the Potosi line.

W. D. Pierce, manager of the La Luz G. M. Co., operating the La Luz mine at Maguarichic, says he has started foundation work for the 16-ton capacity mill and concentrator.

It is reported that most of the work on the San Jose mine (Los Angeles group) at Parral has been stopped until a larger shaft is sunk and connected with the present workings.

The Venture Corporation of London, Eng., is reported to have a short option for $500,000 on the Dolores group of mines, owned by San Francisco, Cal., men. E. A. Wiltsee is resident manager of the company. The ores carry gold and silver.

G. W. Boyce of Boston, Mass., says he will increase operations on a number of mining properties in which he is interested in Chihuahua, especially in Terrazas camp. He will also start work on the Victorino group, and on the Cruger silver-copper mine, 6 miles from Bustillos. Boyce is operating for himself and Boston and Providence, R. I., men several properties in Terrazas camp, the Josefina mine near Cusihuiriachic, and the Cahrisa copper mine over the line in Sonora.

The Torreon Smelter Co. has an option on the San Diego mine at Santa Barbara for $50,000, says the Chihuahua Enterprise.

DURANGO.

The Restaurador M. Co., operating at Guanacevi, has been making tests with the cyanide process at the Santa Cruz mine, which show satisfactory results, says Superintendent H. H. Hughes. The mine is owned by the Banco Nacional, which owns fourteen properties in that section with an average output of 14,000 tons monthly.

The New Australian M. Co. of Guanacevi are preparing to put in additional machinery.

The owners of the San Nacasio mines, 100 miles south of Torreon, Chihuahua, have built a railroad from the mines to Nacasio station, on the Mexican Central R. R. The mines are in the San Juan de Guadalupe district.

SONORA.

D. M. Heller and C. A. Overlock et al. of Douglas, Ariz., have formed a company to open up the Santa Rosa gold mine 20 miles south of Nogales.

ZACATECAS.

N. M. Dieffenbach of Mexico City, general representative of the American S. & R. Co., has an option on the Malanoche mines of the Compania Minera Gran Cuadra Prodigio y Anexas, near Zacatecas, for $500,000 gold.

NEW ZEALAND.

The export of gold for the first seven months is given as follows:

	Oz.	£
1903	313,100	1,194,399
1902	279,454	1,074,044
Increase for 1903	33,646	120,355

The export of gold for the first seven months of 1903 exceeds that of any one year from 1881 to 1898 inclusive.

There are seventy-one men at work on the Puponga Coal Co.'s property at Collingwood; fifteen men in mine development, forty-seven in construction of tram line, and nine in jetty construction. J. Bishop, consulting engineer, says the jetty on August 17th was completed 1400 feet, a further distance of 1000 feet is required to complete the contract, with the addition of breastwork for wharfage, coal bins and housing. These additions will not be completed till November, as there is difficulty in obtaining delivery of timber. A tunneled engine road is being driven to haul the coal from the present lowest levels to the screens, and to extend the dip heading into the dip section of the coal field, the Puponga Coal Co. having taken an option over the lands proved by boring by the Cape Prospecting Co., says the Mines Record.

The Cromwell Proprietary mine, at Bendigo, near Cromwell, Otago, has been sold, together with plant, water races and water rights, for £120, to D. B. Waters, of Dunedin, who will develop it at the lower levels.

The Cromwell and Bannockburn Collieries Co. reports development work progressing on its area of coal-bearing Crown lands. Sixty-four men are employed and the pay sheet is at the rate of £1000 per month. Recent additions to the plant include a 20 H. P. steam hoiler, duplex pump with capacity of 10,080 gallons per hour, also an engine and winding gear for the Shepherd's Creek mine.

PERU.

Thirty carloads of machinery and piping from the Arcadian copper mines, in Houghton county, Mich., have been shipped via New York to the Cerro de Pasco mines, at Cerro de Pasco, in Junin department, and owned by J. B. Haggin of New York.

RUSSIA.

Fire broke out on the 23d inst. at the Biliehat naphtha fountains, owned by the Nobel Co., at the oil fields at Baku, and has already caused damage estimated at $2,500,000. The works have been completely destroyed and the fire at last reports was still spreading.

TASMANIA.

The Briseis Tin Co.'s report for the period ending August 31 shows: Black tin cleaned up, 35 tons 9 cwts. (July output, 36 tons). Average total sluiceheads of water available from all sources, 175 (July, 173); rainfall during period, 804 points (July, 892); overburden removed, 46,900 cubic yards, in addition to 12,540 from No. 1 Co. (July, 41,600, No. 1 Co., 3565). They drift-sluiced 16,300 cubic yards (July, 23,500).

VENEZUELA.

Caracas reports state that the official gazette has published a government decree suspending the operation of the mining code for an indefinite period. This decree will render new acquisitions of mines in Venezuela impossible. The reason given is that certain politicians wish to monopolize all the mines in the district of Ciudad Bolivar, without meeting any competition, in order to afterward sell the mines to foreign companies. This action, taken without previous notice, will cause detriment to the American mining parties who are now engaged in surveying several mining claims in the district of Orinoco.

PERSONAL.

J. R. FERRIS has returned to Rawlins, Wyo., from Denver, Colo.

C. W. PURINGTON has returned to Denver, Colo., from Ely, Nevada.

W. L. WATTS, E. M., is in San Francisco, Cal., from Los Angeles, Cal.

S. T. MURCHIE is superintendent of the Phelps Hill mine, near Grass Valley, Cal.

L. N. FITTS, of Crestone, Colo., is in Old Mexico inspecting mining properties.

H. J. LOUGHRAN, of Tonopah, Nev., is in San Francisco, Cal., on mining business.

C. J. CARLSON has resigned as superintendent of the Golconda mill, near Sumpter, Or.

F. SMAILE is superintendent of the Portland G. M. Co., at Victor, Colo., vice Fitzgerald, resigned.

J. H. MACKENZIE has returned to San Francisco, Cal., from mine examination in Calaveras county, Cal.

M. BONDONNEAU of Paris and M. Lefehre of Lisle, France, are at Frank, Alberta, from Ottawa, Canada.

G. W. BOYCE is at Terrazas, Chihuahua, Mex., from Boston, Mass., to start work on the Victorino mines.

C. A. HOLLAND, of Carters, Cal., manager of the Georgiana mine in Tuolumne county, is in San Francisco, Cal.

H. G. VERCOE, of Fresno, Cal., superintendent of the Fresno copper mine, is in San Francisco, Cal., on business.

H. R VERCOE, of London, Eng., interested in several mining properties in California, is in San Francisco, Cal., on business.

A. M. WAGNER of Webb City, Mo., president of the Thames M. Co., has gone to Hermosillo, Sonora, Mex., to examine mines.

A. C. GIBSON, of the Pick and Drill M. Co., has returned to Vincennes, Ind., from their mines in Agua Fria district, Arizona.

W. C. THOMAS, superintendent of the Newhouse smelters, returned to Salt Lake City last week from a trip to New York and Boston.

J. A. BUNTING, of San Francisco, Cal., is president of the Esperanza Oil Co., operating in the Coalinga field, Fresno county, Cal.

A. E. BRYAN is manager of the North American G. M. Co., owning the Porcupine mine, Wind Creek district, near Sumpter, Or.

C. D. ROOKLIDGE returned to Salt Lake City last week from a trip East, where he has been several weeks on mining business.

V. C. OSMONT will return next week from Berkeley, Cal., to Hermosillo, Sonora, Mexico, near which place he is engaged in mining.

C. MILLER, formerly manager of the Amethyst mine at Creede, Colo., is superintendent of the Comstock mine near Idaho Springs, Colo.

MANAGER D. MCVICHIE of the Bingham Con. C. Co. is at the Balakiala copper mines in Shasta county, Cal., from Salt Lake City, Utah.

C. W. MILNE, of London, Eng., is at Ocampo, Chihuahua, Mex., in the interests of the San Ramon M. Co. and the Watterson Gold, Ltd.

D. J. DUNCAN, of New York, is assistant manager of the Hays Con. M., M. & L. Co. properties, at Camp Hays, in Sonora, Mex., near Nogales, Ariz.

ROBERT, GEORGE AND HENRY MITCHELL, who are largely interested in copper mines on the Pacific coast and in Mexico, are in San Francisco, Cal.

H. C. HOOVER, of Bewick, Moreing & Co., is at Victoria, Australia, from London, England, visiting mines of the London & Globe Deep Lead Assets, Ltd.

W. H. KRITZER, E. E., has resigned from the Risdon Iron Works, San Fran-

cisco, Cal., and will hereafter be associated with the Joshua Hendy Machine Works, San Francisco.

R. HAMILTON, president of the West Australian Chamber of Mines, and manager of the Great Boulder Proprietary G. M. of West Australia, is in California on a tour of inspection.

J. F. PARR has resigned as superintendent of the Esmeralda Con. M. Co., near Hawthorne, Nev., and will be succeeded by H. W. Nelson of the Alpine G. M. Co. of Sumpter, Or.

H. N. DEMPSEY, for the past two years with the Mine & Smelter Supply Co. of Denver, Colo., is located at 578 Mission street, San Francisco, Cal., representing that establishment.

GOVERNOR PARDEE of California has appointed J. E. Doolittle of San Francisco, Cal., a member of the board of trustees of the California State Mining Bureau, vice Ross E. Browne, resigned.

R. P. JARVIS, late superintendent of the Silver City G. & S. M. Co., New Mexico, has accepted the position of professor of mining at the Washington Agricultural College at Pullman, Wash.

W. F. SNYDER, president and manager of the Western Exploration Co., returned to Salt Lake City, Utah, last week, after an extended absence in the East in the interest of the Balakiala copper mines in Shasta county, Cal.

H. A. SALZER, A. PLATZ SR AND F. X. KREITLER, the two former from La Crosse, Wis., and the latter from Nebraska and Forrest county, Pa., who have been inspecting the mine and work of the Idaho Gold Coin at Black Lake, have returned to their homes.

Catalogues Received.

Catalogue No. 12, first edition, from Allis-Chalmers Co., describes in detail the Overstrom concentrator, the subject being given most extended notice. Full directions are given regarding erection and operation. Diagrams in colors are among the illustrations, the diagrams showing the action of the siliceous and other mineral particles on the table.

Catalogue No. 31 from the A. S. Cameron Steam Pump Works, foot of East Twenty-third street, New York City, N. Y., gives comprehensive showing of the various standard makes of pumps by that company. So fine a pictorial exposition of pumping machinery speaks well for the ability of the manufacturers to supply what is graphically depicted. The book is a work of art, and is deservedly copyrighted.

Catalogue No 58, from the Stilwell-Bierce & Smith-Vaile Co., Dayton, Ohio, is devoted to the Stilwell heaters, for heating and purifying water for boiler feed and manufacturing purposes, giving detailed figures showing the manifest economic value of the device, with testimonials to its efficiency and fully illustrated descriptions. The catalogue may be had from the home office, or the Pacific Coast manager, Geo. W. Ingils, 11-13 First street, San Francisco, Cal.

Commercial Paragraphs.

OTTO C. PLESSNER is in San Francisco, Cal., representing Arthur Koppel of 66-68 Broad street, New York, N. Y.

TO CONCENTRATE their business and have better factory facilities the Vajen-Bader Co. has removed from Indianapolis to Richmond, Ind.

THE Pelton Water Wheel Co. of San Francisco, Cal., report their plant working night and day to keep up with orders. Among the important contracts closed during the past few months for hydro-electric plants are reported the following, which aggregate 56,408 H. P.: American River Electric Co., Placerville, Cal., head 575 feet, two double Pelton units, each of 2500 H. P. capacity; Pike's Peak Hydro-Electric Co., Colorado Springs, Colo., head 2200 feet, three Pelton wheels, each of 1500 H. P. capacity; Columbia Improvement Co., Tacoma, Wash., head 850 feet, four Pelton units, each of 7500 H. P. capacity; Vancouver Power Co., Vancouver, B. C., head 390 feet, three double Pelton units, each of 3000 H. P. capacity; Northern California Power Co., Anderson, Cal., head 1150 feet, two double Pelton units, each of 3000 H. P. capacity; Rock Creek P. & T. Co., Baker City, Ore., head 960 feet, two Pelton units, aggregating 1760 H. P. capacity; Columbus Con. M. Co., one Pelton unit, 494 feet head, 660 H. P. capacity.

Obituary.

G. W. SEVERNS, a pioneer mining man of Cochise county, Ariz., died at Boston, Mass., Sept. 24th. Deceased went to Arizona in 1886 and entered the mining field, in which he held considerable interests at the time of his death. He owned considerable property in the Dragoon mountains and is said to have been the first man to erect a mill in those mountains.

CORNELIUS HAYWOOD, for twenty years a resident of Denver, Colo., and interested in Park county, Colo., mines, died Sept 21st, at the age of 82, from general debility. Deceased was born at London, England, in November, 1821, and came to New Orleans, La., in 1840, going from there to St. Louis, Mo. After the civil war he was in Chicago, Ill., going to Colorado in 1885, and interested himself in mining. He is survived by a sister and two sons and one daughter — Bryan, Charles and Lillian Haywood.

Books Received.

"Gas Engine Design, With an Introduction on Compressed Air," is the modest title of a treatise by E. J. Stoddard (for sale by Parker & Burton, 12 Hodge Blk., Detroit, Micb., $1), which contains formulæ and severely technical discussion of gas engine design, and work that is of unusual merit.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING SEPTEMBER 22, 1903

739,632.—TROLLEY CATCHER—J. V. Ainsworth, Los Angeles, Cal.
739,531.—FRUIT DIPPER—H. M. Barngrover, San Jose, Cal.
739,681.—FURNACE—Blanchard & Williams, Dillard, Or.
739,532.—GAS GENERATOR—F. M. Caler, Los Angeles, Cal.
739,647.—HARP—J. E. Childs, Spokane, Wash
739,294.—ROAD SPOOL—W. H. Corbett, Portland, Or.
739,590.—CATTLE GUARD—W. von Daake, Vancouver, Wash.
739,402.—STEREOSCOPE—T. B. Eastman, S. F.
739,662.—EXHIBITING BOX—Francisco & Martin, San Diego, Cal.
739,672.—ELECTRIC SWITCH—J. Harisberger, Seattle, Wash.
739,546.—OIL BURNER—W. F. Hogan, S. F.
739,676.—TREE SUPPORT—A. A. Hoyt, Watsonville, Cal.
739,419.—SCORIFIER TONGS—J. M. Hyde, S. F.
739,755.—WATER GATE—Martin & Ormond, Riverside, Cal.
739,701.—SEAL LOCK—D. E. McLaughlin, Tacoma, Wash.
739,337.—GAME—W. L. Newman, Pannca, Nev.
739,339.—PHOTOGRAPHIC PROCESS—P. Ny, Berkeley, Cal.
739,340.—FURNACE—J. B. Orbison, S. F.
739,340.—GRAIN SEPARATOR—W. M. Russell, Walsh Cal.
739,371.—DISK PLOW—Simeral & Wiggins, Salem, Or.
739,454.—CASING SPEAR—Stockton & Helfenstein, Bakersfield, Cal.
739,745.—OILING DEVICE—G. W. Thurston, Dunsmuir, Cal.
739,570.—RASP—G. K. Woods, Prescott, Ariz
739,530.—CASH REGISTER—W. A. Zimmerman, Los Angeles, Cal.

Notice of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

AIR VENT CONTROLLER FOR BARRELS.—No. 739,058. Sept. 15, 1903. E. R. Charles, Petaluma, Cal. This invention relates to a device for controlling the ingress of air into barrels and like containers, so as to allow the liquid contents to escape freely; and to provide means whereby air may be admitted when required, and the opening hermetically sealed for transportation when not in use

OIL BURNER.—No. 739,546. Sept. 22, 1903. W. F. Hogan, San Francisco, Cal. One-half assigned to Wm. Matson of same place. This invention consists of concentric steam and oil inlet pipes, with discharge passages at the ends, a cylindrical mixing chamber into which the steam and oil are delivered, a return bend connected with the outer end of said chamber having a discharge or burner opening in its outer convexity, a return pipe or passage below and parallel with the mixing chamber contiguous to the oil and steam inlets whereby the heavy portions which may settle are returned continuously into the mixing chamber.

TREE SUPPORT.—No. 739,676. Sept. 22, 1903. Asa A. Hoyt, Watsonville, Cal. Assigned to Hoyt's Tree Support Co. of Watsonville, a corporation. The object of this invention is to provide a propless support for the limbs of fruit and other trees which shall be self-adjusting to any angle at which two limbs to be supported may stand. The device consists essentially of concaved blocks adapted to fit the curvature of tree limbs, and having swivel attachments which may be connected with the opposite support and which by raising of their swivel connection with the blocks allow the latter to take any position to fit the limb without chafing.

Dividends.

Bunker Hill & Sullivan M. & C. Co., $18,000; Oct. 5.

Latest Market Reports.

SAN FRANCISCO, October 2, 1903.

METALS.

SILVER.—Per oz., Troy: London, 27 7/16d (standard ounce, 925 fine); New York, bar silver, 59½c, refined (1000 fine); San Francisco, 59½c; Mexican dollars, 47c @49c; San Francisco, 46c New York.

Silver hovers close to the 60-cent mark, but has not yet reached that figure. There is reason to hope, however, that a further advance in price will be made While the rise in price is a satisfactory item in the output of all mines producing gold-silver, copper-silver and lead-silver ores, no effort has as yet been made to open new mines producing silver only.

COPPER.—New York: Standard, $13.25; Lake, 1 to 3 casks, $13.25; Electrolytic, 1 to 3 casks, $13 25; Casting, 1 to 3 casks, $13.12½; San Francisco: $15.00. Mill copper plates, $17.00; bars, 18@24c. London: £55 spot per ton.

Copper shows a slight falling off in price since last week's quotations The New York market is dull and the small amount of metal being bought makes the market quiet. It would not be surprising to see still lower prices than those quoted today, though no considerable decline is anticipated.

LEAD.—New York, $4 50; Salt Lake City, $3.50; St. Louis, $4.00; San Francisco $4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5½c; pig, $4.75. London: £11 per long ton.

SPELTER.—New York, $6.00; St. Louis, $5.00; London, £20 15s per ton; San Francisco, ton lots, 6½c: 100-lb lots. 7c.

In the United States for the year 1902 the total output of lead for the entire country was 220,000 short tons, and of zinc 156,297 short tons. The lead production was about the same as in 1901, but there was an increase of about 10% in zinc production.

TIN.—New York, pig, $25.82½@26 10; San Francisco, ton lots, 28c; 500 lbs., 28½c; 200 lbs., 29½c; less, 30c; bar tin, ℔ lb, 30c @32c. London, £115 2s 6d spot.

PLATINUM.—San Francisco, crude, $18.00 ℔ oz.; New York, ingot, $19.00 per Troy oz. Platinum ware, 75@80c per gram.

QUICKSILVER.—New York, $46 00@47.00; large lots; London, £8 7s 6d; San Francisco, local, $43@44 ℔ flask of 76½ lbs; Denver, $49.50. Export, $42.50@43.00.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

SOLDER.—Half-and-half, 100-lb. lots, 18 75c; San Francisco, Plumbers', 100-lb. lots, 15 50c.

ZINC.—Metallic, chemically pure, ℔ lb., 50c; dust, ℔ lb., 10c; sulphate, ℔ lb., .04c.

NICKEL.—New York, 50@60c ℔ lb.; ton lots, 45@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 34c.

ANTIMONY.—New York, Cookson's, 7½c; Hallett's, 6¾c; San Francisco, 1000-lb. lots, 8c; 300 to 500 lbs., 8½c; 100-lb. lots, 10½c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, $16 85 @17.35; gray forge, $15 35; San Francisco, bar, 3c ℔ lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $27 00@29.00; open hearth billets, $28.00 @30 00; San Francisco, bar, 7c to 12c per lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer	$17 50@18 50
Foundry Northern 1	17.50@17.75
Northern 2	17.00@17.25
Northern 3	16 50@16.75
Southern 1	16.35@ ——
Southern 2	15 85@ ——
Southern 3	15.35@ ——
Forge	14 85@ ——
Charcoal	20 50@21.00
Billets, Bessemer	28 00@29 00
Bars, Iron	1 55@ ——
Bars, steel	1 75@ 1.80
Rails, standard	28.00@30 00
Rails, light	34 00@40.00
Plates, boiler	1 90@ 2.00
Tank	1.75@ 1 80
Sheets, 26 store	2 90@ 3 00
No. 27	2 90@ 3.00
No. 28	3 00@ 3 10
Angles	1.75@ ——
Beams	1.75@ ——
Tees	1.80@ ——
Zees	1.75@ ——
Channels	1.75@ ——
Steel melting scrap	14.00@15.00
Relaying rails	26.00@28 00
Dealers forge	12.50@13.50
No. 1 railroad wrought	14.50@15.00
No. 1 cast, net ton	13.50@14 50
Iron rails	18.00@19.00
Car wheels	19.00@20.00
Cast borings	5.50@ 6.50
Turnings	10.50@11.50

COAL.—San Francisco, coast, yard prices: Wellington, $8.00; Seattle, $6.50; Coos Bay, $5.50; Southfield, $8.00. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania, bd., $14.00; Scotch, $8; Cumberland, $13; Cannel, $8 50; Welsh Anthracite, $13.00; Rock Springs, $8.50, long ton; Colorado Anthracite, $14.00. Coke, $10.50 per ton in bulk, $13 in sacks; Sunnyside, $8 50, long ton.

For the first time in the history of the United States the annual production of coal has reached a total of over 300,000,000 short tons, the actual showing being 300,930,659 short tons, valued at $373,133,843.

LUMBER.—(Retail): Pine, ordinary sizes, $24.00@25.00; extra sizes higher; redwood, $28.00@30.00; lath, 4 feet, $4.50 @5.00; pickets, $21.00; shingles, $2.50 for No. 1 and $2.25 for No. 2; shakes, $13.50 for split and $15.00 for sawed; rustic, $28 00 @35.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, $3.35; Cut, $3.55; 10d to 16d, Wire, $3.45; Cut, $3.35; 8d, Wire, $3.50; Cut, $3.50; 6d and 7d, Wire, $3.60; Cut, $3.60; 4d and 5d, Wire, $3.70; Cut, $3.70; 3d, Wire, $3.85; Cut, $3.85; 2d, Wire, $4.10; Cut, $4.10. Special rates for carload lots.

LIME.—Santa Cruz, $2.35; Roche Harbor, $2.35 per bbl.

CEMENT.—Imported, $2 50@2.75 ℔ bbl; California carload lots, $2 25 f. o. b. at works; small lots, $2 50 ℔ bbl. in sacks, 4 sacks to bbl.

GENERAL SUPPLIES.

POWDER.—F. o. b. San Francisco: No 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s, 11c ℔ set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 23@24c ℔ lb.: carloads, 23@23½c; in tins, 30c; soda ash, $2.00 ℔ 100 lbs.; byposulpbite of soda, 3@3½c ℔ lb.; caustic soda, in drums, 3@3½c ℔ lb; Cal. s. soda, bbls., $1.20@1.40 ℔ 100 lbs.; sks., $1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb tins; roll sulphur, 2½@2¾c; powdered sulphur, 2@3c; flour sulphur, French, 3¼@3½c; alum, $2.00@2.25; California refined, 1¾@2c; sulphide of iron, 8c ℔ lb; copper sulphate, 5¼@5¾c; chloride of lime, spot, $2 50@2.75: sulphuric acid, in carboys, 66% B, 1¾@2c ℔ lb.; nitric acid, carboys, 8c ℔ lb.

OILS.—Linseed, boiled, bbl., 49c; cs., 54c; raw, bbl., 47c; cs., 52c; Lucol oil, boiled, bbl., 44c; cs, 49c; raw, bbl., 42c; cs, 47c. Kerosene—Pearl, per gal., 21c; Astral, 21c; Star, 21c; Extra Star, 25c; Eocene, 24c; Elaine, 27c; Water White, in bulk, 14½c; Mineral Seal, iron bbls., 18½c; wooden bbls., 21c; cs, 24c; Mineral Sperm, cs, 26½c; Deodorized Stove Gasoline, bulk, 17c; do., cs., 23½c; 86° Gasoline, bulk, 21c; do., cs., 27½c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19½ c: Lard Oil, E. W. S., bbl., $1.00; cs., $1.05; Neats-foot Oil, pure, bbl., 75c; cs.. 80c: Sperm, crude, 50@60c; Natural White, 70c; Bleached do, 75c; Whale Oil, cs, 50@55c.

BONE ASH.—Extra No. 1, 5@6c per lb. No. 1, 4@5c.

RED LEAD.—500 lbs. and over at one purchase, per lb., 6½c; less than 500 lbs., 7c.

LITHARGE.—Pure, in 25-lb. bags, 8 @9c per lb.

BORAX.—Concentrated, 6@7c per lb powdered, 8@10c; fused, 20@25c.

BORAX.—Crystal, 7c; calcined, 25c.

MANGANESE.—Pure, ℔ lb., 60c.

SODIUM.—Metal, ℔ lb., $1.00.

BISMUTH.—Subnitrate, per lb., $1.75.

MERCURY.—Bichloride, ℔ lb., 90c.

PHOSPHORUS.—(American) ℔ lb., 75c.

SILVER.—Chloride, ℔ oz., 90c@$1.00; nitrate, 55c.

ALUMINUM.—No. 1, 99%, small lots, 37c ℔ lb; 100 lbs., 35c; 1000 lbs, 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

URANIUM.—Oxide, ℔ lb., $3.50.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

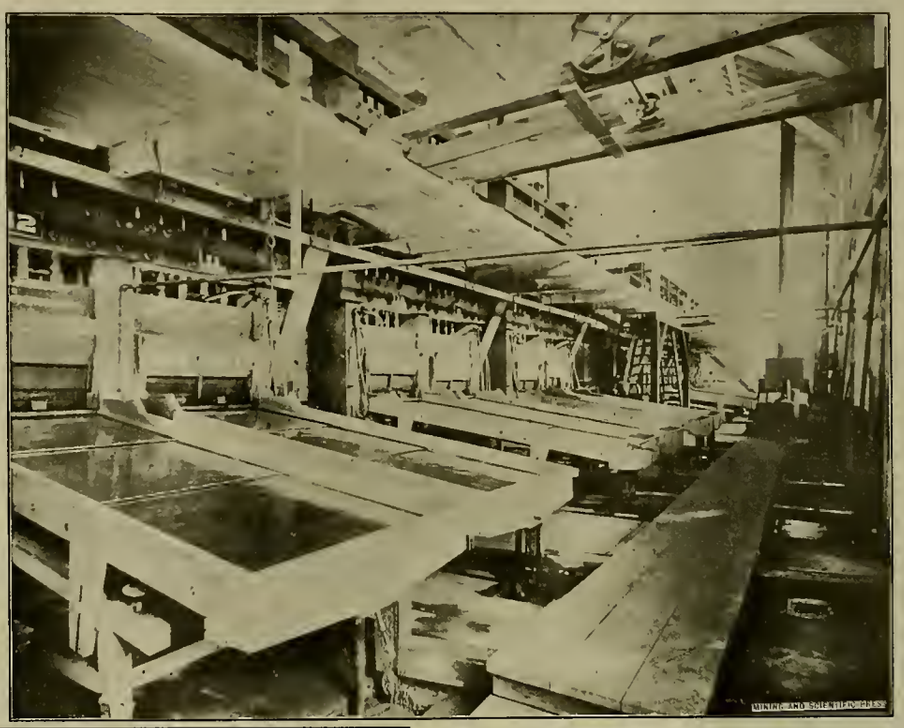
MINING AND SCIENTIFIC PRESS.

Whole No. 2255.—VOLUME LXXXVII. Number 15. SAN FRANCISCO, CAL., SATURDAY, OCTOBER 10, 1903. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Photography in Mining.

The facility with which excellent photographs may be taken, even by amateurs, has led to the employment of the art in illustrating mine descriptions, whether for popular publication or technical reports for commercial purposes. Some writers possess the faculty of description to such an extent that the reader can form a very comprehensive idea of the subject; others lack this "gift" of verbal or written description, and to these the camera and kodak are even of greater service than to the former. By the use of the camera the topography of the country can be distinctly shown, and in the case of new enterprises the difficulties or advantages of transportation and construction are made plain. The methods of working the mine, either on the surface or underground, can be shown in a manner that makes verbal description almost superfluous. On this page is a case in point. Here are seen three illustrations of a mining enterprise. One shows the general features of the country, the topography and drainage of the section, the timber and relative situation of the mining property. Another shows the method of working the mine. At a glance it is seen that it is worked by the open-cut system. The third illustration is an interior view of a well arranged stamp mill.

By use of the camera every phase of mining can be illustrated, even to securing a photograph of a blast



Battery Floor Big Indian 60-Stamp Mill, Near Helena, Mont.



General View Big Indian Mine and 60-Stamp Mill, Near Helena, Mont.

at the instant of the explosion. This has been repeatedly accomplished, though a near view is only obtained at considerable personal risk to the photographer, and also to the instrument. The camera is particularly useful in taking photographs of various types of construction, such as head frames, automatic dumping contrivances, motors, cars and other vehicles, and also in showing methods of timbering, shaft construction, caving workings, etc. The most difficult picture to secure satisfactorily is a rock surface where it is desired to get a photograph that will show the various physical characteristics as they appeal to the eye. The element of color is almost wholly obliterated in a photograph, and unless good judgment is used an exposure of a rock face will prove disappointing in the picture. Diffused light is seldom satisfactory in taking rock pictures. It requires direct sun or flashlight, at an oblique angle, which will throw small shadows and thus bring out the inequalities of the rock surface. Out-of-door rock pictures should be taken with a small aperture and sufficient time to secure detail. Flashlight pictures cannot be taken in this manner, of course. Pictures of machinery and other open construction, such as head frames, should be taken in diffused light—a cloudy day preferred—as it avoids confusing shadows. These may always be observed in photographs of the character described which have been taken in bright, direct sunlight, the deep shadows often making the subject indistinct and very unsatisfactory.

THE eighty-fifth meeting of the American Institute of Mining Engineers will be held in New York City next week, beginning on the 13th inst., in the rooms of the American Society of Mechanical Engineers. Among other features of the programme the members will visit and inspect the subway now in course of construction in New York. This is one of the most extensive engineering feats now being accomplished in the United States. A trip up the Hudson river to West Point Military Academy will form another interesting feature of the meeting.



Open Cut, Big Indian Mine, Helena, Mont. (See Page 236.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION.

United States, Mexico and Canada.....$3 00
All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

BRANCH OFFICES:

NEW YORK CITY, 720 Park Row Bldg. BOSTON, 27 School St.
CHICAGO, 1115 Monadnock Block. DENVER, 606 Mack Block.

J. F. HALLORAN.....Publisher

San Francisco, October 10, 1903.

TABLE OF CONTENTS.

ILLUSTRATIONS: *Page.*

Battery Floor Big Indian 60-Stamp Mill Near Helena, Mont..229
General View Big Indian Mine and 60-Stamp Mill Near Helena Mont.....229
Open Cut Big Indian Mine, Helena, Mont.....229
General Plan Showing Location of Homestake Cyanide Plant and Other Buildings, Lead City, S. D.....232
Plan and Section of Homestake Cyanide Works, Lead, S. D 232
Drifting With Breast Boards.....234
Cross Section of Big Indian Mill.....236
Plan of 60-Stamp Mill.....237
Mining and Metallurgical Patents.....239

EDITORIAL:

Photography in Mining.....229
Eighty-fifth Meeting of American Institute of Mining Engineers.229
The Production of Pig Iron.....230
The Labor Problem.....230
The Bell Signal Code.....230
The Basis of Mine Investigations.....230
California in 1902.....230
Cheap Mining in Montana.....230
An Object Lesson.....230

MINING SUMMARY.....240-241-242-243-244

LATEST MARKET REPORTS.....245

MISCELLANEOUS:

Concentrates.....231
The Metallurgy of the Homestake Ore.....232
No Place in the Field of Metallurgy.....232
Identity and Continuity of Veins.....233
Drift Timbering.....233
Electrolytic Refining of Copper.....234
Testing Methods in the Physical Examination of Portland Cements.....235
Cyanide Poisoning—Its Cure and Prevention.....236
Practical Results of Irrigation.....236
Production of Monazite in 1902.....236
Big Indian Mine.....236
Water Power in South Africa.....237
The Ventilation of Deep Levels.....238
Mining and Metallurgical Patents.....239
Personal.....244
Catalogues Received.....245
Commercial Paragraphs.....245
Books Received.....245
Obituary.....245
New Patents.....245
Notices of Recent Patents.....245

THE production of pig iron has increased so enormously of late that overproduction is the result, and the large iron furnace managers of the East and South, with headquarters at Pittsburg, Pa., and Birmingham, Ala., respectively, have agreed to restrict the output by 25% to bring the amount of iron manufactured within the requirements of the trade.

THE labor problem is still a matter for serious consideration on the Witwatersrand, South Africa. Some of the mine managers and some of the merchandising interests favor the importation of Asiatic laborers, but this policy is stoutly opposed by others. At a recent meeting of prominent citizens representing several interests on the Rand a resolution was passed pledging those present to support the Labor Importation Association in its endeavor to secure the admission of unskilled Asiatic labor, subject to certain legislative restrictions.

The Bell Signal Code.

All miners realize the necessity of a uniform, comprehensive and common-sense code of bell signals in underground mines. On these signals their lives daily depend and a mistake is often attended with fatal consequences. There is at present no uniformity in the bell signals now in use throughout the United States, though there are two in most common use. One is that which has been legalized by legislative enactment in some of the States and the other is that suggested by the Western Federation of Miners. The latter has been given widespread publication, and there has been an effort made to have it universally adopted, but this code is deficient and one likely to result in the injury or death of men who work under it. It is unfortunate that some journals have published the code of the Western Federation of Miners with the editorial statement that "it has been universally adopted by all mines in the United States west of the Missouri river," for such is not the case. If the code of the Federation were revised in such manner as to make it free from objection, by reason of its present shortcomings, there would be no objection to its universal adoption. It is a subject of too great importance to be lightly disposed of.

The Basis of Mine Investigation.

A circular has been issued by the chief of mines and metallurgy of the Louisiana Purchase Exposition, to be held next year at St. Louis, Mo., urging each State commission into whose hands the collection of a representative mineral exhibit has been given, to make as complete and as representative an exhibit as possible. The circular says: "What the engineer desires to see—and it is on his information that the capitalist makes investments—is an exhibit which will illustrate not only the average richness of the deposit, but which will show the country rock contiguous to such deposits." It is true all mining engineers are interested in the kind and condition of the wall rocks of mineral veins and deposits, and all agree that these have a bearing on the economic working, if not the value of the deposits, but the circular goes further and says: "The country rock is the basis upon which the mining engineer makes his investigations," etc. That any experienced mining engineer places such importance upon the wall rocks of an ore deposit is extremely doubtful, and that he makes it "the basis of his investigation" is a flight of imagination. There are things of far greater importance than the wall rocks of a mine which is under investigation. The extent and value of the ore bodies are the real basis of mine examination, and the cost of extracting the ore and reducing it to a merchantable product are of equally great importance. The cost of extraction of the ore is influenced to a greater or less extent by the character of the wall rocks, but even an approximate idea of what particular influence the walls may have upon the economy of the proposition cannot be gained from an inspection of hand specimens of the wall rock.

It is important, however, that every mining State make as characteristic and complete an exhibit as possible at the St. Louis Exposition, for the more comprehensive and representative such exhibits are the greater the effect it will have in directing capital to the various districts represented. The mineral exhibit is no less a competitive display than that of the various arts and manufactures. Such an opportunity as this will be to display the mineral wealth of the United States only occurs occasionally, and it should not be lost sight of nor neglected. It is a duty each district owes to itself to see that it is represented in the best possible way by ores and minerals, and wall rocks as well, with such description as is necessary to render the exhibit intelligible to those who examine it in search of information.

California in 1902

The annual report of L. E. Aubury, State Mineralogist of California, has just been issued and appears on page 240. The report shows that the total output is in excess of that of any previous year, but it also shows a falling off in some of the metallic products, notably of gold and copper. This shrinkage is due mostly to labor troubles in various parts of that State, but has been offset in a measure by the production of new enterprises, which have helped to swell the total. The output the present year will undoubtedly feel the depressing effect of strikes, but still other new enterprises will add their quota and tend to keep up the average to a point near that of former years. The gold yield in 1902 was $16,910,320 and in 1901 it was $16,989,044, showing a small decrease for 1902. On the whole, the report shows what may be considered under existing circumstances to be a satisfactory condition of the mineral industry in California, particularly as there are several new mineral industries which are becoming of greater importance annually. Among these is noticed the production of gem tourmalines and of mica, the latter being included, for the first time, in the mineral output of that State. The manufacture of Portland cement is also increasing largely, as will be shown when the statistics for 1903 have been compiled and published.

Cheap Mining in Montana.

Elsewhere herein will be found an interesting description of a Montana gold mine and mill, the property of the Big Indian Co., near Helena, which will attract the attention and interest of all mining men who see it. The sketches and illustrations show clearly the method of mining by the open-cut and mill-hole system, and is an instance of mining and milling at low cost under the direction of a competent manager. The article is thoroughly practical, direct and complete.

Without going into the minutiæ of operations as conducted at this mine, the manager makes the entire proposition, with its methods, results and costs, so concise and comprehensive, that every miner can understand and appreciate the fact that good work is being done. While at first sight one is inclined to think that if the shoveling on the bench above the mill hole in the cut could be obviated by breaking the ore down directly into the mill hole, it would reduce the cost of mining, still, experience in this instance has evidently proven that it is inexpedient or inadvisable to make raises and build new chutes except at stated intervals, which would probably be determined by a distance which would bring the apex of the two adjoining slope angles to the surface, the intermediate block of ground being mined subsequently.

It is descriptive papers of the character of that here referred to of which the MINING AND SCIENTIFIC PRESS makes a particular feature. Papers of a general nature are always interesting to some, but those of a technical and practical kind are valued by every mining man to whose notice they may come. These columns are always open to those who will contribute something of their knowledge and experience. It is not so much abstruse theories that the miner and metallurgist demands as descriptions of practical operation of mine, mill and smelter. True, no paper descriptive of smelting, or some portions of the various wet processes of ore treatment, would be complete without going into the chemical reactions which take place, and these are essentially scientific and technical, but they are also thoroughly practical.

Such subjects as "the origin of gold" and "the depth within the earth at which rocks are molten and plastic" have a certain interest, but they are beyond the comprehension of most men who are actively engaged in useful pursuits. Subjects of this character are purely theoretical, and absolute knowledge regarding them is not within the present range of human possibility to obtain.

The geological description of a mine or mining district, the practical operation of a mine, with its mechanical features, methods of ore treatment, the result and its cost, new schemes in stoping, new designs in head frame and mill construction, experiences in foreign lands, drainage and ventilation of mines—these are a few of the subjects which all mining men find interesting and consider important, and to such as these the columns of the MINING AND SCIENTIFIC PRESS are always open.

An Object Lesson.

Several years ago a large dump of tailings at a gold mine in El Dorado county, California, was sampled, and considered sufficiently valuable to treat by the cyanide process. A plant was erected, and the dump was worked by that method. The result of the treatment was said to be satisfactory. The plant was removed and the incident passed out of the minds of those who were conversant with the circumstances. It is now stated that these tailings still contain sufficient value to make them susceptible of retreatment by the same process at an additional profit, and a plant is to be again built for this purpose. This is interesting as representing one of two conditions, or possibly both. The ore was originally crushed in a stamp mill and amalgamated. The treatment of the tailings several years later by the cyanide process either left values in the sands that it was not profitable to extract at that time, or the cyanide process was not applied with as perfect a knowledge of its various phases as that possessed at the present time. It amply illustrates the constant onward march of mining and scientific progress.

CONCENTRATES.

THE samples from La Grange, Stanislaus county, Cal., are talc schist impregnated with iron and copper pyrite.

"COSTEANING" is a Cornish term, meaning the prospecting of a mine by sinking pits through alluvium to bedrock.

IN roasting an argentiferous zinc blende there is always a loss of the silver by volatilization. This loss is often in excess of 10%.

COMPRESSED AIR is preferred to steam in driving rock drills. Steam is often employed in quarry work, or in a place where only temporary use is to be made of the drills.

MINERALS may be determined by the use of the blowpipe, but a knowledge of the fundamental principles of chemistry is necessary to successfully make use of the blow pipe in determinative mineralogy.

EIGHT-POUND RAILS are too light for mine cars carrying 1800 pounds or over, though in a double track tunnel rails of this weight may be sufficiently heavy for empty cars. Twelve-pound rails are heavy enough for most mine traffic where men do the tramming or the cars do not hold more than one ton each.

COVELLITE is a copper sulphide, CuS. It commonly occurs massive or in spherical forms, rarely in crystals. It has an indigo blue color, and is sometimes mistaken for blue carbonates of copper. At the Rambler mine in Albany Co., Wyo., with it is associated sperrylite, a diarsenide of platinum. It is cited as an unusual occurrence.

THE cost of transporting ore by narrow-gauge railroad depends upon the grade, capacity of motors, distance to be traveled, quantity of ore handled, management, and other things. The cost of a 7-mile haul in southern California was stated to be 12 cents per ton, coal being used as fuel. With oil it would probably be less. Three hundred tons were hauled daily.

BASALT is a rock of ultra-basic type, containing, according to classification, but 40% to 57% silica. The quartz-bearing basalt is an unusual variety which is rare. It is found at Cinder Cone in Lassen county, Cal., 10 miles east of Lassen peak. Here the rock is a fine-grained black basalt, through which occurs abundantly small white crystals of quartz. It contains, according to Didier, 57 25% silica.

IN the Joplin, Mo., district mining is carried on from the surface to a depth of about 250 feet, though bore holes sunk to a greater depth have encountered rich ore. Much prospecting is done by means of the "churn drill." The cost of drilling by this method on small contracts is stated to be $1.25 per foot. Shaft sinking is done at a low cost as compared with other mining districts. It is stated that a shaft 6x7 feet was sunk under contract 80 feet for $160. The shaft was in soft ground.

NO BATTERY BLOCKS are made for heavy quartz mills that are intended for permanent use by laying timbers horizontally. The best practice is to place them on end. Either large single blocks or two blocks of proper size are used. A battery block may also be built up from 2-inch planks, spiked together, and some mill men believe this to be superior to solid blocks, as the built up block permits repairs to be made, and mortars to be replaced without removing the block.

THE distinction between granite and syenite is in the occurrence of hornblende in excess of mica in the syenite. In each rock the predominant feldspar is alkaline (orthoclase), though plagioclase soda-lime feldspar may also be present. The syenite of Werner is simply orthoclase and hornblende. Granite, syenite and diorite pass by transition from one to the other, grano-diorite representing an intermediate stage in which the essential constituents of both granite and diorite are found.

THE mean tractive force of a locomotive engine in pounds is ascertained by dividing the square of the diameter of one piston in inches, times a single length of stroke in feet, times the average steam pressure in the cylinders in pounds per square inch, by the diameter of the driving wheel in inches. From the tractive force must be deducted 20% to 30% for internal friction. The effective tractive force cannot be greater than the adhesion of the driving wheels, or about 25% of the weight on the drivers.

RAILROAD TUNNELS are so much larger than mine tunnels that the method of excavation is somewhat different. In railroad tunnels a heading (which is an excavation about the size of the average mine tunnel, which is afterward enlarged) is usually driven ahead of the main work. Such headings usually cost about twice as much per cubic yard removed as the balance of the tunnel. Large railroad tunnels in hard rock are usually driven in benches, and in mine tunnels the entire face is carried at once.

THE cost of powder per ton of ore broken in mining varies greatly, like almost every other factor in mining costs. In some mines the cost is about 3 cents per ton, in others still less. In still others, where rock is hard and has a tendency to "break big," a much larger amount is used in order that the rock may be shattered, thus dispensing with the cost of breaking the large masses by "buildozing" and by the use of rock hammers. In such cases the cost of powder may reach 15 cents per ton of ore broken.

THE method of estimating the horse power of a boiler, as adopted by the American Society of Mechanical Engineers, is based on the evaporation of thirty pounds of water per hour from a temperature of 100° F., as it comes from the feed water heater, into steam at 70 pounds gauge pressure, which is considered equivalent to 34.5 pounds of water evaporated from a feed water temperature of 212° F. into steam having the same temperature. So, if a boiler evaporates 1800 pounds of water at 100° F. into steam at 70 pounds pressure, the boiler is rated at 60 H. P.

IN a case where veins cross, each owned by separate locators, the senior locator takes not only the vein upon which he has made his location, but also all other lodes or veins found within his surface boundaries, including the cross lode subsequently located by another. A junior cross-lode locator has no right to any ore found upon the cross vein within the boundaries of a senior claim. The owner of a junior tunnel site cannot by means of a crosscut tunnel penetrate within the bounding planes of a senior location for any purpose. Where two lodes cross in dip, the ore in the intersection of the veins belongs to the senior locator, and the junior has right of way through the vein to the continuation of his own vein beyond.

THE structure of minerals is an important factor in their determination. The various types of structure are the columnar, granular and lamellar. The columnar is divided into several varieties—fibrous, as in crysotile; reticulated, when the crystals or fibers cross in various directions; stellated, when the fibers are arranged in star-like forms, radiating from a center, as in some varieties of pyrophylite, an aluminous silicate resembling talc; radiated, when the fibers radiate from a center, but without producing star-like shapes, as is often seen in stibnite. The granular structure may be from microscopically fine to coarse. The lamellar structure is found in such minerals as mica, selenite, etc. The leaves or plates may be flat or curved.

SKIPS are generally replacing cages in shafts, both vertical and inclined. A skip can run on any angle of inclination. Where the angle of dip of the shaft is less than 80° it is advisable to have the skip built with wheels, and the shaft to be also supplied with guides to prevent the skip overturning in the shaft. Where the angle of inclination is less than 70° no guides are necessary, though it is advisable to put in a guide rail if very rapid running is to be done, as a slight inequality in the surface of the rails has a tendency to derail the skip when moving rapidly. Water skips are built having a capacity of 1500 to 2000 gallons. Skips can be arranged to dump automatically, and when properly adjusted rock may be loaded and dumped by the use of skips much more rapidly than in any other manner.

IN the desilverization of lead, zinc is employed, the latter uniting with the silver or gold, if any be present, and from these the zinc can be readily removed. The ultimate atom of silver may be removed from lead in this manner, but in metallurgical practice about 0.1 ounce per ton of silver still remains in lead bars recovered from mines containing silver with the lead. The zinc also combines with any copper or tellurium present in the lead. Lead is refined by the use of zinc, by what is known as the Parkes process, in which zinc in the form of slabs is stirred into the molten gold and silver-bearing lead, in a large iron vessel. The zinc combines with the gold and silver, forming a mushy alloy which is removed by skimming, the lead being treated in this manner several times. The quantity of zinc required varies with the amount of silver present in the lead.

THERE are cases where it is not advisable to attempt to hold a group of claims by doing assessment work on one of them, ostensibly for the benefit of all. One instance where it would be unwise to assume the risk which this might involve is where an individual or company secures from a number of independent owners a group of claims, under bond, and proceeds with the development by confining the work to a single claim. This is the more likely to lead to complications if these several claims are on several separate veins. If, however, the bond is taken up, and the properties come under a single ownership of either an individual or company, the new owner may confine assessment to one claim without danger of having the other claims "jumped," if the work so done can be shown to be for the benefit of all the claims of the group, which claims must be contiguous.

BRASS is an alloy of zinc and copper. The relative proportion of the metals varies greatly with the use to which the alloy is to be put. An alloy containing 80% copper has a reddish-yellow color; and with less than 48% copper it is gray to white. In intermediate stages the alloys are various shades of golden yellow. The hardness of these alloys is greater and the melting point lower than those generally calculated as the mean of the two metals. The ductility of zinc-copper alloys increases with the percentage of copper. There is but one definite alloy of zinc and copper, containing about 33% copper and 67% zinc, which corresponds to the formula $Cu\ Zn_2$. All other alloys of zinc and copper are stated to be solutions of this definite alloy, in an excess of one of its constituents. Muntz metal contains 40% zinc and 60% copper. It is occasionally employed for mill plates and are said to be satisfactory amalgamators.

AN overshot water wheel should be so placed that the buckets will not be immersed to a depth of more than 1 foot in the tail race. The water should enter the buckets at a point 16 to 27 inches lower than the head water level. The velocity of the water at the point of impact with the wheel is from 9 to 12 feet. The water must have a greater velocity than the periphery of the wheel. If the velocity of the wheel be too great the water will be dashed out of the buckets quickly. The depth of the buckets is usually about 10 to 16 inches, depending on the size of the wheel. The diameter of an overshot wheel may equal the available height of fall of water less about 2½ feet. The number of buckets which may be put on a wheel is determined by the diameter of the wheel and the distance between the buckets. To lessen as far as possible the loss from spilling, the buckets must have the proper form, and the water supply should be restricted to the extent that the buckets be not over one-quarter to one-third full. Overshot wheels have an efficiency of about 75%.

IN many mines the first step in concentrating the ore is the sorting of the ore in the underground workings. This is easy where there is a marked physical difference between the ore and the waste, but in many mines this difference is not always apparent, as the ore and waste may bear such a resemblance to each other that hand sorting is impracticable, at least underground. In other mines the difference in appearance between ore and waste is so difficult to determine that sampling of the face is the only reliable guide. In some portions of the gold mines at Hedges, San Diego county, Cal., the miners who are acquainted with the mine can distinguish between pay rock and waste by simply passing the fingers over the face of rock in the workings, and yet the difference to the eye is scarcely noticeable. The difference is wholly physical and lies in the fact that the gold-bearing rock is more siliceous than that which is barren, the latter containing innumerable grains of decomposed lime feldspar, which disintegrates under the touch, while the more siliceous rock remains firm. Of course this is no index of value, but the harsh feeling rock seldom contains more than a trace of gold.

THE Washoe process is the name given to the amalgamation of gold-silver ores, as practiced on the Comstock lode, Nevada. It consisted essentially in crushing the ore in the stamp mills and grinding it in pans with mercury in the presence of salt and bluestone, together with water and steam. The bluestone dissolves, freeing sulphuric acid which assists in decomposing the sulphides and at the same time, uniting with the sodium chloride, frees chlorine, which unites with the silver to form silver chloride. The gold and silver are then amalgamated by the mercury and drawn off into a well by means of a so-called "syphon." The pulp after several hours' grinding and subsequent amalgamation is discharged into a settler where it was thinned by the introduction of additional water and a further amount of amalgam recovered. As flouring of the mercury is not of infrequent occurrence, a third pan, called the agitator, was usually provided to catch the amalgam and mercury escaping from the settler. The process is more particularly adapted to silver ores containing sulphides. Chloride silver ores are treated by this process or by hyposulphite of soda. Frequently ores treated by the Washoe process require previous roasting. There are many modifications of the process.

THE lack of uniformity in the names and numbers of mill screens makes comparisons difficult. A screen may be called a 30-mesh, meaning thirty holes to the linear inch or ninety to the square inch. Two screens may be made having this number of apertures per square inch, but if made of different gauge wires these holes will not have the same superficial area, and consequently a different capacity for discharging pulp through them. In the selection of a mill screen it should be the aim not only to get a screen which will wear well but one suited to the ore. The ore should be crushed no finer than necessary to free the greatest value at least expense. The economy of saving may easily be carried too far for economical results. When known to what degree of fineness the ore should be crushed it is not good mill practice to employ a screen which, though it endures well, will wear by the attrition of the rock until the holes become enlarged to such an extent as to pass particles of ore twice the size of those which pass it when the screen is new. If fine crushing is necessary to free the values it will generally be found that tailings will run higher through an old battery screen than through a new one. The life of a screen depends upon the kind of screen; amount of water used in the battery; height of discharge, and, largely, upon the character of ore as to hardness. A flinty ore will discharge more rapidly through a slotted screen than through a woven one, and a granular ore is best treated with a wire cloth or round punched screen.

The Metallurgy of the Homestake Ore.*

NUMBER II.

Written by C. W. MERRILL, B. S.

CLASSIFICATION.—We have now a pulp containing eight or ten parts of water to one of ore, and much of the latter is so infinitesimally fine as to cause a visitor, who had watched an attempt to filter the slimes on a large scale, to say that, for an exemplification of the size of a molecule, he would advise the study of Homestake slimes.

The tailings as they leave the mill are sized with the following result: Coarse (remaining on 100-mesh), 22%; middles (between 100-mesh and 200-mesh), 18%; fines (passing a 200-mesh screen), 60%. That is, 60% of the particles issuing from the mortar have less than 0.00001 square inch of cross-section.

When the erection of the cyanide plant had been determined upon, the question of a tailings wheel to elevate the pulp and permit the location of the plant nearer the mills being under discussion, it was calculated that to elevate the tailings at a cost of about 2 cents per ton would cost the company, approximately, $140,000, on the proportion of the material then blocked out in the mine which would be available for leaching. In other words, for every cent per ton which could be saved in the secondary treatment of the leachable material, the company would profit ultimately to the extent of at least $70,000. Consequently the plant was located, as shown in Fig. 1, about a quarter of a mile below the Lead mills, and the problems of transportation and of such classification as would permit the pumping plant to return its former percentage of water to the mills presented themselves. The latter has been met by the installation of the upper cone house, where twelve gravity settling cones, 7 feet in diameter and with 50° sides, throw off about half the water and, perhaps, one-fifth of the solid matter, which latter is the very finest slime, of the following sizing, during 1902: Coarse, 0; middles, 1.76%; fines, 98.24%. The thickened slimes are subsequently settled out of this pulp, and a part of the water is returned to the mills.

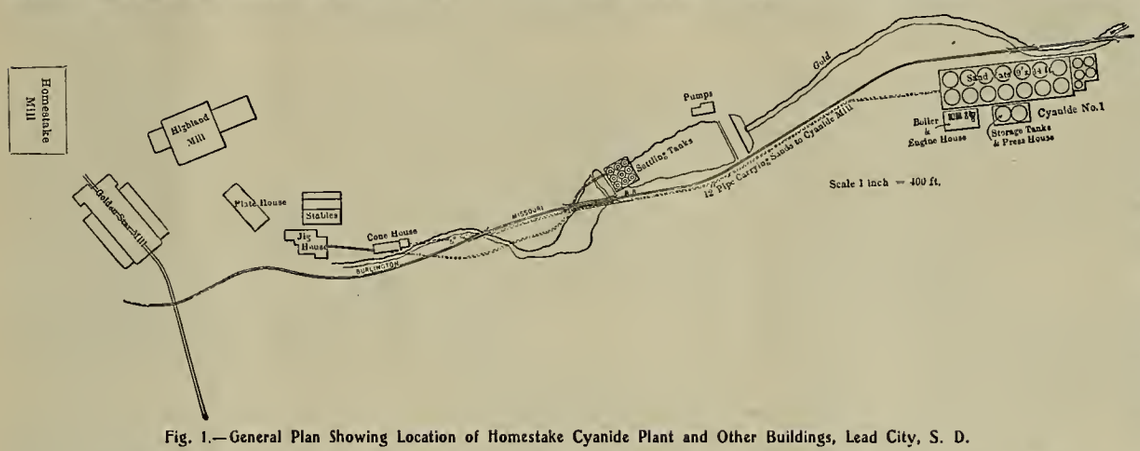


Fig. 1.—General Plan Showing Location of Homestake Cyanide Plant and Other Buildings, Lead City, S. D.

From the bottom of the cones is drawn the thickened pulp, containing all of the leachable material and some of the slimes. This portion is transported by means of a 12-inch cast iron flanged pipe on a minimum grade of 2.5%, and with as few turns as possible, to the cyanide plant.

The second step in the classification is carried out in the plant proper by means of six more gravity settling cones, the overflow from which, of a like composition to that of the first twelve cones, is conducted to a collecting tank, whence it is drawn for the purpose of sluicing out the leachable material after its treatment has been completed. The average sizing of this second settling-cone overflow for 1902 was: Coarse, 0%; middles, 1.38%; fines, 98.62%.

The underflow from the second set of gravity-settling cones, which is now quite thick, passes to twenty-four sizing or hydraulic classifying cones, which carry a device for discharging the sand and introducing the water, patented by the writer. By its means the admission of water does not result in currents of varying velocity, which latter always interferes with uniform separation of slimes from granular material.

These sizing cones complete the classification, which has been a difficult problem—first, because of the extreme fineness of the pulp, and, second, because the writer was determined to avoid double treatment, which entails a largely increased installation and operating cost, but which is necessary, unless a product be obtained practically free from slime.

The slime overflow from hydraulic classifiers had the following sizing average for 1902: Coarse, 0%; middles, 1.46%; fines, 98.54%. As regards all slimes referred to, they will practically pass the 200-mesh screen, the middles being largely wood pulp.

In fact, there is little doubt but that the importance of the most perfect classification possible will be recognized shortly as a vital consideration in the cyaniding of wet, crushed ore; and metallurgists will not follow the old German practice of spitzkasten and spitzlutten, which are very imperfect machines as compared with a cone classifier or sizer for separating granular from flocculent material. The writer's judgment is that a scientific classification system, by which all the granular or angular material may go to the leaching vats, and all the amorphous portion to the slime plant, will in the future be a feature in designing a plant on which the greatest care and experimentation will be put and the highest grade of technical skill utilized.

CYANIDE TREATMENT.—By these three steps in the classification we have separated the pulp into non-leachable slimes, comprising about 40% of the ore crushed, and practically all passing a 200-mesh screen and a direct leachable product, amounting to, approximately, 60% of the tailings, which, although very clean and free from mud, is still of a very fine texture, as the following sizing test (the average for the year 1902) will show: Coarse, remaining on 100-mesh, 40.5%; middles, 100 to 200 mesh, 30.8%; fines, passing 200 mesh, 28.7%.

While this fineness is notable, we find that, as the proportion of lower level ore increases, we can treat an even finer product. A recent charge, containing as high as 40% fines, maintained our normal leaching rate of 3 to 4 inches per hour throughout the treatment. This is undoubtedly due to the fact that the fines from the lower level rock contain a greater proportion of angular or granular, and a smaller proportion of amorphous, hydrated or flocculent, material.

The leachable pulp, which contains 10% to 12% of pyrite, is now ready to go to the vats, and, on the way, lime is added in quantities varying from three to five pounds per ton. At first we tried adding this lime in the mills, as is done in Africa, but found that the amalgamation was most seriously affected thereby. Not only was the plate completely coated, weeks being required to get it back in proper shape, but the tailings values were largely augmented. This result only emphasizes the fact that the process must fit the ore, and that attempts to make an ore fit a process are useless. This practice of adding lime to the battery is, according to the writer's information, unanimously pronounced to work the best results in Africa, and to reduce the values in the slimes lost from amalgamation to half of what they are when no lime is used in the battery. In our case, however, we have demonstrated that the best results follow from crushing the lime wet into a running pulp which joins that from the sizing cones, whereby there is less slacking and less loss of flocculent lime in the vat overflow—i. e., in the water which overflows the vat, the sand having settled out. Not only is it of distinct advantage to have our lime go into the tank in unslacked granules, but recent investigations are proving that the average size of these granules has an important bearing on the subsequent cyanide decomposition and gold extraction. This seems to be due to the fact that a low alkalinity, but one approximately constant throughout the leaching, is an important desideratum with the Homestake ore, on account of its considerable content of easily decomposed sulphides. We are not as yet prepared to say what is the very best mesh screen to use on our lime stamp battery, but at present we are using a wire screen, the opening of which is $\frac{1}{64}$ square inch. In this connection it should be said that only the purest lime should be used, the magnesia in the ordinary domestic (Black Hills) limestone being objectionable for several reasons.

The classified pulp and the lime having commingled, the mixture passes to the distributor, which is of the garden-sprinkler or Butters & Mein type.

There are two distributors, one for each row of vats, hung from a carriage, which travels on a track, and the step of which rests on the top of the center-bottom-discharge gate of each vat, when the distributor is in operation. There are fourteen vats, each 44 feet in diameter, 9 feet deep inside and holding 610 tons of sand. To fill one of these requires from eleven to eleven and one-half hours, which, with our equipment, permits of about five days' contact with solution before it is necessary to recharge the vat. After filling, the drain valve is opened, the top leveled and the stronger of the two stock solutions, of a strength of 0.14 of 1% KCN, is run on. The contact with this solution, including frequent drainages for the purpose of drawing in air, is maintained for about three days. The air contact is very important in Homestake ores, owing to the presence of pyrrhotite or subsulphide of iron, which absorbs oxygen with great avidity, and which would greatly retard the dissolving action of the cyanide solution were not large quantities of the essential oxygen introduced. The effluent solution during this period, having normally a strength of 0.10 of 1% of cyanide, is run to the weak precipitation tanks, of which there are two, each 26 feet in diameter by 19 feet deep, and holding 300 tons of solution.

After the three days' contact with strong solution, the weak solution (normally of a strength of 0.10% KCN) is brought into the charge, and this contact is maintained for the remaining two days. The effluent solution from the charge during this period is run to the strong precipitation or rather collecting tanks, which are of the same size and number as the weak precipitation tanks.

Fig. 2 shows the interior arrangement of the works.

After contact with the weak solution has been completed, wash water is brought into the charge, and the washing continued until the effluent solution is down to 0.03 or 0.02 of 1% in KCN and from 5 to 7 cents per ton in value.

The charge is now ready for sluicing, which operation is accomplished by two men, with 3-inch hose, in about four hours, using the slime water from the overflow of the second settling cones. The four side gates and one center gate afford ample facilities for the discharging. The last inch or so of the sand is sluiced with clear water under seventy-five pounds pressure through 1¼-inch hose, and the eight-ounce duck filter, under which is another of cocoa matting, is washed clean. The vat is then filled with water, and is ready for the next charging.

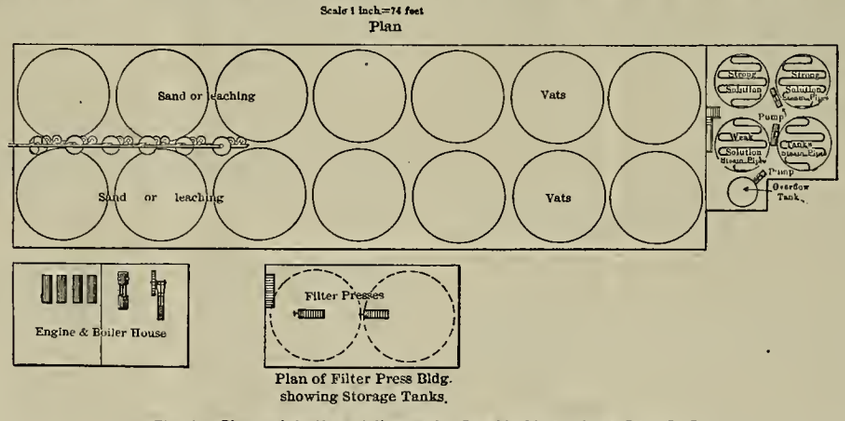


Fig. 2.—Plan and Section of Homestake Cyanide Works, Lead City, S. D.

(TO BE CONTINUED.)

THE haphazard experimenter of the past no longer has a place in the field of metallurgy. He has been supplanted by the expert chemist and analyst, and investigations in the realm of chemical metallurgy are now carried on along scientific lines, and the results are gratifying, for higher percentages of the values are being saved, and the costs of treatment are being reduced.

*Read at Trans. Am. Min. Congress, Lead City, S. D., and to be read at Oct. meeting Am. Inst. Min. Eng., New York City.

Identity and Continuity of Veins.

One of the most interesting features of mining law is that dealing with the extralateral right, which often includes, as a prerequisite to the exercise of this privilege, the establishment of the identity and continuity of the vein. This only becomes necessary when the right of an apex proprietor to follow the dip of his vein beyond the side line of his claim is challenged. In such event he is required to show that an apex actually exists within the boundaries of his claim to an extent sufficient to cover that portion of the vein in dispute. He must also establish the identity and continuity of his vein from the croppings (apex) within his claim boundaries to the point in dispute.

It is not essential that the outcrop of the vein pass through both end lines of his claim, or even one of them, but its course within the claim should be of such a character as to entitle the claim holder to the extralateral right, to the extent of covering that portion of the vein in dispute.

In following his vein on its downward course the owner of the apex must keep within his vein, for he cannot crosscut underneath the holdings of another to reach the vein.

The legal establishment of the identity and continuity of a vein on its downward course, as well as along its strike underground, and beneath the surface of adjoining lands, is often oue of the most difficult questions the courts are called upon to settle. The very wide difference of geological occurrences make it impossible to lay down arbitrary rules for the determination of questions involved in the identity and continuity of veins and the exercise of the extralateral right. The irregular deposits in the limestones of the Eureka district of Nevada, the blanket veins of the northern Black Hills, South Dakota, the fissure veins of the gold belt of California, and the complex vein system of Butte, Mont., are each of widely different geological structure. These illustrations might be made to include many others of still different type. So various are the structural conditions found in the development of mines, that previously decided cases wherein the extralateral right has been involved, may scarcely be assumed as establishing a precedent in another case where geological conditions differ.



FIGURE 103

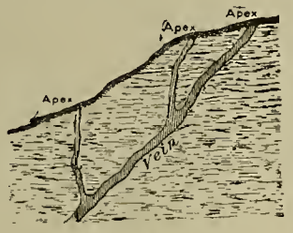


FIGURE 104

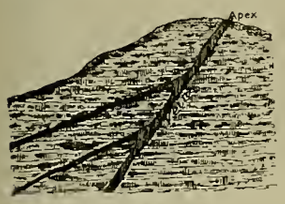


FIGURE 105



FIGURE 106

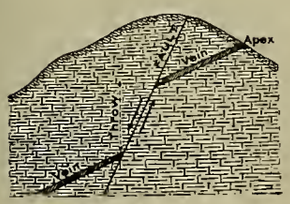


FIGURE 107

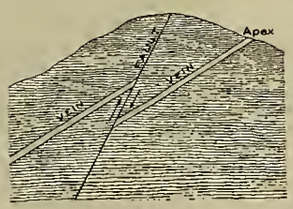


FIGURE 108

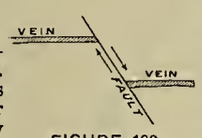


FIGURE 109

The new edition of "Lindley on Mines" contains a valuable chapter devoted to this interesting and important feature of the mining law. Concerning the complicated cases arising from the extralateral right the author says: "The best that can be done in discussing this branch of the law is to present such cases as seem to clearly enunciate principles which may be considered of general application. Of all the decisions of the courts which deal with the subject under consideration, that rendered by the Supreme Court of Montana in Butte & Boston M. Co. vs. Societe Anonyme des Mines de Lexington, speaking through Justice Hunt, is the most instructive and valuable."

Following is an extract from the opinion of the court in the case cited:

"The right of an apex proprietor to pursue a vein passing from his side lines is dependent upon whether or not as a fact the part or mineral body of vein matter which lies outside of the perpendicular of the side lines of his surface claim is so preserved in its identity with the lode inside that it is part of the same vein, the apex of which belongs to the surface owner.

"On principle the identity of the apex of a vein with its spurs or extensions must be the crucial test by which are to be fixed the proprietary rights to that vein and the mineral therein.

"The pursuit of the vein on its dip being, then, the right to be guarded, the identity of the vein pursued must be proven to make the right availing where it is contended the vein, after passing beyond the vertical planes drawn through the side lines of the surface boundaries of the location in which rests the apex, penetrates soil the surface of which is embraced within another location. Identity must always exist. Were there any departure from this rule the miner might secure the benefit of more than he discovered, which was never contemplated by law. Identity in mineral deposit should have no significance not usual to identity of many other material things. It means the same thing or the same vein. It may be said to include a vein that is incessant. But a vein that is incessant or identical in its parts is not necessarily a vein which is continuous in the sense that the continuity or union of its parts is absolute and uninterrupted. In other words, though a continuity of vein does not preclude identity of vein, yet identity does not necessarily include continuity in the exact sense just referred to. 'Law of continuity,' says Webster's dictionary, 'the principle that nothing passes from one state to another without passing through all the intermediate states.' Speaking exactly by this definition, it would often be very difficult, if not impossible, for the challenged proprietor of a mineral vein to convince a jury of the continuity of the vein from one part to another, for there might not be continuity by actual contact of the parts or contiguity which the precise word may literally mean must exist. Were such a rule inexorable a failure of proof would not infrequently be brought about by the inability of the miner to prove continuity without transmission through intermediate states. The miner, therefore, might fall short of that exact measure of evidence required to establish a continuity of vein which excludes interruption between one and another part of the identical vein, and, judged by too closely interpreted significations the continuity would be lost; yet if he prove the identity of his vein by some incessant feature, in our judgment, the right to pursue the lode on its dip is his, and there should but remain the necessity of going to the surface limits to accurately adjudicate the lines defining the right to the vein so identified.

"In this discussion, however, we do not mean to exclude the need of continuity sufficient to preserve identity. The application of the rule of identity of vein should always be made so as to require the miner to trace his lode continuously if he depart beyond his extended side lines."

The court quotes with approval the charge of Judge Hallett in Iron Silver M. Co. vs. Cheesman, upheld by the Supreme Court of the United States, and the following from the opinion of the latter court in that case:

"Certainly the lode or vein must be continuous in the sense that it can be traced through the surrounding rocks, though slight interruption of the mineral bearing rock would not be alone sufficient to destroy the identity of the vein. Nor would a short partial closure of the fissure have that effect if a little farther on it occurred again with mineral bearing rock within it."

The Supreme Court of Montana then continues:

"The true sense in which there must be a continuity of vein is therefore a qualified one and not an unqualified exact one, irrespective or independent of physical conditions found in mining. It may be said as a paraphrase of the decision cited, that identity is essential and the vein must be continuous, but its continuity may be interrupted, even to a closure of the fissure without destruction of the identity, provided the extent of the interruptions or closure does not prevent the tracing of the lode or vein through the fissure to be identical in its parts as a geological fact."

Identity may, of course, be proved by continuous development, says Judge Lindley, although this is not always practicable. It may be deduced from observed facts in different portions of the mine. The incessant features of a given vein as exposed in underground works may ordinarily be presumed to continue throughout undeveloped sections, within reasonable limits, unless there is something in the exposed conditions which negatives such presumption. In regular fissure veins, in the absence of faulting, there is but little room for speculation on the subject of identity. All veins have their individualizing characteristics, and when these are shown to be persistent by actual development their recurrence in undeveloped sections may within reasonable limitations be inferred or established by correlation.

The accompanying illustrations* are in themselves suggestive in connection with the discussion of the identity and continuity of veins.

If a vein "splits," or "forks," either on its strike, as shown on Fig. 103, or on its upward course, as shown on Fig. 104, the forks beyond or above the points of union may form distinct apices, subject to separate location, and thus constitute separate veins in the eyes of the law.

If the forking is downward, as shown on Fig. 105, there is but one controlling apex for all the branches, and, according to our view, the whole must be regarded as a single lode.

In connection with a large complex lode it is sometimes difficult to determine whether or not the various points of outcrop taken together constitute a single apex, and whether included masses of barren rock constitute "horses" belonging to one vein, or country rock in place separating distinct vein apices.

Most veins have small spurs and offshoots. Just where to draw the line or make the distinction between "spurs" and separate branch veins in a legal sense is a matter difficult to determine. Certainly no inexorable rule can be prescribed in advance of some authoritative decision on the subject, and we are aware of none.

In the tracing of a vein there are two important elements—the continuity of vein matter and the continuity of wall boundaries.

"With either of these things well established, very slight evidence may be accepted as to the existence of the other." A vein to be followed must be continuous only in the sense that it can be traced by the miner through the surrounding rocks. Continuous ore is doubtless the best evidence, but it is not essential. Many veins carry only small "shoots" of ore, and the intervening spaces are represented only by a continuous fissure with or without gangue or gouge material.

"A vein is by no means always a straight line, or of uniform dip, or thickness, or richness of mineral matter, throughout its course. The cleft, or fissure, in which a vein is found may be narrowed or widened in its course, and even closed for a few feet and then found further on, and the mineral deposit may be diminished or totally suspended for a short distance; but if found again in the same course, with the same mineral, within that distance, its identity may be presumed."

But as pointed out by the Supreme Court of Montana in the case heretofore referred to, identity is not necessarily destroyed by intrusive dikes, faults, or casual displacements. Certainly in the case shown on Fig. 106 the intruding dike does not destroy vein identity, although it interrupts its continuity in a physical sense.

So in the case illustrated on Fig. 107, representing a very common occurrence, viz., a "normal fault," the fault fissure having been formed after the vein, the hanging wall of the fault plane has slipped or has been thrown downward relatively to the foot wall, and has carried with it a part of the vein; or a "reversed fault," as represented on Fig. 108, where the hanging wall of the fault plane has been thrust upward relatively to the foot wall; or a fault with horizontal displacement, a "lateral heave," as shown in plan on Fig. 109.

*The illustrations accompanying this article are from "Lindley on Mines, Edition 1903," and are published through the courtesy of C. H. Lindley.

Drift Timbering.

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS by W. H STORMS.

The use of a transit is often resorted to for the purpose of keeping the alignment of a tunnel. It is desirable to keep tunnels straight where practicable, but often it is not expedient to do so. Miners, when developing their own claims, often run very crooked tunnels, when not on ore, swinging from side to side in an endeavor to follow the softer ground, or to take advantage of "slips" to "break to." This may seem economy, but it is economy of rather a doubtful character. The subsequent difficulties, loss of time, and extra power required at the various turns, after a time render the economical crooked tunnel a more expensive one than had it been driven straight.

It is an easy matter to keep a tunnel or drift in perfect alignment without use of an engineer's transit. By reference to Fig. 6 a plumb line will be noticed, suspended from a nail driven in the cap, exactly half way from either end. The carpenter, when framing the cap, should make a small score at the center, to be used by the miners as a guide when setting up the timbers. When the direction in which it is desired to run the tunnel or drift has been determined, some stationary object directly in line should

be selected, such as a prominent tree or other natural object, if outside, or a drill hole with a plug and center nail, if underground, from which the alignment may be taken and kept. The first set having been accurately placed (the line from the fixed point

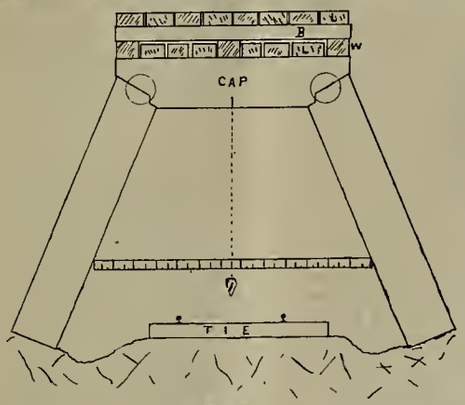


Fig. 6.

to the plumb line being directly in the alignment of the tunnel) the miner may safely proceed. When the second set is in place a second plumb line is dropped in like manner from it, and the set is wedged so that the first and second lines are directly in line with the previously arranged or determined fixed point. When the third set is placed in position the plumb line is removed from the second to the third set, and this set lined up with No. 1 and the fixed point. Underground, candles are often necessary. These are placed directly in the alignment.

The cap may be centered accurately, but the "legs" of the set may not have the same slope, which would make the cap out of level. This may be remedied by utilizing a measuring stick of the proper length, reaching from post to post to post, as shown in the sketch, having a plainly marked center point. The legs should be shifted by wedging, if not "true," until the plumb line is directly opposite the center of the measuring stick. In this manner a drift or tunnel may be run for thousands of feet in perfect alignment. The grade is a matter to be determined by the character of the traffic through the tunnel. Heavy cars hauled by motors are usually run on a light grade, while tunnels where it is intended to tram single cars with men should not exceed 5 inches raise per 100 feet.

In drifting and tunneling, occasionally the material through which the work must be driven caves so badly that not only must top and side lagging be employed, but also "face boards"—that is, the face of the drift must be covered with boards, which are securely held in position either by upright posts and back braces, or in the manner shown in Fig. 7.

In some cases the ground caves so badly that the

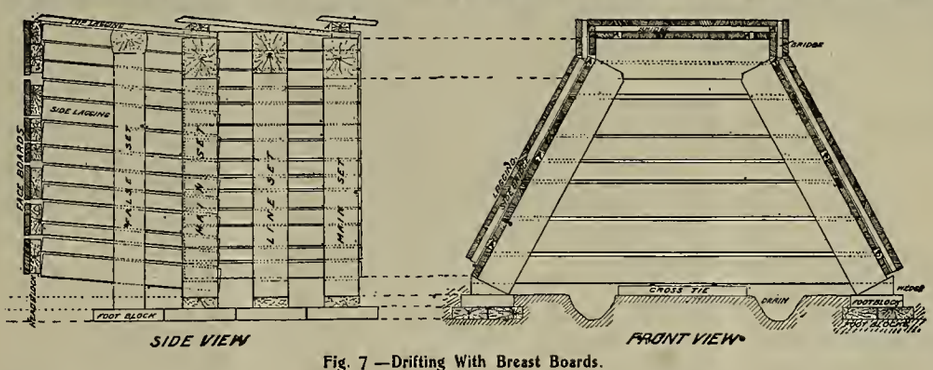


Fig. 7.—Drifting With Breast Boards.

full length between two sets of timber cannot safely be excavated without the use of a "false set," shown in Fig. 7. This set is for temporary use only, and is higher than the regular sets, purposely made so in order that the lagging as driven forward may be kept pointed sufficiently high to catch the bridge on top of the next permanent set.

Electrolytic Refining of Copper.*

Written by W. D. BANCROFT.

In determining the best conditions for the electrolytic refining of copper, we must consider the cost of the power necessary to precipitate a tankful of copper under different current densities and at different temperatures; the cost of heating the tank; the deterioration of the electrolyte; the interest charge on the copper in the tank; the cost of pumping, and the quality of the copper deposited. Good adherent copper can be obtained at almost any current density, provided the rate of circulation be sufficient. The question of the cost of pumping has not been taken up, and is supposed to remain constant while the conditions are varied. The watt-hours necessary to precipitate a gram of copper increase with increasing current density, and decrease with rising temperature. The cost of heating increases with rising temperature, and the interest charge on the copper in the tank decreases with increasing current density. With increasing current density, we have to strike a balance between the increasing power and the decreasing interest charge. With rising temperature, we have to strike a balance between the decreasing cost of power and the increasing cost of heating. The object of this paper is to furnish data bearing on these points. Two of my students, Messrs. Schwab and Baum, have heretofore determined the relation between voltage, current density and temperature for pure copper plates set a definite distance apart in four solutions. By expressing the voltages in terms of the voltage at 20°, the effect of the distance between the plates is eliminated, and the percentage variations hold for any set of plates in the same solution. Data have been obtained showing the relations between current efficiency, current density and temperature for pure copper plates in four different solutions. These experiments were necessary because Foerster and Seidel had found a marked falling off of the current efficiency above 50°. These runs also give the degree of neutralization of the acid by copper. Incidentally, some experiments have been made on the effect of iron salts. The cost of heating tanks similar to those used by the Baltimore Copper Co. has been determined, Messrs. Schwab and Baum having calculated the variation of the cost with varying conditions of temperature and current density for the case of all power costing at the rate of $20 per horse power year, and for the case in which steam heating costs only one-thirtieth of electrical heating.

TEST No. 1.—The object of this test was to determine the variation of voltage with variation of temperature, current density and solution. In commercial copper refining two standard solutions are used, each solution containing 16% copper sulphate crystals. The refineries using the Hayden system make up their electrolyte to contain also 6% sulphuric acid, while the plants operating with the multiple system use a 9% acid solution. It has been claimed that the addition of a small quantity of sodium chloride produces a more coherent form of copper at the higher densities. Experiments were, therefore, made with the following solutions:

SOLUTION A.—16% $CuSO_4 5H_2O$ and 9% sulphuric acid.

SOLUTION B.—16% $CuSO_4 5H_2O$ and 6% sulphuric acid.

SOLUTION C.—Solution A + sodium chloride (1 : 2,000,000 of solution).

SOLUTION D.—Solution B + sodium chloride (1 : 2,000,000 of solution).

Pure copper plates, 5 centimeters wide and dipping 10 centimeters into the solution, were used as electrodes, one cathode and two anodes. The plates were held 1 centimeter apart, and arrangements were made for efficient stirring. The four solutions were placed in four beakers, and the measurements made under practically the same conditions by means of Weston instruments, which had been compared with a standard. The four beakers stood in a large water bath.

The voltage required to obtain a given current density is materially less with the 9% acid solution than with the 6% acid solution. The addition of sodium chloride to the solution increases the voltage at the lower temperatures, while the effect is scarcely noticeable at the higher temperature.

TEST No. 2.—Current Efficiency Run: The object of this test was to determine the variations of the current efficiency when operating with the different electrolytic solutions at varying temperatures and different current densities. Heretofore it has been claimed that the current efficiency drops off rapidly when working at temperatures above 50° C. It was to verify the correctness or prove the incorrectness of this claim that this test was made.

The apparatus used in this test was practically the same as was used in the voltage test (test No. 1), with the addition of a copper voltameter run in series with the four other cells.

The electrolytes used for this run were the same as those of the voltage run, viz., solutions A, B, C and D.

This test showed that the current efficiencies for temperatures below 70° C. fall off but very little, and are practically 100%. Even at a temperature of 90° C. and a high current density of 4 amp. per qdm., the efficiency runs as high as 98% and 99% for the 9% and 6% solutions, respectively, while a current density of 1 amp. per qdm. gives an efficiency of 90% and 91%. While this result is apparently in flat contradiction with that of Foerster and Seidel, this is not really the case. These authors find 47% efficiency with 0.3 amp. per qdm. and 83% efficiency with 1 amp. per qdm. at 100°, while we find, at 90°, 91% efficiency with 1 amp. per qdm. and 99% efficiency with 4 amp. per qdm. The highest current density of Foerster and Seidel is our lowest. Since no refinery in this country runs at as low a current density as 1 amp. per qdm. (except, perhaps, the Calumet & Hecla), the conclusions of Foerster and Seidel are not applicable to American practice. Between 50° and 70° the efficiency in some cases runs a trifle above 100%. This is, no doubt, due to the formation of cuprous sulphate in small quantities in the electrolyte.

The deterioration of solution is proportional to the ratio of anode loss to cathode gain, since pure copper plates were used and there was no sediment or copper scrap at the bottom of the beakers. The solution deteriorates more rapidly at the higher temperature and at the lower current densities. This deterioration of solution probably more than offsets the advantage of decrease in voltage which the higher temperatures give, but only when operating at the lower current densities. The ratio of anode loss to cathode gain, when operating at 70° C. and 4 amp. per qdm., is hardly any higher than this ratio for operating temperatures between 20° and 50°.

EFFECT OF IRON IN ELECTROLYTE.—Frequent statements have been made that the presence of iron in the electrolytic solutions cuts down the current efficiency. To investigate this, solutions containing iron were electrolyzed between weighed copper electrodes at a temperature of 45° C. and a current density of 2 amp. per qdm., with a voltameter in series. The results obtained show that there is no falling off in the current efficiency. After the test the precipitate on the cathode was dissolved in nitric acid, and the solution was tested for iron. None was found, thus demonstrating that iron was not precipitated.

TEST No. 3.—Radiation Run: One of the important items in electrolytic copper refining is the cost of maintaining the electrolytes in the vats at operating temperature. To form some idea of the relative costs of operating at various temperatures was the object of this test.

The vats in a plant using the Hayden system are 9 feet long, 2 feet wide and 2½ feet deep, and are filled with copper plates ½ inch apart. Accordingly, there was constructed a small tank out of ½-inch stock, with the inside dimensions of 9x2x2½ inches, and filled it with copper plates ½ inch apart. The joints of the tank, as well as the inside, were lined with tar, thus effectually preventing leaks.

As a means of heating up a tank, a platinum coil was placed on the bottom and connections brought out to binding posts on the sides of the tank. Next the tank was filled up with electrolytic solution (solution A), and its temperature brought up to near the boiling point by passing an alternating current through the platinum coil. When the solution had reached a temperature of about 95° C. the current was turned off and the run started.

A standard thermometer was placed in the electrolyte, and readings of its temperature taken at varying intervals of time, until the temperature had dropped to about 40° C. Two radiation runs of this sort were made—the first with the tank uncovered and the second with a cover over the top.

The tank was again heated up to 90° C., and the current so adjusted that the temperature of the solution was maintained constant. The power required to overcome radiation at 90° was determined both for covered and uncovered tanks. The power required at several different temperatures was computed both for covered and uncovered tanks, and the data are given in the following table:

CONSTANT TEMPERATURES—POWER DATA.

TANK COVERED.				TANK UNCOVERED			
Degrees Temperature...	Watts.....	Degrees Temperature...	Watts.....	Degrees Temperature...	Watts.....	Degrees Temperature...	Watts.....
90	44.0	65	25.2	90	145.0	65	42 0
85	40.1	60	21.7	85	110.0	60	34.4
80	36 6	55	18.8	80	90.4	55	26.4
75	33 5	50	14.5	75	67.3	50	20.6
70	28.8	.....	.....	70	50.6	.....	.....

Since the radiation of any two similar bodies is directly proportional to the area of their radiating surfaces, these values of power as determined for the small tank can be easily translated to figures for a tank of commercial size by multiplying by 100.

(TO BE CONTINUED.)

*Abstract Transactions American Electrochemical Society, Niagara Falls, N. Y., September 18, 1903.

Testing Methods in the Physical Examination of Portland Cements.*

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS by A. H. CEDERBERG.

TENSILE STRENOTH TEST.—The objective points in this test are:

First.—To ascertain the cementing properties which a cement will develop within a given period.

Second.—To ascertain the quality in general of the cement hy watching the results of the periodical increases in strength, either tensile or crushing, from minimum to maximum time of exposure or immersion.

The methods pursued in manipulating the details in this test are so many and at such a variance that it is next to impossihle to find good checking tests on same sample of cement, if done hy different testers. The principal difference is in the method of moulding the hriquette itself. A good, up-to-date tester will use his fingers and trowel alone, while others, lahoring under antiquated ideas, hased upon quality of cement in years gone hy, will use hammers, moulding or ramming machines, etc. The method recommended hy the committee, ahove referred to, and which should he in use in all first-class lahoratories, is as follows:

"The hrass moulds should he filled at once, the material—that is, the mixed cement—pressed in firmly with the fingers and smoothed off with a trowel without ramming; the material should he heaped up on the upper surface of the mould, and, in smoothing off, the trowel should he drawn over the mould in such a manner as to exert a moderate pressure on the excess material. The mould should he turned over and the operation repeated."

With this detailed description in mind, the test is as follows:

1. NEAT TEST.—Take ahout two pounds of cement—larger quantity at any one time is not to he recommended—and put the same, "cone-fashion," on a large plate glass or polished marhle slah. Form a small crater in the center and pour here the proper percentage of water, which should he as clean as possible. The necessary proportion of water to cement is difficult to determine on paper, without having seen the sample to he tested, or knowing room temperature, etc. Basing the average room temperature at +70° F., I would say that water, in which the temperature lies hetween +65° F. to +75° F., to the extent of 18% to 20% of the weight of the cement, is fairly accurate for a normal and fresh cement, whereas the older the cement the more water is necessary. A percentage of 19.2% water has given excellent results with some of the domestic cements tested hy me. Fineness of cement also affects the proportioning. Thus a cement showing only 92% fineness does not need the same amount of water that a 96% fine requires. A six months' old cement needs more water than when only thirty days old, and so forth.

The water having heen poured into the crater is quickly ahsorhed hy the cement, and the tester now commences to knead the mixture into a dough in a regular hiscuit-haker's fashion for a short period—say, 1½ to 2 minutes—after which the dough is ready to he put into the hrass moulds, preferahly so-called gang moulds, hy the detailed operation as ahove stated.

This neat test is now heing rapidly superseded hy the so-called sand test. As the manipulations in either test are the same, I will at this juncture take up:

2. SAND TEST.—This test originated in Germany and is, from a constructing engineer's standpoint of view, of far greater value than the older "neat test." Like a good many innovations, it met with constant scorn from the outset, and, strange to say, the well-known Faija was one of its worst antagonists. But time has demonstrated its usefulness, and, as stated, to the up-to-date engineer it is the more valuahle of the two, inasmuch as the admixture of the sand to the hriquettes corresponds more closely to the conditions under which the cement is apt to he used, and hence the information gained hy such testing is more in conformity to what might be expected from its cementing properties. No other proportion than three sand to one cement (weight, not volume) should he used, and, if other proportions are used, such should he explicitly stated or given. Any clean silica or quartz sand can he used, and should he of such fineness that all will pass through a 20-mesh screen, hut all to he retained on 30-mesh. (This is also recommended hy the committee above referred to.) Right proportions of sand and cement are mixed together very thorough and in dry state.

A sample lot thus mixed should weigh ahout thirty-six ounces, which would mean nine ounces cement and twenty-seven ounces sand. Put this mixture, cone-fashion, on a plate glass, form a small crater in center of same and put in proper percentage of water, generally half of what is required in neat test. Knead this mixture in same manner as described in the neat test and put it in the mould as quick as possible, as per details given ahove. From this on the treatment of either neat or sand moulds is the same.

The neat hriquette and sand hriquette moulds should now all he weighed, and if there should appear any great discrepancy in weight, say, 3½% or more, of any one hriquette in particular, throw same out entirely.

During the first twenty-four hours the moulded and weighed hriquettes, which, after having ohtained their final set, are removed from the moulds, are put either on a glass plate or polished marhle slab and covered with a damp cloth, or else put into a special moist air chamher. Initial and final set of every hriquette should he taken and recorded in minutes, and for all practical purposes the time thus recorded is amply sufficient. When the twenty-four hours are up, the hriquettes to he suhjected to long-time tests are immersed in water, kept in zinc-lined wooden trays, or, what is still hetter, porcelain-lined cast iron trays. The water should have an even temperature, say, +65° to +75° F. In the tray the immersed hriquettes should he turned over every other day.

For practical purposes the testing machines in use to-day, such as the Fairhanks, Riehles, Adies, etc., are all good. To the less expert, the Fairhanks is prohahly the most reliahle, as it works ahsolutely automatically after once adjusted. The only precaution necessary to ohserve in using the Fairhanks is to see that the "shot" is not discharged too rapidly, i. e., the rapidity of discharge should not register any faster than at the rate of 550 to 600 pounds in one minute. Nothing is more important than the maintaining of uniform rapidity of discharge, especially when comparing different hrands, and in the hands of an unscrupulous or "fixed" tester the disregard of this uniformity can easily lead to unwarranted discriminations.

The idea of running the shot through very slow in testing A's hrand and very fast in testing B's brand is as unfair to A as it is advantageous to B and should never he tolerated.

The time tests to which the neat and sand hriquettes are suhjected, in order to ohtain "the commercial value of the cementing properties," are for—

Neat Briquettes.	Sand Briquettes.
24 hours in air.	7 days (1 day in air, 6 days in water).
7 days (1 day in air, 6 days in water).	28 days (1 day in air, 27 days in water).
28 days (1 day in air, 27 days in water).	

To the contractor or engineer these time tests, together with the all important hoiling test, are amply sufficient for all practical purposes. For municipal or puhlic works, the engineering departments of which generally maintain a permanent tester at a regular salary, long-time tests should he carried on, covering as much as twelve months, and the records of such long-time tests should he open for inspection to any contractor or engineer in charge of construction where cement is used. It is not fair to expect a contractor to pay a large sum of money for testing cement covering long periods and to have these long-time tests repeated every time he uses a new shipment of cement. The tests ahove enumerated are amply sufficient and can he done at a comparatively low figure, and the city engineering department should give all the other necessary data free of charge, if it possesses same.

These municipal long-time tests, or "checking tests," as they may properly be called, should he recorded as follows:

Neat Briquettes.	Sand Briquettes.
24 hours	
7 days	7 days.
28 days	28 days.
2 months	2 months.
4 months	4 months.
8 months	8 months.
12 months	12 months.

The proportional increase in tensile strength per square inch a first-class, modern, domestic Portland cement hriquette, treated as above described, should develop on neat test and sand test during the first twenty-eight days is as follows:

	Neat.	Sand.
24 hours	250 lbs. @ 400 lbs.	
7 days	500 lbs. @ 800 lbs.	200 lbs. @ 300 lbs. or over.
28 days	700 lbs. @ 1,000 lbs. or over.	300 lbs. @ 400 lbs. or over.

A Portland cement that increases in tensile strength in the ahove time limits, and in a proportion that is more or less in conformity with the ahove quoted, will always he considered a more normal acting Portland cement than one that tests as follows:

	Sample No. 4231 Neat.	Sample No. 4978 Neat.	Sample No. 6131 Neat.
24 hours	262 lbs.	119 lbs.	365 lbs.
7 days	906 "	764 "	796 "
28 days	864 "	765 "	921 "
30 days	865 "	701 "	905 "
Boiling test	Fair.	Pat warped.	Pat cracked and warped.

It is seen the hoiling test will soon ferret out the trouhle.

Cement representing such samples should he rejected, not on account of an ahsolute unsoundness, which in sample No. 4231 might he unwarranted, hut hecause a manufacturer has no husiness to palm off such cement as a true Portland cement. Any chemist, any engineer, who is in charge of cement works can, if he is the least hit careful, and has the necessary practical experience, prevent the making of such cement, and the public at large may as well know that a manufacturer can, even under adverse circumstances, always produce a cement that will conform in all main details to the most exacting requirements. This fact ought to he enough reason to induce the careless "experts" to change their methods and he fair and square towards their competitors, that is, meet a first-class cement with first-class, and hoth tested alike.

Cement manufacturers, as a rule, puhlish pamphlets advertising the excellence of their product, and in most instances they are intimately fair. Notahle exceptions are, however, found now and then. Thus for instance:

A well-known cement works in the East, whose product is widely advertised and is known to test lower than any other hrand, either neat or sand, in the same locality, defends this with the following remarks:

"Cement giving tensile strength neat hetween 300 and 350 pounds per square inch at seven days, shows the highest ultimate results and the highest percentage of increase per annum, while cements showing strains of 500 and 600 pounds per square inch at seven days show no ultimate gain, hut an actual loss, and a very slight percentage of annual gain."

This pamphlet also gives the following comparative analyses:

Time.	Brand I.			Brand II.			Brand III (the advertised)		
	Neat, lbs..	Fineness on 100..	Sand, lbs..	Neat, lbs..	Fineness on 100..	Sand, lbs..	Neat, lbs..	Fineness on 100..	Sand, lbs..
24 hours	373	89.6	137	389	93.9	141	293	92.4	103
7 days	682	.....	253	668	.....	258	456	on 200	186
28 days	756	on 200	29	748	on 200	292	542	.....	261
60 days	806	76.7	320	754	81.8	311	568	82.1	299
90 days	829	.....	331	806	.....	321	579	.....	329
120 days	837	.....	350	836	.....	332	615	.....	335
180 days	869	.....	362	870	.....	382	625	.....	337

A careful study of the ahove three hrands would indicate that the advertised hrand heing finest on 200 mesh shows up the poorest on the sand test, hecause according to experience the finer the cement the higher the sand test.

Trautwine gives the following interesting data on page 437 (page 923 eighteenth edition):

CONCRETE OF PORTLAND CEMENT—CRUSHING LOAD PER SQUARE FOOT IN TONS.

Proportion—1 cement, 3 sand, 7 broken stone.

When 1 month old.....12 to 18 tons.
" 6 months old.....48 to 72 "
" 12 " " .....74 to 120 "

Which cement is then to the constructing engineer the hest, providing hoiling test is satisfactory?

There can he only one answer and that is, "The cement that ohtains its ultimate tensile strength in the shortest time limit," that is what the engineer wants.

The same pamphlet gives the following long-time sand tests: 1 to 3 in pounds—Seven days, 230; one month, 275; two months, 275; three months, 267; four months, 296; five months, 329; six months, 325; seven months, 351; eight months, 286; nine months, 304; ten months, 300; eleven months, 308; twelve months, 327; twenty-four months, 342; thirty-six months, 336. (Test made hy Eng. Dept. District of Columhia). I consider this test not only erratic, hut rather poor. I will say that I have myself used nearly 11,000 harrels of this cement in construction work, hut of all the tests I have made of same, which numhered eighty-nine, I got the following average results:

Neat.		Sand 1 to 3.	
24 hours	181 lbs.		
7 days	334 "	7 days	143 lbs.
28 days	418 "	28 days	209 "
6 months	618 "	6 months	307 "

Here on the Pacific coast manufacturers' pamphlets have recently been issued, hut a glance of these pamphlets show their utter disregard of fairness. They compare tests of their own modern hrand ground and tested according to modern requirements with tests of foreign as well as domestic hrands which were made and tested ten years ago, under less exacting conditions, as well as requirements, and especially taking good pains to talk ahout the extreme fineness, hut never mentioning one word ahout the all important hoiling test. The expert chemist, as well as engineer, can at a glance tell, hy looking over such publications, which cement

*Copyrighted.

is the best, the advertised new brand or the despised old braud. If these pamphlets had shown comparative tests of all brauds under equal conditions the results would probably be published in somewhat different form, if at all.

What a modern American cement can show is strongly illustrated in the following test made by the writer:

Time—	Boiling Test.			Neat Test in Lbs.			Sand Test in Lbs.		
Aug. 14, 1901— Aug. 14, 1902.	Alpha.....	Whitehall.	Dragon ...	Alpha.....	Whitehall.	Dragon...	Alpha.....	Whitehall.	Dragon...
24 hours .	O.K.	O.K	O.K.	349	393	421	...	...	...
7 days ..				679	721	702	291	321	289
28 days ..				821	881	816	384	449	395
2 months				896	906	860	472	483	764
6 months				904	910	891	523	521	509
12 months				over 1,000	926	894	611	604	599

Fineness on 100 mesh — Alpha, 94.8; Whitehall, 95.7; Dragon, 94 2

Any number of domestic brands, such as "Atlas," "Vulcanite," "Lehigh," "Medusa" "Star," etc., can show up similar excellent results, and so can any manufacturer if he has the right kind of raw materials and the right kind of men in charge of his works.

The writer has made preparations for comparative long-time tests, etc., of the brands in use on the Pacific coast, and will in time publish the result of same.

(TO BE CONTINUED.)

Cyanide Poisoning---Its Cure and Prevention.

Several months ago the Chemical and Metallurgical Society of South Africa sent circulars broadcast throughout the mining regions of the world, the purpose of which was an investigation of cases of poisoning by means of cyanide of potassium in any form around metallurgical works.

From a large number of replies sent in answer to the questions asked on the original circular the following has been deduced by the committee:

1. That cyaniding, per se, is a healthy occupation.

2. Considering the large amount of cyanide used at the mines, the number of fatal cases of cyanide poisoning is very small.

3. The few fatal cases are to be attributed to carelessness on the part of the deceased, or to pure accident. In one case only was the accident to be attributed to the mine authorities.

4. The most important disease attributable to cyanide is cyanide eczema.

5. Many cases of "gassing" occur among those who are working the zinc-dissolving tanks, on account of the hydrocyanic acid gas and arsenuretted hydrogen given off.

PREVENTIVE MEASURES.—Your committee is convinced that very little in the way of expenditure will result in the prevention of practically all the evils attendant upon working with cyanide. The following is a categorical account of the evils and the suggested preventive measures:

1. The danger of death from cyanide poisoning lies almost entirely in the cyanide testing rooms and assay offices. Familiarity breeds contempt or carelessness, and all the accidents which have been brought to the notice of your committee have been caused by the imbibition of cyanide solution in mistake for water.

Your committee is strongly of opinion that it is necessary that there shall be an adequate supply of wholesome drinking water provided in each testing room and assay office, and that the supply shall be distinctly labelled "Drinking Water." Your committee feels that if this is not done the mine management can hardly be held blameless should an accident occur.

2. Cyanide eczema is confined entirely to those who have to handle the zinc shavings in the precipitation boxes.

From the evidence that has been brought before your committee cyanide eczema is unknown on those mines where the cyanide solution is replaced by water previous to the zinc shavings being handled, and your committee therefore recommends that it should be the duty of the cyanide manager to see that the cyanide solution in the precipitation boxes is so replaced before the zinc shavings are handled.

Your committee is of opinion that this simple precaution will result in the disappearance of cyanide eczema from the mines.

3. When the zinc shavings and gold precipitates which contain arsenic and cyanide compounds are brought into contact with sulphuric acid, hydrocyanic acid gas and arsenuretted hydrogen are evolved, the former always, and the latter frequently, in dangerous quantities. Both these gases are very poisonous, and were it not that the majority of the extractor houses are lofty and well ventilated, the danger arising from the evolution of these gases would be serious. Notwithstanding the good ventilation, however, your committee is of opinion that this is a source of real danger, as is evidenced by the number of cases of "gassing" which occur.

Your committee therefore recommends that these dissolving vats in which the gold precipitates are treated should be hooded in some manner, in order that the gases may be carried into the open air.

It is also desirable that some form of mechanical agitation should be used, in order to do away with the necessity of raising the hood for the purpose of stirring the contents of the vats.

Although only remotely connected with cyanide poisoning, among the replies received mention was made of salivation produced by the calcining of gold precipitates from the zinc boxes. This salivation is, of course, due to the inhalation of mercury vapors, and can be prevented by a proper construction of the calcination furnace, which insures that the vapors shall be completely removed to the outer air.

Practical Results of Irrigation.

From an address by HON. JAMES WILSON, Secretary of Agriculture, at the National Irrigation Congress.

Up to the present time a large part of the field work of this department has been measuring the quantities of water used in irrigation. Measurements have been made at the heads of canals, at the heads of laterals and at the margins of fields. The great differences between the quantities diverted by some canals and the quantities delivered by them led to a series of measurements to find out where the water taken from the streams, but not delivered to farmers, went. Such measurements, made up to and including the season of 1901, show that canals on an average lose 6.75% of the water entering them in each mile of their length, some small canals losing in a single mile as high as 64% of the water diverted by them. The general average of the volume lost by canals in their entire length is usually given as one-third of the volume diverted, although our measurements would indicate that it is even greater. The saving of these losses from canals means an increase of a third in the area which can ultimately be reclaimed. The measurements made show that in many canals the larger part of the losses occur in short sections of the canals, and the measurements locate these conditions. Where this is the case, the losses can be stopped by lining the canals or putting in flumes for these short distances where the losses are greatest. The measurements show another fact: The percentage of losses from small canals are much greater than those from large canals. Averages of our measurements show that:

WHAT THE FIGURES SHOW.—Canals carrying 100 cubic feet per second or more lose .98% per mile.

Canals carrying from 50 to 100 cubic feet per second lose 2.67% per mile.

Canals carrying from 25 to 50 cubic feet per second lose 5 22% per mile.

Canals carrying less than 25 cubic feet per second lose 7.48% per mile.

These figures show that the percentage of loss from small canals is more than seven times that from large canals. Great savings can, therefore, be made by running water in large canals, rather than in a large number of small ones.

Various experiments have been made in lining ditches to prevent loss, and the department is collecting all available information on this subject. The problem is not to find a means of conveying water without loss, but to find a cheap means of doing this. As the demand for water becomes greater, larger expense will be justified. What is needed is a cheap but effective means of stopping the losses from canals. We are working on this problem. Its solution means, as has been shown, an addition of at least one-third to the area which can be reclaimed.

Production of Monazite in 1902.

In his report to the United States Geological Survey on the production of monazite in 1902, J. H. Pratt says that the Brazilian Government has granted to a German, for a period of ten years, the exclusive right to develop the monazite sand deposits along the coast of Brazil, and this, he thinks, will tend to increase the interest in the monazite deposits of North Carolina and South Carolina. The Consul General at Frankfort has informed the Department of State that a company has been formed in Berlin to acquire control of this privilege. During 1902 a number of inquiries were received from German importers for information regarding the occurrence of Carolina monazite. Satisfactory replies were made in all cases, except with regard to the price of monazite sand. This is held at a higher figure delivered in Germany than the Brazilian monazite, but, with the latter deposits controlled by one company, the price of the sand will probably be much increased, and a considerable demand for the Carolina sand for export to Germany is likely to arise.

The production of monazite in the United States is confined exclusively to North Carolina and South Carolina, by far the larger amount being obtained from the former State, and in 1902 this amounted to 982,000 pounds, valued at $69,580. This is an increase of $10,318 in value and of 233,264 pounds in quantity over the production of 1901, which was 748,736 pounds, valued at $59,262. The price received by the miners per pound of the monazite produced in 1902 varied from 2½ cents to 5½ cents, according to the percentage of thoria. The nearer the sand is brought to a pure monazite, the higher its relative value, and this is accomplished by closer concentration and the use of the electromagnet in separating the higher minerals.

Only 190 pounds of monazite sand and thorite were imported into the United States during 1902. There is no record of any export of monazite, though in 1903 there will probably be a considerable export of this mineral to Germany.

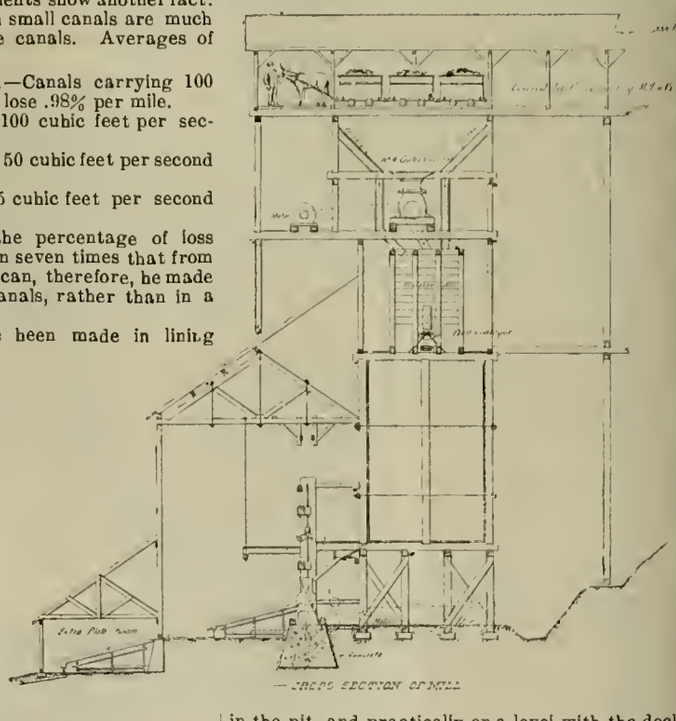
Big Indian Mine.

Written for the MINING AND SCIENTIFIC PRESS by COLIN MCINTOSH.

The Big Indian mine is situated at the head of Big Indian gulch, about 4½ miles south of Helena, Mont., and at an altitude of 5300 feet above sea level.

The formation is granite, cut by several porphyry dikes. The ore is a heterogeneous mass of metamorphic quartz, granite and porphyry, forming a dike about 250 feet in width, unknown length and an average height of the oxidized ore of 80 feet. For the past ten years the ore has averaged in value $3 per ton. This ore is mined or quarried in an open pit, as shown by the accompanying sketch and illustrations.*

Holes of an average depth of 12 feet are made by hand churn drills. These are "sprung" with giant powder, after which black blasting powder is used. As the ore is very friable it is broken into sizes which can be readily handled. The cars are loaded by hand and then dumped into the different loading chutes—but one handling being necessary. The loading chutes are operated from a working tunnel, which is about 55 feet below the deck of the trestles



CROSS SECTION OF MILL

in the pit, and practically on a level with the deck of the crusher house.

Each chute contains three pockets, each of which is fitted with iron ore bin gates, rack, pinion and hand wheel. The gates are spaced so as to accommodate a car opposite each one. The cars are of the gable end style, of about three and one-third tons capacity each, three cars being a load for one mule. But one man is employed in this work. As high as 510 tons of ore have been handled in one shift of ten hours, the ore being hauled from mine to mill and unloaded into the crusher, the distance from mine to mill being about 450 feet. The mining force usually employed consists of one foreman, two drill hands, one car man in working tunnel, one blacksmith and twelve laborers. Drill hands, blacksmith and car man are paid $3.50 per day and laborers $3 for ten hours' work.

The average daily output with this force is about

*See Illustrations front page.

310 tons, the amount milled. The total cost per day is $64.50, equivalent to 20 1/3 cents per ton, including supplies, tools, etc.

At the present time the ore is handled for much less than this amount, owing to the favorable weather.

The question may arise, "Why are not the loading chutes placed directly under the ore body?" The answer to this question is, That the lower working tunnel is below the oxidized ore in hard rock. As the working tunnels are necessarily large, the cost per foot is about $16, to which must be added the cost of building the chutes. Further, the ore which could be mined into these chutes is equivalent only to the amount between the lines of natural slope from the chutes. This method was tried and discarded for the one now in use, which is more economical, and has the further advantage of enabling the sorting of ore.

Of course, when the haul from the present chutes to the face of the pit gets to be excessive new chutes will be put in directly under the ore body.

During the winter months but little trouble is experienced, as the chutes are covered up to the level of the trestle, affording storage room for ten to fifteen days supply of ore for use in stormy weather.

The entire plant is operated by electricity, including lighting of mine and mill. The power is obtained from the Missouri River Power Co. at a yearly rental of $50 per horse power. The current, three-phase, alternating, is received at 11,500 volts and transformed to 440 volts.

By referring to the accompanying sketch it will be seen that the mill is divided into two units of thirty stamps each, driven by separate motors. Crusher and pumps are also operated by independent motors. The mill is equipped with chrome-steel cams, tappets and shoes, and cast iron dies. Each stamp head weighs 850 pounds, has a drop of 5 inches, 100 per minute. The mortars are of the narrow Homestake, low-discharge pattern, and are bolted to cast iron anvil blocks, each weighing about 13,000 pounds. A piece of sheet rubber 1/8 of an inch in thickness is placed between the mortar and anvil block. The latter is secured to the concrete piers by six bolding down bolts built in the concrete.

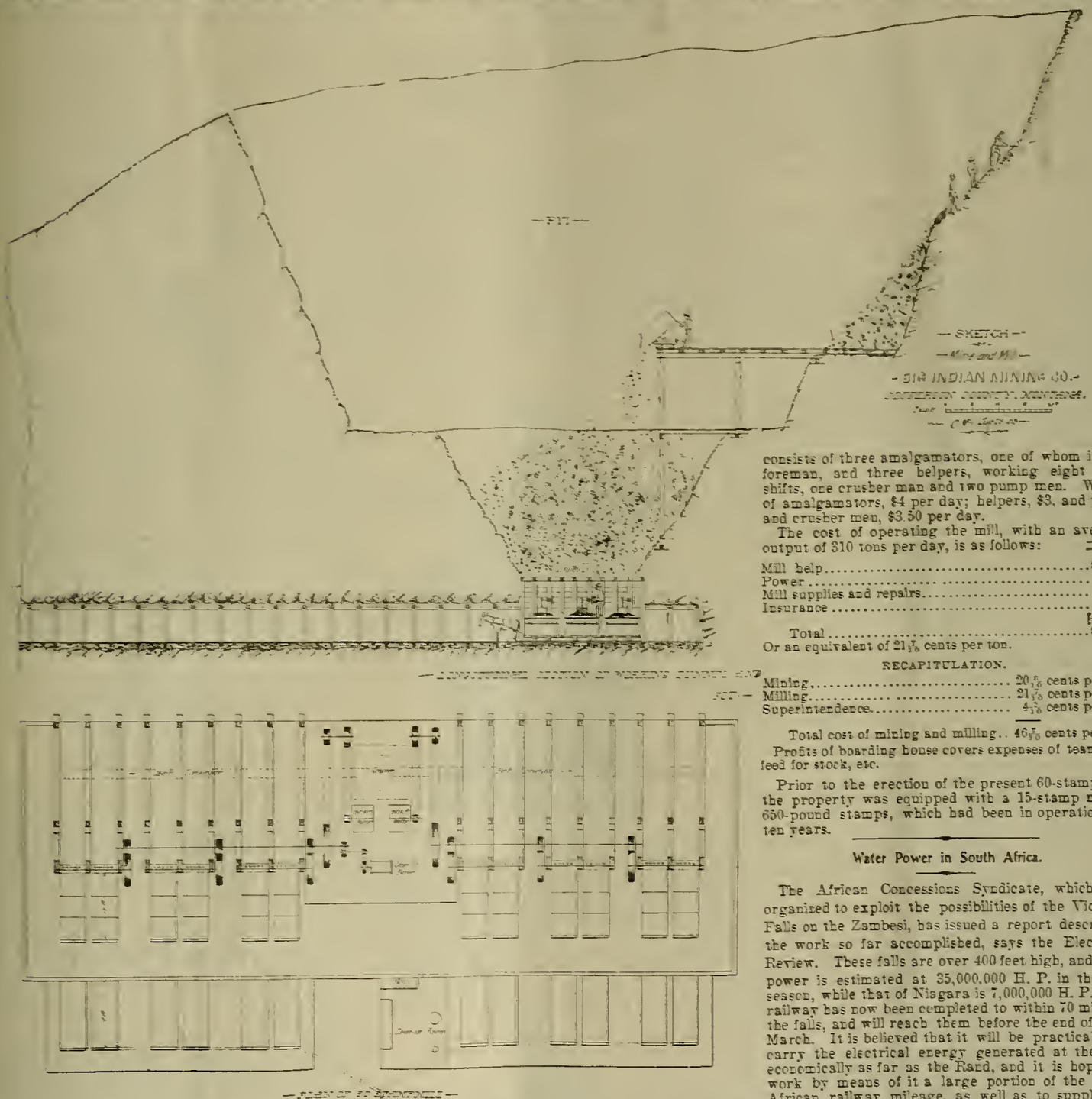
The ore is dumped from the cars over the grizzlies and into the No. 4 Gates crusher—the fines passing through the grizzlies into chutes and thence to the crusher bin. From this bin it is fed onto two flat belt conveyors (one on each side of the bin), from which the ore is distributed to the different pockets in the ore bin. These belts have been in use and show but very little wear, considering the amount of ore handled.

The conveyor rollers are of hard wood, set in an adjustable yoke, which permits the roller to be tilted to an angle of 45°. By this arrangement any pocket in the ore bin can be filled. Some trouble was at first experienced by wet ore sticking to the belts. This difficulty was overcome by screwing to the roller, for its full length, a half round piece of hard wood, ¾ inch diamter, imparting to the roller a vertical shaking motion. But one man is required to attend the crusher and belt conveyors.

Suspended ore feeders are used, which give excellent satisfaction. Numerous experiments were made with screens of different styles and sizes. A 24-mesh wire screen is now used, from which the best results were obtained. Straight outside amalgamation is practiced. At first 4x12 feet silvered copper plates were used to each battery. This area has been doubled, as it has been found advantageous to do so. Plates are cleaned once in twenty-four hours. The average saving is about 87½% of the assay value of the ore.

The tailings cannot be worked profitably. They are conducted to a system of settling tanks, from which the clear water is drawn off and pumped back to the mill for re-use.

The average life of shoes and dies is about 150 days. But one stem has been broken since the mill has been in operation, a period of ten months. The mill force



consists of three amalgamators, one of whom is mill foreman, and three helpers, working eight hour shifts, one crusher man and two pump men. Wages of amalgamators, $4 per day; helpers, $3, and pump and crusher men, $3.50 per day.

The cost of operating the mill, with an average output of 310 tons per day, is as follows:

Mill help	$32.50
Power	20.14
Mill supplies and repairs	12.00
Insurance	2.70
Total	$67.34

Or an equivalent of 21 7/10 cents per ton.

RECAPITULATION.

Mining	20 5/10 cents per ton
Milling	21 7/10 cents per ton
Superintendence	4 3/10 cents per ton
Total cost of mining and milling	46 7/10 cents per ton

Profits of boarding house covers expenses of teamster, feed for stock, etc.

Prior to the erection of the present 60-stamp mill the property was equipped with a 15-stamp mill of 650-pound stamps, which had been in operation for ten years.

Water Power in South Africa.

The African Concessions Syndicate, which was organized to exploit the possibilities of the Victoria Falls on the Zambesi, has issued a report describing the work so far accomplished, says the Electrical Review. These falls are over 400 feet high, and their power is estimated at 35,000,000 H. P. in the wet season, while that of Niagara is 7,000,000 H. P. The railway has now been completed to within 70 miles of the falls, and will reach them before the end of next March. It is believed that it will be practicable to carry the electrical energy generated at the falls economically as far as the Rand, and it is hoped to work by means of it a large portion of the South African railway mileage, as well as to supply the power in the gold mines. American estimates are that with conditions similar to those in Rhodesia it will be possible to convey the current 330 miles and deliver it there at a cost of $22 per kilowatt per year,* the load being on the whole twenty-four hours of the day. Within a radius of 300 miles of the falls there are important gold fields, coal fields, copper fields and about 900 miles of railways, while a transmission of 600 miles would take in the whole of the South African gold fields. The site of the falls is said to be healthy throughout the year, and the whole region is thought to be more richly endowed in mineral wealth, including copper, iron, gold and coal, than any similar area on the surface of the globe. At present only preliminary survey work is in progress, but it is expected to complete this very shortly, and work will then be begun on the building of a hydroelectric generating station, much on the lines of that at Niagara Falls.

* Equivalent to about $1.50 per horse power per month.

The Ventilation of Deep Levels.*

Written by THOS. JOHNSON.

The efficient ventilation of the deep level mines is a matter of great importance. The term ventilation may he defined as the constant exchange of a current of fresh air for a current of foul air, circulating in certain definite directions, so that all the different parts of a mine may he kept in a healthy condition, and, therefore, free from all accumulation or mixtures of dangerous gases.

That there is a proper supply of air to a mine is a point that should he attended to hy every one in charge. It really pays to have good ventilation, as men are not only capable of doing more work, hut do it with greater comfort and are more contented.

Mine regulations require that every mine must he constantly supplied with an adequate supply of fresh air. Not less than 70 cubic feet of such air per minute shall he supplied in the intake for each and every person employed underground, and as much more as circumstances may require.

Should the Inspector of Mines deem it necessary, a register of the quantities of air circulating through the mine shall he kept.

The ventilating current shall be suitahly split where necessary, and the air conducted to and along the face of each and every working place throughout the entire mine, in sufficient quantities to render harmless and sweep away the smoke produced hy hlasting, or any other noxious gases, so that all working places and traveling roads shall he in a fit state for persons to work and therein travel.

The rules also require at least two shafts or outlets to the surface, with which every reef or mineral hed for the time heing worked in the mine shall have a communication of not less than one meter wide and one meter high, so that such shafts or outlets shall afford separate means of ingress and egress availahle to all persons employed in such mine, whether the shafts or outlets helong to the same mine or to more than one mine.

Now, although the law provides that there shall he two shafts or outlets, it is silent as to upcast and downcast shafts, which leaves every one in uncertainty as to whether a company would he within its rights in using one shaft for hoth upcast and downcast; anyway, there must be upcast and downcast.

The necessity for ventilation is understood at once when it is remembered that the breathing of every person in a mine, the comhustion of lights and explosives and the numerous chemical changes constantly taking place in the mine all rob the air of its oxygen, and contribute toward the production of an impure atmosphere.

The average composition of the atmosphere is as follows: Nitrogen, 77.95 volumes; oxygen, 20.61 volumes; carbonic acid, .04 volume; watery vapor, 1.4 volumes; also, traces of ammonia, ozone, nitric acid, Marsh gas and several newly discovered gases, argon, neon, krypton, xeon.

Oxygen, the chief supporter of life and comhustion, is the most important. If by any means the oxygen is reduced hy 1%, the remaining air is no longer fit to he hreathed; if reduced by 2%, it is only just capahle of supporting the flame of a candle, and if 4% is taken away, a lamp will refuse to hurn, while air with 5% less oxygen than is contained in the ordinary atmosphere can not be breathed.

Authorities differ as to the amount of air necessary for efficient ventilation.

The Transvaal mine regulations of 1898 require not less than 70 cubic feet per person per minute.

The hituminous mine law of Pennsylvania specifies for not less than 100 cuhic feet per person per minute in any mine.

The anthracite mine law of Pennsylvania specifies for not less than 200 cuhic feet per person per minute.

Each of these laws contain modifying clauses, specifying that the amount of air in circulation shall he sufficient to dilute, render harmless and sweep away smoke or noxious gases.

The first general rule of the English coal mines regulation act states that an adequate amount of air shall constantly he in circulation to dilute, render harmless and sweep away noxious gases to such an extent that all working places, traveling roads, etc., shall he in a fit state to work and travel therein.

Belgium calls for from 64 to 106 cuhic feet per person per minute in mines not giving off fire damp.

Warrington Smythe recommends 100 cubic feet, T. J. Taylor 160 cubic feet, Mr. Mackworth 100 cuhic feet and Mr. Lloyd 100 cuhic feet per person per minute in mines free from fire damp.

The quantity of air required for efficient ventilation can not properly be fixed at so much per person for each and every mine, as the conditions at different mines and in different parts of the same mine vary so much.

A mine or part of a mine with a small stoping width could he hetter ventilated with a certain amount of air than a mine with a greater stoping width, as good ventilation depends greatly on velocity.

Take, for example, a stope of 3 feet width, quantity of air 1500 cubic feet per minute, the velocity equals 1, and a stope of 6 feet width, quantity of air 1500 per minute, the velocity equals 0.5.

Now, in a case like this, if the smaller stope was only getting sufficient air to keep it clear and in a fit state, then it is probable that the larger stope would not he sufficiently ventilated hecause of the lower velocity, although the volume would be the same; air and other gases have weight and require a force to move them, and if the velocity is reduced to 0.5 through the increase of area, then the pressure would he reduced to something less than 0.5.

As with stopes so with mines, the greater the stoping width and the greater the area worked out the greater amount of air per person would he needed for efficient ventilation. It is my opinion that any standard based on the numher of men in a mine is not sufficient to meet the different conditions existing at different mines.

As mentioned before, the mining laws of this colony call for 70 cubic feet per person per minute and as much more as circumstances may require, which is not very definite. The quantity of air going into a mine is not a measure of the efficiency of the ventilation. There may be thousands of cuhic feet of air per minute more than is necessary going into a mine, still it may be a hadly ventilated mine if the air is not conducted to the required points.

I helieve it would be much hetter to fix the quantity of air according to the quantity of dangerous gases allowahle in the air of any working place; this is what the modifying clauses of the different mining laws aim at; but they do not define any danger point, which leaves the management of the mines in great uncertainty as to what is required from them.

UNDERGROUND TEMPERATURE.—F. G. Meachim, in a paper recently read before the South Staffordshire and East Worcestershire Mining Engineers, gave the results of some experiments made by himself and others tending to show that in the south Staffordshire district the rate of increase of temperature is 1° F. for every 110 feet increase of depth. Some recent American experiments seem to show that the rate of increase of temperature is 1° F. for every 101 feet increase of depth. He also stated that recent experiments proved that the temperature of the rock was much less than that of the mine workings. (This is in coal mines.)

Mr. Agassiz and P. C. F. West, in their experiments carried on at the Calumet and Hecla mines, found that the increase of temperature averaged 1° F. for every 223 7 feet increase of depth. At a depth of 105 feet the temperature was 59° F. The greatest depth was 4580 feet vertical and the highest temperature of rock 79° F.

Negretti & Zamhra's slow-registering thermometers were used and were placed in holes 10 feet deep, the holes being then plugged up with wood and clay and left for a period of from one to three months.

In England the increase of depth for every rise of 1° F. is variahle, ranging from 56 feet at Tresavean mines, Cornwall, to 86 feet at the Dukinfield colliery.

It would he of benefit to many if the different companies concerned would get the temperatures of the different deep hore holes and the deep shafts and have a list compiled and published.

Mr. Truscott, in his hook, "Banket and Mining Practice on the Rand," gives a tahle of M. Francke's from which he deducts that on the Rand the rate of increase of temperature is about 1° F. for every 250 feet increase of depth. This would give for a shaft 5000 feet in depth a rise in temperature of 20° F.

In summer this increase of temperature would give a ventilating pressure of, say, about eleven pounds per square foot under the following conditions: Downcast temperature, 80° F.; upcast temperature, 100°, shafts 5000 feet in depth, barometer 25 inches in height.

This ventilating pressure would give a motive column of 179 feet of the density of the downcast. In winter a greater ventilating pressure would be produced for a difference of 20° F.

Say downcast temperature 40° F., upcast temperature 60° F., shafts 5000 feet in depth, mercury column 25 inches as before, the ventilating pressure in this case would equal thirteen pounds, or 195 feet motive column. These results are found by using the following formula:

$$\frac{1.3253 \times H}{459 + t.} = \text{Weight of 1 cubic foot of air.}$$

Where H = Height of barometer in inches,
t = Temperature in degrees F.

Or $\frac{.73437 \times H}{273 + t}$ T = Temperature in degrees C.

Motive column is generally taken to mean the height in feet of a column of air of the same density of the air in the downcast shaft, which is equal to the difference of weight per unit of area of the downcast and upcast columns, and is found hy dividing the ventilating pressure per square foot of area by the weight of 1 cubic foot of air of the same density as the downcast column, or multiply depth of upcast shaft by difference of temperature and divide by 459 plus temperature of upcast shaft for motive column in terms of upcast shaft.

POSITION OF SHAFTS.—It is generally accepted that mines should he ventilated on the plan known as ascentional ventilation; this is right for a mine giving off fire damp or other light gases, hut it does not suit so well for a mine giving off hlack damp (CO_2).

For fire damp (sp. grav. .559) the ideal manner of ventilating would be to have the upcast shaft at the extreme rise of the property and the downcast at the extreme dip. The fire damp would tend to rise toward the upcast because of its lightness. In case of a mine giving off black damp (CO_2) instead of CH_4, the upcast should be at the dip houndary and the downcast at the rise houndary, the sp. grav. (1.529) of CO_2 causing it to sink.

Given two shafts of approximately the same surface level, it must he apparent to all that the height to which the CO_2 has to he lifted is the same whether the upcast is at the rise side or dip side. There is nearly as good a reason for the upcast to he on the dip side for a mine giving off CO_2 as for the upcast to he on the rise side for a mine giving off fire damp. To carry CO_2 to the rise through the workings of a mine would require a much greater current velocity in every working place than would be necessary to carry it to the dip, because of its weight, as stated before. Once at the shaft the trouble will he over, as the velocity there is much greater than in the working places.

I do not think that the amount of noxious gases given off in the gold mines of the Rand is sufficient to cause ventilation to he a determining factor as to the position of the shafts. Other and more important considerations, such as surface facilities, drainage, hauling and faults will decide.

NATURAL VENTILATION.—What is termed natural ventilation is that quantity of air which circulates through a mine without the aid of artificial means, the motion depending entirely upon the difference of temperature ahove and helow ground, direction of the wind, surface level, motion of skips, cars, etc. In natural ventilation the ventilating motor or air column exists in the downcast shaft by virtue of the greater weight of the air in the downcast shaft. This air column acts to force the air through the airways of a mine. No matter what the respective sizes of the downcast and upcast may he, so long as there is a difference of density of the two columns of air, a current will he set up, provided the difference of density is great enough to overcome the resistances.

For example, take a mine with two shafts, each 5000 feet in depth, 30x7-foot inside timbers, six drives, each a mile long, and of 7x5-foot section, what quantity of air would prohahly he put in circulation if downcast temperature is 60° F. and upcast temperature 80° F., harometer 27 inches?

$$\text{Weight of a column of air, 1 square foot area, in downcast shaft} = \frac{1.3253 \times 27}{459 + 80} \times 5000 = 344.73 \text{ lhs.}$$

$$\text{Weight of a column of air in upcast shaft} = \frac{1\,3253 \times 27 \times 5000}{459 + 80} = 331.93 \text{ lhs.}$$

Ventilating pressure, P, = 12.8 pounds. Then the quantity required would be 83,600 cubic feet per minute.

With a temperature of 60° F. in the downcast and 100° F. in the upcast, other conditions remaining the same, the ventilating pressure would he 24.67 pounds per square foot and the quantity would equal 115,920 cuhic feet per minute.

These quantities would be greatly reduced if the mines gave off any great quantity of CO_2. Take a mine where the upcast air is charged with 5% CO_2:

The downcast column would weigh 344.73 pounds; temperature, 60° F.

The upcast column, temperature 80° F., would weigh 315.34 pounds for the 4750 feet of air and 25 38 pounds for the 250 feet of CO_2 = 315.34 + 25.38 = 340.72 pounds.

Downcast pressure—Upcast pressure = ventilating pressure, substituting figures 344.73 — 340.72 = 4.01 pounds, which, under the conditions stated, would give 46,784 cubic feet per minute—a difference of 36.816 cuhic feet, due to the CO_2.

In this example I have taken 5% CO_2, which I think is more than any one would knowingly allow in the main current; hut at times there are odd working places that do not contain this much CO_2 in the air.

This example serves to show the bad effects of the heavier gases on the ventilation; it shows how it is that there is so much divergence in the results of tests of furnaces and fans, when the composition of the air is not taken into account.

In these examples I have taken the co-efficient of friction at .005 pound per square foot of rubbing surface and a velocity of 1000 feet per minute, which I think is a fair value for the size of shafts and airways in use here.

Natural ventilation is very unreliahle; in cold weather the ventilation may be good and on warm days very had; in some cases the direction of the current may he changed. To keep the direction constant and the quantity up to what is necessary, artificial ventilation will be necessary inmost deep mines.

(TO BE CONTINUED.

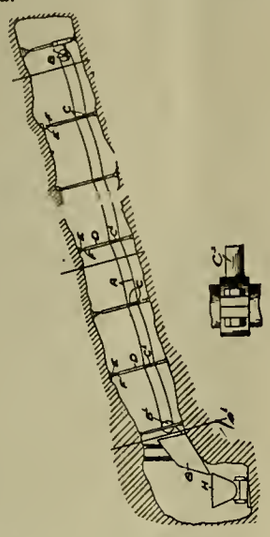
*Trans. Chemical, Metallurgical and Min. Society, S. A. (Condensed).

Mining and Metallurgical Patents.

PATENTS ISSUED SEPTEMBER 29, 1903.

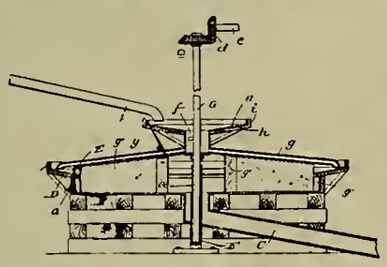
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

BELT OR LIKE CONVEYOR.—No. 739,884; W. R. Laurie and T. H. Wilson, Johannesburg, Transvaal, South Africa.



In portable conveyors, combination with flexible carrier, of terminal drums, groups of idly-running pulleys, brackets or holders for pulleys, standards to which holders are adjustably secured, means consisting of wedges and extension pieces whereby standards are fixed in position.

COMBINED ORE CONCENTRATOR AND AMALGAMATOR.—No. 739,971; D. W. Almond, Leadville, Colo.



Ore concentrator and amalgamator, having hed or support, stationary receptacle arranged thereon, and made up of pan, annular, downwardly and inwardly inclined wall D, mounted on upper edge of side of wall and arranged to discharge into pan, and equipped with means for catching and holding gold and silver, wall b extending upwardly from outer edge of wall D, and a discharge conduit leading from center of hottom of pan, fixed hearing F extending through conduit and hottom of pan, vertical shaft journaled in hearing, rotary tray fixed on shaft, above center of pan, comprising receptacle, an annular downwardly and inwardly inclined wall h, mounted on upper edge of side wall of and arranged to discharge into receptacle, and equipped with means for catching and holding gold and silver, and wall i, extending upwardly from outer edge of wall h, radial pipes connected to receptacle of tray, and arranged to discharge on wall D of stationary receptacle, means for supplying pulp and water to inclined wall of tray, and sweeps connected to and carried hy radial pipes, and movable in stationary receptacle.

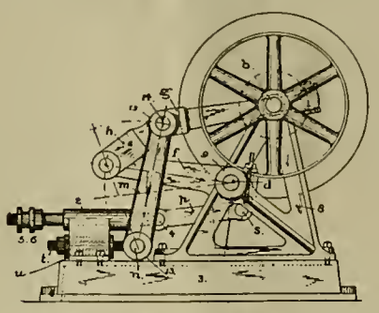
PROCESS OF EXTRACTING ZINC FROM SULPHIDE ORES, ETC.—No. 740,372; C. Rogers, Kew, Victoria, Australia.

Process for extraction and recovery of zinc from zinc containing sulphide ores or tailings, hy subjecting same to a partial sulphatizing roast, discharging same while hot into water, leaching same with water and with dilute sulphuric acid, subjecting leached ores or tailings to second sulphatizing roast, releaching same with lixivium from former leaching, and repeating operations until sufficient zinc and sulphur are removed.

PROCESS OF TREATING ORES.—No. 740,014; J. Herman, Lincoln, Neb.

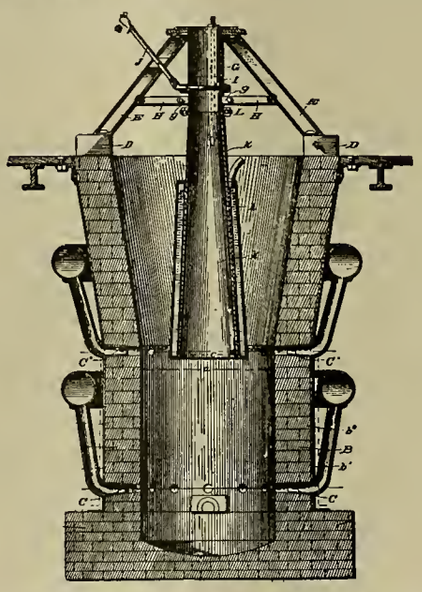
Process of extracting copper from ores hy treating ores containing iron, with chlorine containing compound to produce ferrous chloride, utilizing chloride and free acid to dissolve carhonates and oxides of copper, free acid heing adapted to neutralize interfering suhstances, and to attack surface of particles of copper oxide or carhooate, and leaching ore thus treated with ferrous chloride and salt.

DRIVING MECHANISM FOR ORE CONCENTRATORS.—No. 740,027; M. S. Leve, Fruitvale, Cal.



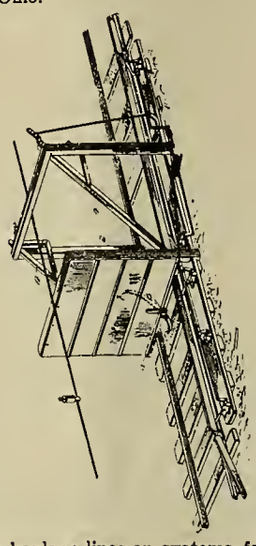
In driving mechanism for converting uniform rotary motion into varying reciprocating motion, comhination with a part to be reciprocated, of a crank, relatively long connecting rod, link having one end connected to rod, means operating to guide point of connection in arc of definite length, means connecting other end of link with part to be reciprocated, and arranged to guide that end of link in an arc approximately at right angles to arc in which opposite end of link attached to connecting rod travels, means also operating to confine link within last mentioned arc.

METALLURGICAL FURNACE.—No. 740,360; W. F. Hannes, Deming, N. M.



In metallurgical furnace, lower chamher having tuyeres at lower portion, upper chamher merging into lower chamher and decreasing in area from upper end, tuyeres located at merging portion for supplying oxidizing hlast, fuel casing located in furnace with its discharge end located slightly helow zone of oxidizing tuyeres, and means for removahly supporting fuel casing in furnace.

MINE GATE.—No. 739,978; N. K. Bowman, North Lawrence, Ohio.



In electric haulage lines or systems for mines and in comhination with trolley line and mine gate, bridge for spanning gate or like part to carry trolley wheel therehy without necessitating interruption of electric circuit or power.

Mineral Output of Canada.

E. D. Iogall, head of the mioers' hureau of the Canadian Geological Survey, reports the mineral output for the year 1902 as follows:

METALLIC.

Gold:		Value.
Yukon		$14,500,000
All other		6,241,245
Total		$20 741,245
Product.	Quantity.	Value.
Copper, lbs., @ 11 626c ℔ lb	39,168 202	4,553,695
Iron ore, tons (exports)	428,901	1,065,019
Pig iron from Canadian ore, tons.	71,655	1,043,011
Lead, lbs., @ 4 069c ℔ lb	23.000,000	935,870
Nickel, lbs., @ 47c ℔ lb	10,693,410	5.025,903
Silver, ounces, @ 52 16c ℔ oz	4,373,000	2,280,957
Zinc, lbs	166,700	8,068
Total metallic		$35.653,768

NON-METALLIC.

Coal, tons	7,639,255	$15,538,611
Coke, tons (oven coke, all from Nova Scotia and British Columbia)	506,466	1,538,930
Gypsum, tons	332,045	356 317
Limestone for flux, tons	293,108	218,809
Petroleum, harrels	521,485	934,740
Salt, tons	63,056	288 581
Total		$18.875,988
All other non-metallic		2,369,106
Total non-metallic		$21,245,094

STRUCTURAL MATERIALS AND CLAY PRODUCTS.

Cement, natural rock, harrels	124,400	91,870
Cement, Portland, harrels	594,594	1,028,618
Total		$7,771,870
Estimated value of mineral products not returned		300,000
Metallic		35,653,768
Non-metallic		21,245 094
Total for 1902		$64,970,732

The figures for copper, lead, si ver, nickel and zinc include contents of ores, mattes, etc.

Alloys of Gold.

Following are some of the alloys of gold made use of hy jewelers, says the Pacific Goldsmith:

Color.	Gold.	Silver.	Copper.	Cadmium.	Steel.
Blue	250	...	...	...	250
Blue	500	...	...	...	250
Gray	800	...	...	...	200
Gray	857	86	...	...	57
Gray	725	275	...	...	...
Green	750	125	...	125	...
Green	750	166	...	84	...
Green	746	114	97	43	...
Red	666	67	268	...	...
Red	750	104	146	...	...
Red, pale	600	200	200	...	...
Red, very	583	42	375	...	...
Yellow	583	250	167	...	...
Yellow	666	194	139	...	...
Yellow	750	146	104	...	...
Yellow, dark	583	125	292	...	...
Yellow, pale	666	333	...	...	...

The alloys of gold should not he overheated aod ought to be poured immediately after the proper fusion has taken place. The mixture should be well stirred from time to time after it has commenced to melt, using a cherry-red iron rod or a stick of very dry poplar or other slow hurning wood. This serves two purposes—it makes the metal homogeneous in its composition and it enables the operator to judge hy the feeling when the mass is thoroughly melted. As long as the metal feels curdy or cloggy it is unfit to pour. When the stirred mass feels thin and watery it should he thoroughly agitated, fresh charcoal added, and allowed to stand for a minute, then poured.

In melting silver alloys, great care and strict attention to the points given helow are necessary in order to secure homogeneous alloys of the proportions required. Especially is this the case when the alloys contain the more readily oxidizahle metals, such as zinc and tin. The weighing of the metals, the arrangement of them in the crucible, the management during the time they are in the furnace, all are points requiring steady care and constant attention to produce accurate results.

When the alloy consists only of copper and silver they should both he put in the crucible hefore putting it into the furnace. Put the copper at the bottom and the silver over it, as copper has the highest melting point and the heat is greatest at the bottom. Then, too, the silver, heing the heaviest, will descend through the copper when melting, thus producing a more perfect mixing than when the copper is placed on the top.

Mining Summary.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

Nome reports say the weather is unusually good in the north, no storms of any consequence being reported up to September 24th. Mining operations are in full blast, and it is estimated 2000 people will winter in Nome this year.

The Mt. Drum platinum deposits will be developed next season, say White & Thorp of New York, who have bought a controlling interest in thirty-four platinum claims. These properties are 12 miles from Copper Center, which place will be headquarters, says the Valdez News.

A drilling outfit is being put in by the Cudahy Oil Co., which will operate in the Kayak district. The plant includes a triplicate set of tools and an oil pump. It is to be used on lands owned by the company and J. A. Ritchie, being tracts on Lake Chilcat and on Martin river, aggregating 1600 acres. The Cudahy Co. also operates in Indiana, Indian Territory and in Oklahoma.

G. W. Otterson, superintendent of the Windfall hydraulic mines at Windfall, near Juneau, says he has closed down the mines for the season for lack of water. Next season the company will put in a steam shovel and work the property on a larger scale.

ARIZONA.

COCHISE COUNTY.

The Mountain View D. Co. has been incorporated at Bisbee. The company owns a group of claims 1½ miles north of Bisbee. Assays of the croppings show copper values. G. Bennett, I. E. Holmes, G. S. Crockett, G. Walker, C. Trottman, H. M. Woods and J. F. Sinclair are directors.

MARICOPA COUNTY.

(Special Correspondence).—R. E. Humphries is working eight men on his property, east of Morristown.

Donofrio & Eddy, who have a number of claims 8 miles west of Frog Tanks, are doing development and assessment work. They have an incline shaft down 50 feet and will sink to 100 feet.

B. Ford has a deposit of asbestos in the White Tank mountains which he is developing.

The parties, who are interested in the deposit of bismuth ore in the eastern part of Maricopa county, have a shaft down 60 feet on one of the claims.

The Arizona M. & D. Co., which recently purchased the Ryland lead property, or what is better known as the Black Jack mine, 3 miles west of Morristown, contemplate the erection of a concentration plant for working the old dumps; meanwhile, extensive work will be carried on. This property in the past has been a large producer of silver-lead ores.

Burson & Langley, of Buckeye, have their stamp mill in operation again.

Considerable development work is being done in the Cave Creek district. Several properties in that section of the country have been sold recently, and a number of other deals are under way.

Phœnix, Oct. 5.

(Special Correspondence) —S. W. Haines has men at work on his mines 6 miles north of Buckeye. A shaft is down 300 feet with drifts and crosscuts on every 50-foot level, showing the extent of the ore bodies. The ore is free milling and will mill on an average $30 per ton. W. Dunn and H. Welch are working their gold claims in the White Tank mountains, taking out ore which is to be milled at Buckeye.

It is reported that a deal is being closed with the present owner for the Vulture mine, near Wickenburg.

Wickenburg, Oct. 5.

T. J. Morrison of Martinez, manager of the United Verde Jr. M. Co., 9 miles from Harqua Hala and 35 miles from Wickenburg, reports development work being increased. Their group comprises five gold claims known as the Sunset group. H. J. Ailen and T. E. Campbell of Jerome are also interested. The claims have been developed by two 175-foot shafts connected at the 125-foot level. The 5-stamp mill on the property will be started next week.

MOHAVE COUNTY.

The deal for sale of the Dempsey-O'Dea group of mines, near Chloride, is reported off, and Dempsey & O'Dea, the owners, are preparing to continue development themselves.

Machinery for the milling plant at the Great West mine, near Kingman, is on the ground. The plant will treat fifty tons of ore daily by cyanide process.

PIMA COUNTY.

At Quijotoa, the Producer M. & S. Co. have about completed their smelting plant and will build a concentrator, says Superintendent F. Brownell.

The Twin Buttes copper mines at Olive Camp, near Tucson, have been incorporated as the Twin Buttes M. & S. Co., with G. Baxter, J. Ellis and M. Irish as directors, and S. Rose of Milwaukee, Wis., as president, and M. Blakely as manager. The workings consist of a 250-foot shaft, a 90 foot shaft and several drifts. A gasoline hoist and drills are being put in.

PINAL COUNTY.

(Special Correspondence).—Forty men are employed at Superior copper camp, near the Silver King mine.

Superior, Oct 5.

SANTA CRUZ COUNTY.

At Oro Blanco J P. Owens, superintendent, says the Tres Amigos and Sorrel Top mines are being worked under one management. The ore in the Tres Amigos yielded by mill test $21 per ton; and the ores of the Sorrel Top gave $14 They are putting up a mill on the Tres Amigos. Hoists have been put on both properties, and concentrating tables are on the ground for the Tres Amigos. They have 100 men at work.——E. C. Pearce has thirty men at work on the Oro Blanco mine. They are unwatering the main shaft.

R R. Richardson is sinking a shaft on his Irish Lord mine, in the Harshaw district, near Patagonia.

J. Baker & Son, of Michigan, who have a lease and bond on the Old Glory mine, near Oro Blanco, have the 30-stamp mill running steadily and fifty men are at work, says Superintendent Finch.

YAVAPAI COUNTY.

At the Iron King mine, on Equator hill, near Jerome, work on the smelter is about completed, and is expected to be producing bullion before Nov. 1st.

At the Chicago mine at Groom creek, while cutting the station for 300-foot level an 18-inch streak of gold ore was struck, says E. M. Clark, principal owner and manager. The shaft is vertical and crosscuts have been run to the main vein. Sinking to the 500-foot level will be continued and at this depth, in order to drift for the gold-bearing porphyry dike, a larger pump and an air compressor will be put in. Eighteen men are employed.

Superintendent J. B. Tomlinson says he has the machinery for the Yaeger Canyon Copper Co. (the Sloan group) in place. There are three 80 H. P. boilers, one 140 H. P. hoist and a 10 drill air compressor. This property was explored by diamond drills before development work was started. There is a shaft down 830 feet.

CALIFORNIA.

State Mineralogist Lewis E. Aubury reports the yield and value of mineral substances of California for 1902 as follows, as per returns received at the State Mining Bureau, San Francisco:

	Amount.	Value.
Asphalt, tons	34,511	$ 349,344
Bituminous rock, tons	33,490	43 411
Borax and boric acid, tons	17,202	2,234,694
Cement, bbls	171,000	423,600
Chrome, tons	315	4,725
Chrysoprase, lbs	50	500
Clays—		
For pottery, tons	67,933	74,163
For brick, M	169,651	1,306,215
Coal, tons	68,460	246,622
Copper, pounds	27,660,162	3,239,975
Fuller's earth, tons	967	19,246
Glass sand, tons	4,500	12,225
Gold	.....	16,910,320
Granite, cubic feet	257,650	256,239
Graphite, tons	42	1,680
Gypsum, tons	10,250	53,503
Infusorial earth, tons	422	2,532
Lead, pounds	349,440	12,230
Lithia mica, tons	822	31,680
Lime, bbls	446,664	369,616
Limestone, tons	71,422	90,524
Macadam, tons	500,939	418,546
Manganese, tons	670	7,140
Magnesite, tons	2,630	20,655
Marble, cubic feet	19,305	37,616
Mica, tons	20	2,500
Mineral paint, tons	589	1,533
Mineral water, gallons	1,701,142	612 477
Natural gas, M. cubic feet	129,966	99 443
Paving blocks, M	3,502	112,437
Petroleum, bbls	14,356,910	4,692,189
Platinum, ounces	39	466
Pyrites, tons	17,525	60,306
Quicksilver, flasks	29,552	1,276,524
Rubble, tons	1,555,076	830,961
Salt, tons	115 206	205,876
Sandstone, cubic feet	212,123	142,506
Serpentine, cubic feet	512	5,065
Silver, (commercial value)	.....	616,412
Soda, tons	7,000	50,000
Slate, squares	4,000	30,000
Soapstone, tons	14	266
Tourmaline	.....	150,000
Turquoise, pounds	510	11,600
		$35,069,105

In the previous year the total product was valued at $34,355,981, the increase for 1902 being $715,124.

The total value of the metallic substances, including precious metals, for 1902 was $22,052,796, which includes gold, silver, mineral paint, quicksilver, copper, lead, manganese, platinum and chrome. The silver is given in commercial value, or amount received for it by producers; if given in coining value, the sum would be about doubled. The Bureau has never independently collected statistics of precious metal output, but has used totals and distribution by counties as obtained at the United States Mint, San Francisco, where they have the advantages of verification by figures of receipts at United States Mints and Assay Offices, and private refineries and smelters throughout the country.

The total value of non-metallic substances was $3,706,368, which includes borax, coal, chrysoprase, mineral waters, salt, asbestos, infusorial earth, gypsum, magnesite, pyrites, lithia mica, fullers' earth, quartz crystals, mica, soda, tourmaline and turquoise.

The total value of hydrocarbons and gases was $5,184,387, an increase of $1,651,678, including asphalt, bituminous rock, natural gas and petroleum. The gas is given in value of that commercially utilized. The petroleum price is the average per barrel f. o. b. at the wells or stations in each county. The number of barrels of oil produced was 14,356,910. valued at $4,692,189, as against 7,710,315 barrels in 1901, valued at $2,961,102. The increase in value has not kept pace with increase in amount, owing to prevalence of low prices in the oil fields, especially in the valley counties.

The total value of structural materials was $4,109,023, an increase of $1,161,748 over the previous year. This includes brick and pottery clays, Portland cement, lime and limestone, macadam, rubble and concrete rock, paving blocks, marble, granite, sandstone, serpentine, slate and glass sand.

The relative value of the principal mineral products of the State is as follows: First, gold; second, petroleum; third, copper; fourth, borax; fifth, clays and their products; sixth, quicksilver; seventh, silver. In the previous year the copper values were more than those of petroleum, quicksilver was fourth and borax sixth.

The relative rank of the counties of the State, in point of mineral production, is given in the following table. In each case the value given includes that of all the mineral substances combined produced in the respective counties for the year. Some counties, in addition to gold and silver, produce five, six or seven other substances, while other counties which produce little or no gold or silver produce in large quantities quicksilver, mineral oils, copper, lead, asphalt, structural materials, etc. The figures include aggregate value of all mineral products, including precious metals. These latter are based, as stated, upon United States Mint returns for the year. The term "unapportioned" includes the total value of such substances as are grouped to avoid disclosing private business, as in the case of single operations in a single county. In the table just published in Bulletin No. 28 by the State Mining Bureau, from which these figures are taken, the amount and value of each substance in the respective counties are set forth. It is, therefore, necessary in some cases to place the figures in the "unapportioned" column:

RELATIVE RANK OF COUNTIES.

Shasta	$ 3,730,049
Kern	3,461,926
San Bernardino	3,316,102
Calaveras	2,371,013
Nevada	2,155,839
Tuolumne	1,690,229
Los Angeles	1,697,932
Amador	1,679,113
Siskiyou	1,094,745
Placer	1,016,487
Butte	926,251
Orange	824,742
Trinity	731,261
Fresno	670,056
Alameda	666,836
Mariposa	647,296
San Diego	562,730
Sacramento	555,136
Mono	549,296
Ventura	463,966
Santa Clara	411,112
Napa	410,966
San Francisco	395,100
El Dorado	361,576
Plumas	361,203
Riverside	334,622
Sierra	332,466
San Mateo	330,745
San Benito	326,231
Santa Barbara	312,550
Lake	286,231
Marin	206,600
Santa Cruz	205,296
San Luis Obispo	200,391
Sonoma	196 603
Colusa	194,500
Inyo	184,414
Solano	170,140
Yuba	155,632
Madera	121,151
Humboldt	79,555
San Joaquin	70,596
Tulare	62,396
Contra Costa	55,141
Monterey	39,253
Lassen	23,754
Stanislaus	19 026
Kings	19,000
Alpine	14,129
Mendocino	9.696
Del Norte	5,450
Tehama	3,500
Merced	1,656
Yolo	450
Unapportioned	73,619
Total	$35,069,105

It is to be noted that for the first time since these detailed statistics were gathered, three counties show a product of over $3,000,000. Shasta county, while showing a very material falling off in its total, is still in the lead. The decrease from the year previous is $3,007,522, which is owing to the lower prices for copper, and the prevalence of miners' strikes at the leading producing mines, causing them to close down part of the year. Shasta owes its precedence to copper; Kern to petroleum and San Bernardino to its borax. While gold is still the leading mining product, its yield no longer puts the greatest gold-producing country in the first place. Nevada county still leads in gold and silver ($2,149,564), though closely followed by Calaveras ($2,119,173); but when total mineral products are considered, Calaveras takes rank above Nevada county, the difference being caused by the value of copper produced in Calaveras. As usual, Shasta county still makes the largest yield of silver, owing to so much silver-bearing quartz being used as flux in the copper smelting operations.

Asphalt was produced in 1902 in the counties of Kern, Los Angeles, Santa Barbara, San Luis Obispo, Santa Cruz and Ventura, most of it now being derived from the refining of petroleum. Bituminous rock was quarried in San Luis Obispo and Santa Cruz counties. Most of the borax came from San Bernardino county, though some was produced in Inyo. Brick clays were utilized in the counties of Alameda, Butte, Contra Costa, Fresno, Humboldt, Kern, Kings, Los Angeles, Madera, Marin, Mendocino, Riverside, Sacramento, San Bernardino, San Diego, San Francisco, San Luis Obispo, Santa Barbara, Santa Clara, Shasta, Sonoma, Tehama and Tulare. Clay for pottery, sewer pipe, etc., came from the pits in Amador, Los Angeles, Placer, Riverside and San Mateo counties. Cement was manufactured at quarries in San Bernardino and Solano counties, the latter producing this for the first time in many years, and in considerable quantity. All the chrome mined was in Shasta county, and all the chrysoprase was derived from Tulare county.

Coal was mined in Alameda, Amador, Contra Costa and Riverside counties, most of it being from Alameda. Copper was produced in the counties of Amador, Calaveras, Contra Costa, El Dorado, Fresno, Inyo, Kern, Madera, Mariposa, Merced, Nevada, Placer, San Bernardino, Shasta, Siskiyou, Stanislaus and Tuolumne. The total product was 27,860,162 pounds, as compared with 34,931,785 the previous year. The valuation in 1901 was $5,501,782, as compared with $3,239,475 in 1892.

All the fullers' earth produced in the State came from Kern county; and the glass sand came from the "sand ranches" near Monterey bay. Granite for building purposes, curbing, etc., was quarried in the counties of Los Angeles, Madera, Nevada, Placer, Riverside, Sacramento, San Diego, Santa Clara, Sonoma and Tulare. Graphite came from Sonoma county only; and gypsum from Los Angeles, Kern and Riverside.

Gold is more widely distributed than any other mineral substance thus far mined in California, thirty-five counties out of fifty-seven in the State showing a gold yield in 1902, and it is known to exist in several others. According to the returns received from producers at the San Francisco Mint, the gold yield for 1902 was $16,910,320, and was derived from the following counties, which are named in the order of their respective gold product for the year: Nevada, Calaveras, Tuolumne, Amador, Kern, Butte, Siskiyou, Shasta, Placer, Trinity, Mariposa, Mono, Sacramento, San Bernardino, Plumas, San Diego, El Dorado, Sierra, Yuba, Inyo, Humboldt, Fresno, Riverside, Madera, Lassen, Tulare, Alpine, Los Angeles, Monterey, Del Norte, San Luis Obispo, Ventura, Colusa, Orange and Santa Barbara.

Infusorial earth was produced in the counties of Los Angeles and Santa Barbara. Lead was produced in Inyo, Los Angeles, Mono and San Bernardino, with small quantities from Alameda and Tuolumne counties. All the lithia-mica was from San Diego county. Lime was quarried and burned in the counties of Butte, El Dorado, Kern, Monterey, Riverside, San Bernardino, Santa Cruz, Shasta and Mono; and limestone in the counties of Napa, San Bernardino, Santa Cruz and Shasta. Macadam quarries were operated in Alameda, Los Angeles, Marin, Monterey, Sacramento, San Benito, San Mateo, San Francisco, Solano and Sonoma counties.

All the manganese was from Alameda, and the magnesite from Alameda, Napa, Sonoma and Tulare counties. Marble was quarried in Amador, San Bernardino and Tuolumne counties. Mineral paint came from the counties of Calaveras, Los Angeles, Sonoma and Stanislaus.

Mica was produced only in Ventura county and is a new industry there. Min-

eral waters were commercially utilized by being bottled and sold from the counties of Butte, Colusa, Contra Costa, Fresno, Humboldt, Lake, Mendocino, Monterey, Napa, San Benito, San Diego, San Luis Obispo, Shasta, Santa Barbara, Santa Clara, Sierra, Siskiyou, Solano and Sonoma. This is a business which is increasing rapidly every year, both in amount and valuation. Natural gas was utilized in the counties of Sacramento, San Joaquin and Santa Barbara. Paving blocks were quarried in Placer, Riverside, San Bernardino, Solano and Sonoma counties.

Petroleum was produced in the counties of Fresno, Kern, Los Angeles, Orange, Santa Barbara and Ventura. Thus it will be noted that only six counties are producing this substance, notwithstanding the wide range of prospecting and drilling in numerous counties, both north and south, during the past two years.

All the platinum which could be traced was from Trinity county, though its presence is noted at other points. Pyrites were mined (for sulphur contents) in Alameda and Shasta counties only, most coming from the former.

Quicksilver came from the counties of Colusa, Lake, Napa, San Benito, San Luis Obispo, Santa Clara, Solano, Sonoma and Trinity. There were 2832 more flasks (of 76½ pounds each) produced in 1902 than in the previous year, but the total valuation is less, owing to prices.

Rubble was quarried in the counties of Los Angeles, Madera, Marin, Monterey, Napa, Placer, Sacramento, San Bernardino, San Diego, San Francisco, San Mateo and Ventura. Over one-quarter of the 1,555,076 tons came from San Mateo county and was used in railroad construction work on Mission bay. The class of work on San Francisco bay and San Pedro harbor uses up the larger part of the rubble quarried.

Salt comes from the counties of Alameda, Colusa, Los Angeles, Marin, Riverside, San Diego and San Mateo. It is the product of solar evaporation of the sea water and more than three-quarters of the total is made in Alameda county from San Francisco bay water.

Silver was produced (mainly from gold ores carrying silver) from the counties of Alpine, Amador, Butte, Calaveras, El Dorado, Fresno, Inyo, Kern, Lassen, Madera, Mariposa, Mono, Nevada, Placer, Plumas, Riverside, Sacramento, San Bernardino, San Diego, Shasta, Sierra, Siskiyou, Trinity and Tuolumne. In distribution, silver takes second rank to gold, having been produced in twenty-seven counties in 1902

As far as the "banner" counties are concerned in the different mineral products, the following is the record for 1902, with the values of the material in which the county leads:

Alameda county leads in coal ($203,550); macadam ($182,295); manganese ($7140); pyrites ($53,301), and salt ($160,000) Calaveras leads in mineral paint ($778); Colusa in sandstone ($87,456); El Dorado in slate ($30,000); Inyo in lead ($9013), and soda ($50,000); Kern leads in fuller's earth ($19,426), and petroleum ($1,955,585); Los Angeles in asphalt ($171,904), and brick clay ($335,670); Monterey in glass sand ($12,225); Nevada county leads in gold ($2,142,740); Placer in granite ($105 377); Riverside in pottery clay ($38,920); San Benito in quicksilver ($306,081); San Bernardino leads in borax ($2,043,600), cement ($272,600), limestone ($51,578), marble ($15,600) and turquoise ($11,600); San Diego leads in lithia mica ($31,880) and tourmaline ($150,000); San Joaquin in natural gas ($67,868); San Mateo in rubble ($300 000); Santa Barbara in infusorial earth ($2172); Santa Cruz in bituminous rock ($41,084) and lime ($161,302); Shasta county leads in copper ($2,496,731), chrome ($4725) and silver ($616,412); Siskiyou in mineral waters ($187,500); Sonoma in graphite ($1680) and paving blocks ($82,227); Trinity in platinum ($468); Tulare in chrysoprase ($500) and magnesite ($19,250); and Ventura in mica ($2500).

It will be noted that two counties lead in five substances—Alameda and San Bernardino; one leads in three—Shasta; seven lead in two—Inyo, Kern, Los Angeles, San Diego, Santa Cruz, Sonoma and Tulare; and fourteen lead in one substance — Calaveras, Colusa, El Dorado, Monterey, Nevada, Placer, Riverside, San Benito, San Josquin, San Mateo, Santa Barbara, Siskiyou, Trinity and Ventura.

AMADOR COUNTY.

The 60-stamp mill at the Fremont-Gover mine, near Drytown, near Amador City, is expected to be ready for operation October 15th. The batteries are in place, the stamps are hung and the ore feeders up. The concentrators are being set up.

At the Argonaut mine at Jackson the shaft is being repaired preparatory to resuming operations.

CALAVERAS COUNTY.

To operate the Shepherd group on Six Mile Creek, near Murphys, the New Deal M. Co. has been incorporated by D. C. Shepherd of Stockton, W. & A. Garland, J. M. Shepherd of Murphys and J. S Shepherd of Hodson. Considerable development work has been done on the mine under J. M. Shepherd.

The Mayday mine, near Murphys, has resumed work.

J. T. Thompson, superintendent of the Kenross mine, near Mokelumne Hill, reports having bought the Leota ranch, in Fischer's district, near Jesus Maria. This property has been secured by the company to develop the gold-bearing quartz ledges on it.

EL DORADO COUNTY.

(Special Correspondence). — W. E. Everson, superintendent of the El Dorado C. Co., has sunk a new vertical shaft on the Woodside-Eureka mine.

Georgetown, Oct. 5.

(Special Correspondence) — The Hart Consolidated is not working at present. The Esperanza Co. have had several new sets put in at the top of the shaft and the shaft has been cleaned out. Some work is being done on the Rosencrans, preparatory to sinking a new shaft.

Work has begun clearing out the brush, getting ready to cyanide the tailings from the Taylor mine. This will make the second time these tailings have been through cyanide treatment.

No work is being done on the Ford copper and asbestos claims near Georgetown. This property is owned by the El Dorado C. Co. of San Francisco. This company has begun work on a three-compartment shaft on the Eureka mine in Georgetown.

The Ohio and Argonaut, near Greenwood, are idle. Lewis Sites, owner of the Short Handle, at Spanish Dry Diggings, is doing some work on this claim, which was a big producer some years ago. Most of the mines around here are closed on account of lack of water.

The Fowlers are making preparations to resume work on their claim on Bald mountain. They have a good lead in the serpentine, which prospects well in free gold.

Georgetown, Oct. 6.

The Peyton Chemical Co. of Oakland has men at work in the Noonday copper mine, near El Dorado, and regular shipments of ore are being made to the company's smelter at Oakland.

The mill on the Del Monte mine, on the American river, 4 miles below Coloma, is completed and the Del Monte M. & M. Co. expect to begin crushing ore next week. The mill is a 2 stamp triple discharge mill and will be operated with a twelve H. P. gasoline engine, says the Placerville Nugget. B. McBeth is superintendent.

A. Schenck is reported to have bonded the Cooley mine in Mount Echo district, near Echo, and will start sinking

The Mt. Pleasant M. Co. has sixteen men at work at the Mt. Pleasant mine, near Grizzly Flat. Development work is being done on the 500-foot level.

W. E. Everson, of Elk Grove, superintendent of the El Dorado C. M. Co. at Georgetown, says sinking the three-compartment shaft will be started as soon as the necessary machinery can be set up. Steam power will be used for hoisting.

The Union mine, which was closed down owing to the organization of a union at El Dorado, has resumed with C. Cantrell as foreman.

KERN COUNTY.

F. S. Jones and B. Summers are working the Wedge and Kinyon mines, near Randsburg, under lease for one year —— The Gold Flint mine in Stringer district, near Randsburg, has been leased to A. E. Sanderson for one year at 10% royalty, with an option to purchase for $5000. It is intended to sink and crosscut.

LOS ANGELES COUNTY.

The holdings of the Puente Oil Co. and the light oil territory of the Columbia Oil Producing Co. have been consolidated. It includes 4700 acres of oil lands; the Puente company's oil refinery at Chino with refining capacity of 800 barrels daily; 15 miles of 3 inch pipe line from the wells at Puente to Chino; eighty-five producing wells; six pumping plants; ten drilling outfits, and steel tanks of 100,000 barrels capacity. The present output of light oil from this district is estimated at 20,000 barrels per month. The oil produced by the lands of this combine is of 32°–34° Baume specific gravity. The consolidated company will be the Puente Oil Co., with W. R. Rowland, president, and W. B. Scott, vice-president and general field superintendent. The Columbia company retains its heavy grade oil territory on which it has nine wells producing 4000 barrels per month. The new company will increase its capacity both in the field and at the Chino refinery.

NEVADA COUNTY.

Work has been resumed on the Cassidy mine, 1 mile southeast of Grass Valley, by P. & J. Feeny, J. Irish, H. Stewart, P. Cassidy and P. Cannon. The mine is between the Empire and Pennsylvania mines.

The Fountain Head M. C. Co. of Nevada City has bonded its holdings to the Phelps Hill M. & Dev. Co, of which C. A. Poage is local manager. Poage also has an option on the Cold Spring mine, adjoining.

The Red Cross and Huron mining companies, near Nevada City, have been consolidated, says Superintendent W. H. Bray of the Posey and Huron mines. The 20-stamp mill on the Red Cross will be used to crush ore from both the Red Cross and Examiner properties. A tramway will be built to transport the ore from the Examiner shaft to the mill, while the Red Cross will be worked by tunnel. W. H. Bray is manager and vice-president of the consolidated company.

PLACER COUNTY.

The Sacramento Dredging Co., which has a plant on the American river near Colfax, reports work progressing, and they have completed the flume and put in a water wheel on the east side of the river, which is to operate the pump that supplies water for washing out the gold, says the Colfax Sentinel.

The company that attempted to unwater the Chicago mine at Penryn has abandoned the operation, having found the pump insufficient, and the prospects did not warrant more machinery, says the Auburn Herald.

PLUMAS COUNTY.

J. C. Rasmussen and H. C. Brown of San Francisco are preparing for development of the Hope mine in Nelson Point district.

SHASTA COUNTY.

The Calumet mine on Quartz Hill, near Redding, is being reopened by the Quartz Hill G. M. Co., with W. O'Donald as superintendent, says the Redding Free Press.

SISKIYOU COUNTY.

(Special Correspondence) — Manager Brokaw, operating the Golden Eagle mine on Indian creek, 6 miles from Fort Jones, reports work progressing. On July 12th he began work of putting in an engine, boiler and hoists, and on Oct. 1st had sunk a two-compartment shaft 150 feet, and drifted 100 feet, both being partially timbered. This work was done with one baby machine drill, operated by steam (in the drift, the exhaust was carried back to the shaft), and three shifts, two men per shift, underground. The formation is slate. ——At the Brokaw mine in Hull Gulch, Manager Brokaw has six stamps dropping. The shaft is down 150 feet and sinking continues. The compressor is run by water power, and the mill, hoist, pumps, drills, etc., are all operated by air.

Morrison & Carlock, in Quartz valley, 7 miles from Fort Jones, are dropping five stamps on high-grade ore, crushing nine tons per stamp per day. They are working seven levels (50 feet apart), all hand drilling, and have sixty-five men on the payroll.

At the Sheba mine, on Pattison creek, operations have resumed after an idleness of two years. Ten stamps are dropping. ——The Schroeder mine, at head of Deadwood gulch, is hung up temporarily.

The H. J. Diggles Estate Co. is opening up the Big Ledge mine in Quartz valley. The tunnel is in 30 feet on a 16-inch stringer, and is expected to cut the main ledge at 150 feet and depth of 250 feet. The main ledge is 4 feet wide, and assays $4 in free gold, with 0.7% sulphides. The 16 inch stringer assays $24 in gold.——The same company is also preparing to reopen the Hoboken mine on Cherry Hill, and will cut the ore bodies with a 500-foot tunnel, giving 250 feet of backs. Ore from this vein milled $10 per ton free gold, with 6% sulphides, which assayed $80. Cherry Hill is near Fort Jones and 8 miles from Yreka.——At the Cherry Hill mine, on Cherry Hill, preparations are being made to put in electrical power.

The power plant on Fall creek (tributary to Klamath river) is furnishing electric lights and power to the Scott mine on Indian creek, Scott valley, near Fort Jones, and 12 miles from Yreka. They have a 10-stamp mill in operation.——Several other mines are preparing to put in electric power.

Yreka, Oct. 7.

TRINITY COUNTY.

R. Hicks, superintendent of the Mountain Boomer mine at New River, near Junction City, reports shipping last week a $3000 gold bar, the product of eighteen days' run with a 3 stamp mill. There are twenty-two men at work, and a Huntington mill is being set up. The Bohs Farm M. Co. is owner. The ledge is 20 inches in width. A tunnel will be started from the mill level, which will tap the ledge at a depth of 800 feet.

TUOLUMNE COUNTY.

Tyer and Watson are taking out ore from the Jewel mine, near Big Oak Flat.

The Black Hawk mine on the Davis ranch, near Soulsbyville, has been bonded to C. H. Glines and E. M. Cavanaugh. They are unwatering the shaft, after which development will be resumed.

A company consisting of W. H. Richardson and G Bartlett of Kings county, and Walter King of Sonora, has bought a group of three quartz claims on Turnback creek, near Carters, being the Monitor, Mountain Chief and Turnback; also the Grizzly mine on the Berger ranch. A 10 stamp mill will be built and one battery will be dropping stamps by December 1st. The properties will be worked by tunnel.

Operations have resumed at the Doyle gravel mine, near Columbia, under bond to W. S. Estey after a temporary suspension.

J. Barry and E. Sharpe have taken over the Hughes interest in a bond on the Josephine quartz mine, near the Jones and Brown Bird claims, below Algerine.

J. P. Beckett of Oakland has bought a one-sixth interest in the Golden Thread quartz mine, near Algerine.——B. Kolich of Columbia has bought forty acres near Yankee Hill, being the southern portion of the Gold Nugget placer claim.——V. Gianella of Carters has bought the Wild Duck quartz claim, 7 miles southeast of Carters.

The California Consols, Ltd., an English company, has bought the Leviathan quartz mine, the north extension of the Louisiana quartz mine; also the Park & Mason mine, near Coulterville, says the Independent.

S. W. Blakely of San Joaquin for $6500 has bought the John Royal quartz mine on the Day ranch, near Columbia.——T. F. Temple of Boston, Mass, for $3500 has bought the Porto Fino quartz mine, near Cherokee and south of the Carlotta mine, near Carters.

The Manderville shaft at the Don Pedro mine, near Chinese Camp, is being sunk 200 feet deeper, says President W. H. McClintock.

A few men are at work in the Hard Tack mine, on Hunter creek, near Carters, preparing to resume operations. The property is equipped with a 2-stamp mill

At the Providence mine, near Carters, ore is being sent to the mill from the third level, which is 400 feet below the surface. It is from the north drift which has been run on a shoot. The diamond drill is still on exploration work. The mine is 1200 feet deep.——At the Garfield mine, which adjoins the Providence on the north, a vein of ribbon rock is being developed. The property is being worked by a tunnel, in 400 feet. A raise to the surface at a point 350 feet from the mouth of the tunnel affords ventilation. Ten men are at work in the mine, and ore is being taken out in the face of the tunnel. A tramway 900 feet in length has been built from the tunnel to the Grizzly mill, and the stamps began dropping this week.

YUBA COUNTY.

Manager Hill says preparations are being made to reopen the Paddy Campbell mine (the Blue Point mine) at Smartsville. A change of plans has been made necessary on account of the refusal of the California Debris Commission to grant a permit to remove by sluice process the waste material in the bed of the claim. Several miles of flume and ditch will be built.

W. P. Hammon, operating gold dredging plants at Oroville, in Butte county, is preparing to put in two dredgers which will cost $100,000 each, to be used on the Yuba river near Marysville.

COLORADO.

(Special Correspondence).—While mining, on account of labor difficulties in several parts of the State, is practically at a standstill, yet it is the opinion of many that within thirty days, perhaps less, everything will be running smoothly. At Telluride, in San Miguel county, the situation is unchanged. Ouray county miners have decided not to go out on strike. At Cripple Creek, Teller county, the operators claim to have 1000 men at work in the different mines and putting more on daily.

Denver, Oct. 5.

CLEAR CREEK COUNTY.

The Silver Plume M. & T. Co. has been incorporated by H. L. and L. L. Roberts, W. H. Stephens, H. H. Noyes and W. A. Roberts to operate the Mary Etta group of claims on McClellan mountain, a few miles above Silver Plume. The ore developed shows values in gold and silver. It is intended to drive a tunnel to cut the lodes at depth.

The Wisconsin mine, near Silver Plume, will resume shipments, as the raise from the lower to the upper level has been completed, opening up the ore shoot.

CUSTER COUNTY.

The owners of the Franklin mine at Ilse are making a resurvey of their boundaries, and operations will be resumed.

G. Avery reports opening a body of sil-

ver ore in the Evening Star, north of Robinson hill, near Custer City. O. W. Murphy has bought the Silver Bow group and will begin development work.

The cyanide plant of the Bassick mill, near Silver Cliff, has resumed.

DOUGLAS COUNTY.

The West Creek & Council Grove M. & M. Co., which owns twenty-four claims in northern Teller county and southern Douglas, reports opening up a body of ore 20 feet wide on Thunder butte, near Pemberton, near the Teller county line. Five feet are of zinc ore. The shaft on the Bald Eagle has been sunk to a depth of 200 feet and lateral work is under way. Mill tests gave returns of $21 in gold to the ton. It is proposed to build a 50-ton cyanide mill.

EL PASO COUNTY.

The Telluride reduction mill at Colorado City, which was forced to cease operations seven weeks ago by a strike of its union employes and subsequent shortage of ore occasioned by the Cripple Creek strike, will resume operations next week with non-union men, says Superintendent Groves. The mill is receiving ore daily.

Because of a demand for an eight-hour day and a 20% increase per ton for mining coal, the miners in the principal coal mines north of Colorado Springs are reported out on strike.

GILPIN COUNTY.

The Mont d'Oro M. & M. Co. has bought for $1000 the New Century, Fatty Felix and Smuggler lodes, in Quartz Valley district, a mile north of Central City. Machinery will be put in.

GUNNISON COUNTY.

Near White Pine, the Akron M. Co. has struck a body of carbonate ore in its tunnel which is mined at 700 feet depth. The company has three four-horse teams hauling coal and timber.

The Anna Silver M. Co. will resume work on its group, near Tin Cup, which has been idle for several years. It consists of the Anna Dedricka mine, on Anna mountain. The values are in gold and silver, with enough lead to make it a desirable smelting product. It is intended to resume shipments as soon as the railroad reaches Tin Cup. The principal stockholders are E. A. Nash of Avon, N. Y.; J. V. Farwell & Co. and F. McVeigh & Co. of Chicago, Ill.; I. E. Blake of San Francisco, Cal., and W. L. Beardsley of New York.

JEFFERSON COUNTY.

The Diamond Match Co. reports preparing to develop a discovery of placer gold deposits near Golden. While digging wells near the creek it was found that at depth of 300 feet bedrock was struck, and panning the gravel showed gold. The company has taken over the land and will put in five steam dredgers.

LAKE COUNTY.

(Special Correspondence). — Preparations are under way for driving a tunnel, ¾ of a mile in length, through Mosquito range, connecting Horseshoe gulch on the Fairplay side with Leadville. J. A. Shinn is manager and a company has been organized.

Leadville, Oct. 5.

The Rio Grande Railroad has completed a spur to the Diamond mine, near Leadville, and shipments are being increased. The average daily output is 150 tons.—— The Two Bit M. Co. has closed down temporarily, but plans are under way for resuming operations with increased development. A vein of gold-copper ore has been opened.

J. Shinn and W. F. Deaner, for Illinois men, have taken up their option on the La Plata mine on Rock Hill, near Leadville. A new shaft will be sunk on the south end of the property to a depth of 350 feet. The holdings cover fifty-two acres.

Leadville reports say the improvement in the price of silver is being felt in the district. It will affect first the large silver producers which have large reserves of ore blocked out, which did not pay to ship with silver much below 60 cents. This is particularly the case in the oxidized iron properties. The increase in price of silver by 10 cents an ounce makes a difference of 60 cents to $1 a ton on average iron ore. On the lowest grades of iron the margin of profit is 25 cents a ton, so that the present improvement means an increase in iron tonnage.

LA PLATA COUNTY.

B. N. Freeman of the Durango Oil Co., operating near Durango, says after drilling a number of holes with varied success, they are now in the first oil sands at a depth of 800 feet and a steady flow is being obtained. In addition to the oil well they have acquired coal lands which they are also working.

OURAY COUNTY.

A strike of gold ore is reported made by R. Porteus in the Floyd claim in Mount Sneffels district, 4 miles southwest of Ouray. The ore is 14 inches in width and runs high in gold, with good values in silver and copper. The strike was made in crosscutting the vein at breast of tunnel, 260 feet from portal. The owners of the Floyd are Porteus, Henry & Sigfrid of Ouray and D. Floyd of Denver. One of the group, the Queen Bee, has shipped ore that ran 800 ounces in silver and $16 in gold to the ton. Development work will be increased. Ample water supply is at hand for power purposes.

SAN JUAN COUNTY.

It is reported that the Bandora–Little Todd group, near Silverton, will resume.

SAN MIGUEL COUNTY.

The one-half interest in the Calvenite–Sylvanite–Patzite group, near Ophir, has been sold to F. Maumey of Telluride.

SUMMIT COUNTY.

W. Mitchell, manager of the Breckenridge branch sampler of the Chamberlain-Dillingham Ore Purchasing Co. has a lease on the Double-Standard lode on Mount Baldy, near Breckenridge. There are several tunnels on the group from which lead ore has been shipped. It also carries gold and silver values.

The Graff mine, on the lower end of Copper mountain, near Wheeler, is being reopened under lease to Hogan & Keogh, who have exposed a body of lead ore at the surface. They are driving a tunnel 300 feet to gain depth on the vein.

Near Kokomo the Iron Mask mine is putting in machinery, says D. M. Masters, who has a lease and bond. The workings will be unwatered.

A bond has been given on the Victoria-Eureka group, near Frisco, and the Masontown M. & M. Co. has been organized to operate it. The group of claims covers an area of 115 acres. The incorporators are J. V. Hoover of Masontown, Pa., S. R. Provins of Greenshorough, Pa., and A. E. Reables of Denver. About 2000 feet of work has been done in the mine and a body of low-grade free gold ore has been opened. A stamp mill will be placed at the mouth of the tunnel this fall. The concentrates from the mill will be cyanided.

TELLER COUNTY.

The following table gives the amount of ore treated from Cripple Creek district for month of September, and its value, by the mills and the smelters:

	Tons.	Total Value.
Magna Charta	150	$600
Globe	1,500	6,000
Jordan	600	4,200
Other cyanide mills	500	2,500
Ingham	1,500	6,000
Smelters	2,200	132,000
Portland	9,000	270,000
U. S. R & R	1,500	40,500
Dorcas	1,800	68,400
Economic	3,400	72,000
Total	22,150	$601,200

The total value was $381,275 less than for month of August.

The plant of the Chicken Hawk mine on Guyot hill, near Cripple Creek, has been placed in position and is expected to be in operation this week. It has capacity of 180 H. P.

The El Paso mine on Beacon hill, Cripple Creek, is making average daily production of 35 tons of ore running $50 per ton. Manager Bainbridge, in addition to breaking this ore, is doing development. The drainage tunnel is being driven on into the hill. Drifting in the third level (475 feet from surface), and on the C. K. & N. vein, is progressing in both directions.

The Portland mine at Victor, operated by the Portland G. M. Co., J. F. Burns president and manager, is outputting daily an average of 300 tons, all of which is treated at the company mill at Colorado City. The ore is broken in the levels from the 1000-foot point up to the surface. A large number of men have been put on development work, and the payroll of the Portland now has the names of 530 men. The Times says the mill at Colorado City will be doubled in capacity, and also that the acreage the company owns is to be added to.

The Cripple Creek Sampling & Ore Co., owners of the Black sampler at Goldfield, resumed operations with twenty men last week. The major portion of the ore treated by this plant comes from the Stratton's Independence. There are 180 men at work on the Independence, and a night shift will be put on next week, adding 60 more men, says Manager Cornish. —— There is being shipped out from the three samplers—Eagle, Rio Grande and Taylor & Brunton—400 tons of ore daily.

The number of men given out by the Mine Owners' Association on the 2d inst. as being employed on mines in Cripple Creek district, now under ban of Western Federation of Miners, is 1160. This number is being added to daily. A number of Cœur d'Alene miners from Idaho have been brought in.

IDAHO.

BLAINE COUNTY.

The Minnie Moore M. Co., near Halley, is increasing its output. Its manager intends to ship an average of 1000 tons a month of ore averaging $100 a ton.

Negotiations are reported under way whereby the Hercules M. Co. at Burke will buy the Frisco mine and mill. The Hercules Co. has no mill.

BOISE COUNTY.

G. W. Dorsey of Pearl says the stockholders of the United Gold Ledge M. Co., which owns the Blue Bucket mine, the Idaho G. Dev. Co., owning the Osborn mine, and the Pearl G. M. Co., will jointly build a custom mill with capacity of 100 tons of ore per day. It will be built on the Payette river and ore conveyed to it on aerial tramways operated by electricity. It is said the ore can be taken from the mines to the mill by this means for 8 cents per ton. Work will be started this month.

A 100-ton reduction plant will be put in on the Osborne mine at Horseshoe Bend, and work on the buildings began this week, says Manager M. E. Hopkins of Idaho City of the Idaho G. M. Dev. Co., which owns the property.

KOOTENAI COUNTY.

Copper ore is being opened up on the Little North Fork of the Cœur d'Alene river, 10 miles above Cataldo, by the Little North Fork M. & M. Co., says the Spokesman-Review. There are six claims in the group. A tunnel is being driven on one and is in 220 feet. In the face of the tunnel there are 5 feet of copper ore showing, 15% copper, $11 in gold and four ounces silver. This ore was taken from the face of the tunnel at depth of 100 feet. The tunnel will be driven on the ledge 500 feet farther, reaching depth of 300 feet. H. L. Aiward is superintendent. The property is owned by Wardner men.

LEMHI COUNTY.

The enlarged mill of the Kittie Burton M. Co. will be in operation by November 1st. The fifteen additional stamps have reached the mine at Ulysses and are being set up.

OWYHEE COUNTY.

A. Muntzing of Colorado, president of the Imperial M. Co., operating near Silver City, says they have discontinued sinking the shaft the second hundred feet until a hoist is put in. In the meantime drifting will be continued south at the 100-foot level. Superintendent Stoddard has this drift in 75 feet.

SHOSHONE COUNTY.

At the King mine, near Murray, Lessees Bacon, Schmidt & Lesher have unwatered the shaft. They repaired the flume which supplies water power. They will reopen the 5-stamp mill.

H. E. Ginter of Dubois, Pa., president of the New Jersey M. Co., operating near Wardner, says their 10-stamp mill is in operation, and they propose to increase the capacity next spring to forty stamps. A flume 8000 feet long carries water power to the mill, and a 2000-foot tramway conveys ore from the mine. A body of free milling gold ore has been opened up to a depth of 200 feet with shafts and tunnels.

ILLINOIS.

The Ohio Valley Zinc, Lead & Spar Co. has been organized in New York City to operate a group of properties near the Lavendar, Montgomery, Roslclare and other mines in the Ohio river valley, in Pope and Hardin counties, which carry zinc, lead and fluorspar, the latter predominating. A. Greig, F. B. Lord, G. J. Nicholson, M. Abbott, T. F. Goodrich, N. McPhatter, C. Sykes, H. A. Lloyd, C. S. McKenzie and R. M. Nugent are incorporators. F. B. Lord of Roseville, N. J., is vice-president and manager.

LOUISIANA.

CALCASIEN COUNTY.

Manager R. H. Childs of the Central Oil & R. Co. of Welsh says one unit of their refinery will be ready for operation by Nov. 15, with capacity of 250 barrels per day. The entire plant will be in operation by Jan. 1, with total capacity of 4000 barrels per day.

MICHIGAN.

HOUGHTON COUNTY.

The Baltic mine of the Copper Range Con. C. Co., north of Painesdale, is being further opened up to secure a larger monthly production. It is expected the Octoher output will reach 47,000 tons, which is 2000 tons better than for September. The Trimountain openings, when continued, will afford a connection with the south drifts at Baltic, thereby opening considerable undeveloped territory. The September output of the Baltic mine yielded 674 tons refined copper.——The output of the Champion mine for month of September was 734 tons refined copper.

During September the Atlantic mine, south of Houghton, maintained a yield of twenty pounds of mineral to the ton of rock stamped. The burning of the shaft house reduced the rock supply so that the milling capacity was reduced one-tenth, yet the mine gave a yield of 345 tons 1000 pounds copper, exceeding its best previous record by twenty tons.

The September product of the Wolverine mine at Kearsarge amounted to 522 tons 638 pounds of copper. Operations were interfered with during the month by trouble with logs at the pumping station.

The Septemher product of the Winona mine at Winona amounted to 41 tons of copper. The management is concentrating work on No. 3 shaft, which is being opened up.

The Michigan Smelting Co. has started work on the superstructure of its power house and machine shop near Houghton, says the News. Foundations for the smelter building are completed.

KEWEENAW COUNTY.

The Phœnix mill, near Phœnix, is in full operation with satisfactory results, says the News.

ONTONAGON COUNTY.

A 45-drill compressor is being set up at the Michigan mine at Rockland and is expected to be in commission by the time rock shipments start from the Michigan to the Mass mill.

MISSOURI

JASPER COUNTY.

T. F. Coyne has begun work with a drill prospecting the southwest forty of the Missouri zinc fields tract, near Joplin, says the News-Herald.——The Ishpeming M. Co., operating 2 miles south of Reeds, is planning to build a 100 ton mill ——The Scotia mine on the Missouri zinc fields has started up again after a temporary shutdown on account of recribbing the shaft.

The Lester tract of eighty acres, 2 miles southwest of Carthage, is being developed. Three drill holes have been put down on the west forty acres, and mineral found in all of them at depth ranging from 190 to 210 feet. The drillings from the last hole sunk show both lead and zinc ore. The land is owned by G. B. Allen and B. Parkell of St. Louis.

The Basch-Scogin M. Co. and the Thames M. Co. have consolidated under name of the Midway Con. Co. The Basch-Scogin M. Co. has a sub-lease from the American Z, L. & S. Co. on the Midway tract, near Joplin. The Thames M. Co. has a sub-lease from the Basch-Scogin M. Co. The object is to operate the two mines and mills and pumping plant under ore management. Power for both mills is furnished from the boilers that furnish power for the pump. The consolidated company will put in three steam drills. With the pump they expect to control the water during the wet season.

MONTANA.

BEAVERHEAD COUNTY.

Molybdenum is reported found on the upper lake in Birch creek, 35 miles from Dillon, and locations have been made by A. French, J. McKay et al. of Dillon. It is proposed to organize a company to develop the prospects and build a concentrating plant, says the Dillon Tribune. L. D. Graeter of Dillon is manager.

Manager A. J. Noyes says he is preparing to put in a 10-stamp mill at the Ajax mine, near Dillon. The mill is to be ready for work November 1st. The stamps weigh 1050 pounds each.

GRANITE COUNTY.

Certain litigation having been settled, the Hope M. Co., of St. Louis, Mo., will resume work in the Hope mine, and start up the Hope mill, near Phillipsburg. Men are at work on the mill. By the terms of the settlement Boyd & Ringling relinquish all claim to the ground covered by the Fraction lode, for a consideration of $2800.

JEFFERSON COUNTY.

The Pennsylvania & Montana M. Co. has been incorporated by H. Maskrey and C. White of Mercer, Pa., J. H. and M. S. Hildebrand of Basin, and J. Pearson of Butte, to operate a group of claims in Cataract district near the Eva May mine, near Basin.

SILVER BOW COUNTY.

The Green-Campbell Con. G M Co has been incorporated, with principal place of business in Butte. The following are directors: A. D. Field of Waterbury, Conn.; J. McBarron of Whitehall, Mont., and T. T. Baker, W. F. Davis and E. B. Howell of Butte.

NEVADA.

ELKO COUNTY.

The smelter of the Latham mines at Spruce mountain, near Clover, south of

Wells, will be remodeled and operations resumed, says the Nevada State Journal.

ESMERALDA COUNTY.

Crocker & Salsberry have an option on the Jaggers & McAffee mines, in Tuia Canyon district, 18 miles west of Tokop, southeast of Silver Peak. There are eleven claims in the two groups and a 5-stamp mill is on the property. On the Jaggers the vein has been tapped by a tunnel at a depth of 170 feet from the surface, the vein showing from 6 inches to 3 feet in width. The ore is free milling. There is plenty of wood and water near by, and the mill will be running next week, says A. J. Crocker of Tonopah, who has put twelve men to work on the group.

The first shipment of ore to the smelters from the copper mines north of Sodaville has been made. Assays show 11% copper, $12 in gold and a small percentage of silver.

EUREKA COUNTY.

(Special Correspondence). — Fletcher Bros, while doing assessment work on their Snowbound claim in the Diamond range, near Eureka, report opening up 25 feet of ledge matter, carrying 35% zinc, 8% lead, with traces of silver and gold. They are negotiating with Eastern men for working the prospect.

The mines in Eureka district will continue ore shipments throughout the winter season.——At the Keystone mine, northwest of Eureka, they are running a 700 foot tunnel to tap ledge on contact between shale and quartzite. The Keystone is under $35,000 bond to Salt Lake City, Utah, men, and is taking out ore from shaft, which is reduced in small furnace on the ground.

The Diamond mine is being opened up by new tunnel, and ore shipments running $40 per ton (values carried by lead carbonate) are being made to Salt Lake smelters. ——T. V. Matthews, leasing the Rossi and Siri mine at Hamilton, will put in a table concentrator.——The cyanide mill at Tuscarora, north of Palisade, is working successfully on ore from the dumps.——A new tunnel is being run on the Silver Connor mine, near Eureka.

Eureka, Oct. 6.

LINCOLN COUNTY.

The superintendent of the Quartet mine at Searchlight reports there arrived from the East on the 5th inst. thirty-five strike breakers. Their coming had been reported to the union men at Searchlight, and 100 walked from Searchlight to Manvel, Cal., 26 miles, to intercept the new men. The Eastern men were surrounded, but refused to break their contracts, and appealed to the sheriff for a guard. A sheriff's posse accompanied them. The Quartet mine is working steadily under guard.

The Chiquita and Jumper groups, in the Newberry district, near Searchlight, have been bonded to the Providence Exploration & Development Co. of Providence, R. I., for $35,000, and first payment made.

NYE COUNTY.

The Tonopah-Utica M. Co. has been organized at Salt Lake City, Utah, to develop a group in the Liberty Bell mining district. The officers are E. E. Jones, F. B. Stephens and P. Schulte.

STOREY COUNTY.

The Butters Cyanide Co. will move the four Kinkead crushers in the Best & Belcher mill at Virginia City to the upper floor of the mill, where five are set up, and will add another, making a total of ten, with a daily ore crushing capacity of 100 tons, the pulp from which will be flumed to the company's plant in Six Mile canyon, without passing over the concentrating tables, says the Virginia City Report.

WASHOE COUNTY.

The Springfield-Nevada M. Co.'s mill at Olinghouse is in operation, the water supply having increased.

WHITE PINE COUNTY.

The Giroux Con. M. Co. will build smelting plants, both at Ely and on its properties in the State of Sonora, Mexico. A 500-ton plant will go up at each point, says Manager J. L. Giroux. At their Ely properties sinking is in progress at the Morris, and development work under way in the Giroux.

NEW MEXICO.

The following is the copper production of New Mexico for the past ten years, says the Santa Fe New Mexican:

Year—	Pounds.
1893	280,742
1894	31,884
1895	143,719
1896	2,701,664
1897	701,892
1898	1,592,371
1899	3,935,441
1900	4,169,400
1901	9,629,884
1902	6,614,961

GRANT COUNTY.

The Gold Gulch M. Co., operating the Pactolus and six other claims at Gold Gulch, has development work under way. The shaft of the Pactolus has been unwatered and will be put down another 60 feet. A steam hoist is being placed. The Pactolus has a 20-inch shoot of ore.

At the Superior mine, in Shakespeare district, south of Lordsburg, it is reported work will be resumed.

SOCORRO COUNTY.

Operations are again under way at the Rosedale mine, on the east side of the San Mateo range, near Socorro, under the W. H. Martin Co., after a shutdown of two years. They have a 10 stamp mill and cyanide plant. The mine has a depth of 740 feet, at which point the water level was struck. From the shaft fourteen levels are run north and south. The ore above water level is free milling. There are thirty men at work. It is proposed to enlarge the mill.

TAOS COUNTY.

(Special Correspondence) —J. K. Turner, consulting engineer of the San Cristobal C. Co., operating mines at Arroyo Seco, has started construction of a 200-ton cyanide mill to treat the gold ores that are free of copper. The Pueblo Chieftain M. Co. and the Rio Grande M. Co., for which Turner is also consulting engineer, propose to build cyanide mills of 100 tons capacity.

Arroyo Seco, Oct. 3.

The Mining Reporter, at Tres Piedras, says preparations are being made to work the Lower Flat placer by hydraulicking. M. J. Gill is manager. The company proposes to raise the water from Eureka creek.

OREGON.

BAKER COUNTY.

B. MacDonald of Spokane, Wash., has a bond on two undeveloped prospects near the Cornucopia mines, at Cornucopia, for $2000. The claims are the Champagne Charley and the Companion.

P. Basche of Baker City and O. D. Taylor of The Dalles have taken a working bond and lease on the Connor Creek mine at Connor creek, on Snake river, 10 miles below Huntington. They are making a test run of ore through the 35-stamp mill on the property.

The Baker group of mines in Bald Mountain district, 10 miles above Sumpter, has been bonded for $43,000 for a year to G. G. Eltel et al. The group lies between the headwaters of McCully fork of Powder river and the head of Umpqua gulch.

H. Gillis and E. Hayes are reported to have a bond on the Oneta group of claims near Greenhorn for $3000.

The Fortune M. & S. Co. has put men to work on the Red Lion mine, near Sumpter, says W. Brady, superintendent.

Excavations for the Blue Bird mill, near Sumpter, are being made, says President O. C. Wright. The machinery is on the ground.

Sinking below the 1000-foot level at the Bonanza mine three-compartment shaft, near Sumpter, has been started. When this contract has been completed the Bonanza shaft will have a total depth of 1400 feet.

The Oregon Blue Gravel M. Co. has been organized at Sumpter to work placer ground on the Sumpter townsite. N. C. Richards, E. S. Topping, A. J. Stinson and C. S. Warren are officers, with Topping as manager. They control fifty blocks on Sumpter townsite. In addition to this, they have placer holdings in the John Day valley. Operations will be begun this month.

A. E. Bryan, superintendent of the North American G. M. Co. of Seattle, operating the Porcupine group in Wind Creek district, near Sumpter, says he will put in an air compressor. He has men at work putting up buildings. A road is also being built up Wind creek. To the Porcupine holdings the company has added three claims—the Eldon, Last Dollar and the Oro Fino. Work was started last week on a 1200-foot crosscut, which will cut the five ledges of the group, and will attain a maximum depth of 1000 feet.

DOUGLAS COUNTY.

Operations are being resumed on the Gold Bug mine, on Mount Reuben, southwest of Glendale, says Superintendent W. S. Haskins. Additional machinery has been put in, the lower levels cleaned out and retimbered. The mill will also resume.

The Stocks and Harlow group, near Bohemia, is in operation again. Miners are at work blocking out ore for the winter's run.

D. F. Letsinger, interested with N. F. Wyatt in five claims on the ridge near Cottage Grove, reports development progressing, and 1000 feet of tunnel have been driven. The Golden Rule claim shows width of ledge 18 feet. Ledge on Rambler No. 2 gave surface assay of $6. The Puzzle claim is the one on which the main tunnel is being driven, and this is in 170 feet, and will tap Rambler No. 2 ledge at depth of 150 feet. A millsite has been located, with abundance of water and wood.

GRANT COUNTY.

Work will be resumed at the Big Four mine in Red Boy district, near Granite, next week, says W. C. Rutter of Seattle, Wash., president and general manager of the Kittanning M. Co. They propose to drive a 1000-foot crosscut tunnel which will give a depth of 700 feet on the vein. The Big Four is between the Red Boy and the Cougar, on the same vein system. There is a 300-foot crosscut to the main lead with 300 feet of drifts and two shafts of 40 and 60 feet on the vein. There are three veins on the location, the main one of which averages 15 feet wide.

JACKSON COUNTY.

F. Kalh of Amsterdam, N Y, and treasurer of the New York & Western M. Co, reports making final payment on the Oregon Bell mine on Forest creek, 7 miles west of Jacksonville, which his company bought for $30,000. W. C. Kitto is superintendent. It is intended this winter to put in a quartz mill, the power to be electrical.

JOSEPHINE COUNTY.

The Waratah Minerals Co, a department of the Welshach Gas Fitting Co. of Philadelphia, Pa, is preparing to put in a platinum mining plant at the Old Channel mines on Galice Creek, near Grant's Pass, says J. R. Harvey, manager of the Old Channel mines. W. F. Smith, manager of the Waratah Minerals Co., has begun putting in the machinery. These placers will hereafter be operated under lease by J. R Harvey, and will be known as "The Royal Group Mines." Platinum occurs in these placers both free and with rhodium, osmium, iridium and palladium. The saving of the platinum concentrates does not interfere with the gold mining operations The sands and concentrates are drawn from the sluice boxes through a ½ inch grizzly, then spread out over a broad riffle table to catch the flour gold, and later drawn through a ¼-inch screen and spread over cocoa mat riffles, where the concentrates settle and are gathered up. This system of undercurrents and riffles is so arranged that a part of them can be cleaned every day during the mining season. The concentrates are finally milled and run over a concentrating table, and they are valued at $160 a ton in gold and platinum, says the Telegram.

MALHEUR COUNTY.

Manager J. F. Meikle of the Black Eagle M. Co., near Malheur City, reports that they propose to increase their milling plant at the Black Eagle mine, says the Democrat. They have twenty stamps dropping. Either water or electric power will be added.

MORROW COUNTY.

Tunnel No. 5 of the Willow Creek coal mine, near Heppner, is producing. There are twenty men at work and several teams are on the road hauling the coal and placing it on the local market. Arrangements are being made to ship to Pendleton and other points on the main line of the O. R. & N.

SOUTH DAKOTA.

LAWRENCE COUNTY.

W. T. Beane of Deadwood, manager of the Golden Empire M. Co., in western Lawrence county, says he is putting on more men and will increase development work. He has thirty men, mostly on the Eureka and Troy claims, where former work has shown promising vein matter. The Eureka is over the line in Wyoming.

The Columbus M. Co., near Deadwood, has decided to build a milling plant on Sawpit gulch, a short distance above the main shaft. It will be necessary to pump water a considerable distance. The plant will use a combination of amalgamating and cyaniding processes—crushing with stamps in a solution of cyanide of potassium, leaching and finally amalgamating, says President Mayham. The mill will contain 240 stamps.

The Rex M. Co. is putting in a heavier pump at its shaft at Kirk, south of Lead City. The company has had considerable trouble with water. The pump has a capacity of 1800 gallons a minute.——The Lucky Strike G. M. Co. has replaced its shaft house which was destroyed by fire a few weeks ago, and work has been resumed with a temporary shaft house and whim until the permanent structure can be built and a steam hoist put in. The Lucky Strike has its own sawmill.

TEXAS.

HARDIN COUNTY.

The seventy-five producing wells in the oil field at Sour Lake are said to have a total capacity of 100,000 barrels of oil daily. There are 100 new wells drilling. Present facilities permit of moving but 50,000 barrels daily.

UTAH.

September in the ore and bullion market closed on settlements aggregating $1,956,912, as compared with $1,658,800 for the same month in 1902, says the Salt Lake Tribune. During the same period the copper producers, independent of the Murray plant, operated by the American S. & R. Co., marketed bullion that brought $835,059. While approximately 100,000 tons of ore was reduced at the valley furnaces during the month, the capacity of hut one was on trial, and the requirements of October are expected to exceed this total. The advance in silver and other conditions favorable to production are doing more to stimulate the efforts of the producer than has any other incentive during the past two years.—— The output of copper bullion carrying gold and silver during the month attained a total of 3,669,513 pounds, of a value exceeding $1,000,000, with the valley furnaces not at their full capacity. The output was distributed as follows:

	Pounds.
Bingham Con	720,263
Highland Boy	1,203,720
United States	852 530
Total	2,786 513
American S. & R	883,000
Grand total	3 669,513

During the previous month the output of copper bullion from the same sources amounted to 2,573.580 pounds, a gain for September of over 200,000 pounds at the independent smelters.

GRAND COUNTY.

The Clara C. Co. is planning to put in a copper leaching plant at its property, 20 miles south of Thompson's Springs. W. C. Tracy of Alta is superintendent.

JUAB COUNTY.

The management of the Carisa C. & G. M Co. during its past fiscal year reports having marketed 3239 tons of ore, of which 839 was forwarded from the dump for "trial" purposes, from which was smelted 660 820 pounds of copper, 8260 ounces of silver and 445 ounces of gold, of total value $59,477.63. In addition to this the report of the managing director and vice-president, H. S. Joseph, showed that during the same period 4315 feet of development work was done with satisfactory results. On the 700-foot level 4 feet of ore, averaging 15% copper, 12 ounces silver and $2 gold per ton, has been opened up, while on the 100-foot level and 400 feet below the surface a body of copper oxide was cut, shipments from which give an average of 18% copper. On the 700-foot level one important piece of work was completion of connection of workings with the Sioux-Ajax tunnel, giving an easy mode of egress and good ventilation; also means of transportation of ore direct into railway cars. An important factor in the development work is the leasing system, says Manager Joseph. There are fourteen separate leases in operation in the old surface tunnels, old stopes and shallow workings. These lessees mine considerable ore from bodies too small to be profitably worked by the company.

The shipments from Tintic district for month of September amounted to 499 cars, showing an increase over August. The shippers and output during September were: Centennial Eureka, 112 cars; Grand Central, 107; Carisa, 10; Mammoth, 40; Victor, 14; Black Jack (iron), 15; Dragon (iron), 55; Bullion-Beck, 27; Gemini, 52; Yankee Con., 18; and 14 others, a total of 50 cars. Seven cars of concentrates were shipped from the May Day jigs.

Smoke from an unlocated fire in the abandoned workings of either the Eureka Hill or the Bullion-Beck mine is reported to have put a stop to all underground work in those mines, and also the mines in the Tintic district. Miners were driven out of the Centennial-Eureka and the Gemini mines on the 6th inst. Several hundred miners are idle. Nine men were overcome by the smoke in the Centennial-Eureka, but were rescued.

Work has been resumed at the Joe Bowers mine near Eureka, with W. Conley as superintendent. As soon as the shaft is unwatered a crosscut will be run to the vein. The ores carry galena with silver.

The Utah M. Co, at Fish Springs, during the month of September shipped four carloads of ore (100 tons) which netted $9478. The ores carry lead and silver.

The Neho M. Co., of Salt Lake City, has been incorporated by J. J. Sears and F. H. Hyde. The company owns a group of claims in Mt. Neho district.

PIUTE COUNTY.

Final payment has been made on the Elephant group, near Marysvale, by the Gold D. Co., of Salt Lake City. They

also have taken an option on the L. & N. (or Lammersdorf) group and have absorbed the Silver King and Golden Queen groups. These mines are near the Annie Laurie mines and mill. P. A. H. Franklin is manager and D. E. Rohlfing consulting engineer. On the Elephant group, the tunnel of which is in 260 feet, a contract for 500 feet of more work bas been given, although its destination is 2400 feet from its portal, where it will connect with the main Franklin tunnel, which is approaching from the south and which will cut through the gold-bearing zone 8000 feet in length. At the same time on tbe strike of the vein the Log Cabin tunnel is in 300 feet and headed for the Sunshine. Supplies are being sent in, to continue operations this winter.

SALT LAKE COUNTY.

An average of twenty-five 50-ton cars of ore are being shipped from Bingham daily, says the Bingham Bulletin. The amount is expected to be increased this month, when the Boston Con. begins output, and the Yampa changes from wagon hauling to the Copper Belt railroad.

A branch of the Copper Belt road will be run to the Boston Con. C. Co.'s upper tunnel in Muddy gulch, near Bingham.

UTAH COUNTY.

The Park City Co-operative M. & D. Co., of Park City, has been incorporated by M. J. Daily, J. E. Hartman, W. H. West, N. B. Dresser and W. Byrne. The company owns the Iron Master Nos. 1 and 2 lode claims, in Utah county. W. H West is manager.

The Garden City M. Co. has been incorporated at Provo City to operate the Monarch and the Monarch Nos. 1 to 6 inclusive, in Rock canyon, near Provo City. The following are directors: J., S. H., J. W , G. H. and E. Buckley. They are drifting on the ore body.

The Sygnet M. Co., which has a group of four claims in American Fork canyon, near American Fork, has been incorporated by C. E. Steward, M. C. Moyer, A. D. Beaman and C. I. Berger. The property is developed by a tunnel 140 feet in length, which has struck ore.

WASATCH COUNTY.

The Gold Dust M. & M. Co., of Heber City, has been incorporated by J. R. Murdoch, W. Van Wagener and J. C. Jensen. The company owns four claims in Snake Creek district.

WASHINGTON COUNTY.

Manager C. H. Doolittle of the Dixie mine and smelter, near St. George, says the smelter is treating an average of fifty tons of ore daily, producing 12,000 tons of copper bullion.

WASHINGTON.

FERRY COUNTY.

Work was resumed at the Mountain Lion mine, near Republic, last week, after a shut down of two years. Machine drills will be put in to stope ore. The pumps are unwatering the shaft.

WYOMING.

CARBON COUNTY.

Blister copper ingots are being shipped to New York from the North American C. Co.'s plant at Grand Encampment. The bullion is hauled 40 miles to the railroad.

UINTA COUNTY.

The American Con. Oil Co. at Spring Valley has lumber on the ground to build seven rigs, as they expect to complete that number of wells by December 1st. They have also a rig going up on a section outside what is considered the proven field.

FOREIGN.

AFRICA.

The total gold output of companies making returns to the Rhodesian Chamber of Mines at Bulawayo for month of August amounts to 19,187 ounces, a decrease of 4384 ounces as compared with July, and an increase of 3440 ounces as compared with the corresponding period of 1902 The monthly returns for 1902, and for 1903 to Sept. 1 have been as follows:

	1903. Ounces.	1902. Ounces.
January	16,245	15,955
February	17 090	13,204
March	19,626	16,891
April	20,727	17,559
May	22,137	19,698
June	22,166	15,842
July	23,571	15,226
August	19,187	15,747
September	.....	15.164
October	.....	16,849
November	.....	15,923
December	.....	16,210
Totals	160,749	194,268

AUSTRALIA.

WESTERN AUSTRALIA.

The annual report of the Lady Shenton G. M. Ltd., near Kalgoorlie, J. W. Rayfield, mine manager, shows a reduction of 2s. 5d. in the cost per ton for mining, 2s. 6d. for milling, 8.3d. for cyaniding, and also reductions in cost of recovering and treating concentrates. Although the tonnage of ore mined and treated was larger and the general operations of the company more extensive, the aggregate expenditure is below that for the previous period. The final quarter of the year was affected by the heavy general increase in wages awarded by the Arbitration Court to employes on this and other mines throughout the district. To minimize the extra expense thus entailed one-man machine drills are being introduced at the company's mine, and those already obtained have resulted in saving of labor and consequent reduction in amount of wages paid per month. In addition to stoping and general underground operations, 977 feet of sinking and raising, 2020 feet of crosscutting and driving and 618 feet of boring, beside costeaning, have been done.

BRITISH COLUMBIA.

BOUNDARY DISTRICT.

The Hesperus group on Hardy mountain, 4 miles from Grand Forks, has begun shipments of ore. Smelter returns give values, principally in copper, of $16 per ton. The properties are owned by the Hesperus G. & C. M , Ltd., of Chicago, Ill.

R. Plewman, manager of the Winnipeg mine, at Wellington, says the tramway that was destroyed by fire has been replaced, also the gallows-frame. Ore is being extracted from the 100-foot and the 50 foot levels.

CARIBOO DISTRICT.

So much rain, in amount not exceeded since 1862, has been falling in Cariboo lately, that hydraulic mines, which made light returns early in the season, and had to close down as a result of the shortage of water in the mountain streams, have resumed operations, says the News-Advertiser. However, all the hydraulic mining must close down for winter in a few weeks.

CASSIAR DISTRICT.

The gold output of Atlin's section totals $1,500,000 this season, says J. T. Wilkinson of Vancouver.

LILLOOET DISTRICT.

The dredger for the Iowa Lillooet G. M. Co. has been floated and the machinery is being set up.

NELSON DISTRICT.

P. E. Sharpless and H. L. Gilmour of Pennsylvania have organized the Morning Star M. & M. Co. to work the Star mine, on Eagle creek, near Nelson. Manager Gilmour will remain in Nelson. A stamp mill will be built at the mine. Men have been started on preliminary work. A wagon road will be built from the Poorman-Granite mine to the millsite, and it is expected a tramway will connect the mine with the same.

SLOCAN DISTRICT.

The Wakefield mine, near Silverton, has its concentrator running and has forty men on its payroll. It is turning out two products—a lead concentrate (65% lead and 100 ounces silver) and a zinc concentrate (45% zinc and seventy ounces silver) to the ton. There are 100 tons of zinc concentrates on the wharf ready for shipment. The management is holding it for better terms of treatment. The lead product is shipped to the local smelters as fast as produced ——The Bosun mine is keeping up its output of 120 tons per month and works thirty men.

MEXICO.

AGUAS CALIENTES.

Two 300-ton furnaces will be added to the American S. & R. Co.'s plant at Aguas Callentes.

DURANGO.

The San Acacia M. Co. has finished construction of a line of railway from a point on the Mexican Central to the San Acacia mines, in the district of San Juan de Guadalupe.

OAXACA.

The Natividad M. Co. of Oaxaca is preparing to put in an electric plant to give at least 350 H. P. from the present water supply, which will double the present capacity, says E. Girault, consulting engineer.

SONORA.

At La Bufa, in Sahauripa district, the concentrating and smelting machinery of the Bufa M. & R. Co. is expected to be ready to start up Nov. 1.

The Cananea Herald says tbe Yaqui River C. Co. has closed down all work at its mines at Campo Santo Nino. No reason is given for the shut down.

PHILIPPINE ISLANDS.

Though several of the islands of the archipelago are considered to have extensive mineral deposits, says the Manila Bulletin, the inadequate transportation facilities and the obstacles imposed upon the prospector by heat of the lowlands and by dense tropical vegetation (which usually covers and to great extent conceals the rock formations) have restricted systematic development up to the present time. There have been found in Benguet and Lepanto small bodies of rich gold ore, but the veins are narrow and irregular. Quantities of low grade, free milling ores have been found, but they are for the most part in the interior; and their successful development involves considerable outlay in building roads and putting in machinery.

SPAIN.

The Espana Economica y Financiera says Spain's exports of gold and silver for the first six months of 1903, as compared with same period of 1901 and 1902, was:

	1901.	1902.	1903.
Gold, ingots and coin...$	19,300	$ 28,950	$ 5,790
Silver, ingots and coin. .	2 659,540	928,330	2,171,250
Total.....	$2,678,840	$957,280	$2,177,040

PERSONAL.

J. L. BUTLER of Belmont, Nev., is in San Francisco, Cal.

J. T. ARUNDEL of London, England, is in San Francisco, Cal.

S. I. HALLET of Colorado is examining mining property in Idaho.

H. ALTMAN of Salt Lake City, Utah, is in Montana on mining business.

H. T. BURES, a mining engineer of London, Eng., is in San Francisco, Cal.

C. H. WILDMAN, formerly of Cottage Grove, Or., is now at Placerville, Cal.

F. FARISH AND C. W. PURINGTON have left Denver, Colo , for Sonora, Mexico.

D. CRAELIUS has resigned his position with C. A. Luckhardt & Co , San Francisco, Cal.

E F. FLOYD of San Andreas, Calaveras county, Cal., is in San Francisco, Cal , on mining business.

H. K. WHEELER of Los Angeles, Cal , is examining a copper property at Encampment, Wyo.

W. S. HASKINS is superintendent of the Gold Bug mine on Mt. Rueben, southwest of Glendale, Or.

P. KARTSCHOKE, interested in mines near Nevada City, Cal., is in San Francisco, Cal., on business.

W. E. EVERSON of Elk Grove, Cal., is superintendent of the El Dorado C. M. Co , at Georgetown, Cal.

T. H. TRACY is now general superintendent of the North American Copper Co., Encampment, Wyo.

C. A. ROSS, president of the Standard copper mine, near Clifton, Ariz , is at Clifton from London, England.

W. C. RALSTON has returned to California from an inspection of Idaho and Oregon gold mining properties.

J. B. WARNER, manager of the Silver Ledge mill, Red Mountain, Colo , has returned there from Denver, Colo.

E. D. BOYLE, manager of the North Rapidan M. Co , Como. Nev., has returned from a visit to California.

G. E COLLINS has returned to Denver, Colo., from an extended trip to the Colorado river, near Kingman, A. T.

W. SHARWOOD, superintendent of the Soulsby mine, at Soulsbyville, Tuolumne Co., Cal., is in San Francisco, Cal.

R W. RODDA left Seattle, Wash., the 1st for southeastern Alaska on mining business, and will return Nov. 1st.

A. B. CALL is in Guanajuato, Mexico, examining mining properties for W. C. Bennett & Co. of Springfield, Mass.

F. E. ABERCROMBIE of the Boston Con. and other Bingham, Utah, mines, is in Salt Lake City, Utah, from the East.

MANAGER J. F. MEIKLE of the Black Eagle M. Co., near Malheur, Or., is in Houghton, Mich , on company business.

SUPERINTENDENT S. TARBET has been appointed manager of the Estella mine, near Milford, Utah, vice Penrose, deceased.

SUPERINTENDENT A. B. HODGES, of the Granby smelter, returned to Grand Forks, B. C., last week from a trip to California.

G. W. OTTERSON, superintendent of the Windfall hydrulic mines at Windfall, near Juneau, Alaska, is visiting in Placer county, Cal.

C. D. GALVIN, who is interested in mining properties in the United States of Colombia, South America, has returned to California.

HARRY M. ROCHE has resigned as assayer and metallurgist for the Fannie Marie G. M. Co. of Glencoe, Cal., and is in Oakland, Cal.

G. A. EASTON is mine superintendent for the Gold Gulch M. Co., operating the Pactolus group at Gold Gulch, Grant county, N. M.

M. J. LIDSTONE, of San Francisco, Cal., has gone to Shasta county, Cal., to rebuild the mill at the Niagara mine, near French Gulch.

J. F. BRANDES accompanies Count Ward of London on mining business to Salt Lake City, Utah. The latter has returned to London.

FRANKLIN LEONARD, president of the Comstock Tunnel Co., returned to Sutro, Nev., this week from a business trip to San Francisco, Cal.

W. A. CLARK of Butte, Mont., principal owner of the United Verde copper mines at Jerome, Ariz , is visiting in southern California.

L. MORRIS, president of tbe United Bingham M. Co. and Avondale of Park City, Utah, is in Salt Lake City, Utah, from Cincinnati, Ohio.

A. J. MCMILLAN, managing director of the Le Roi M. Co., Ltd., returned to Rossland, B. C , last week, after an absence since May in England.

MANAGER ROCKWELL, of the Minnie Moore and Idaho Con. mine companies, near Hailey, Blaine county, Idaho, is in Chicago, Ill., on business.

G. Z EDWARDS, who has been connected with the Con. Mercur G. M. Co., at Mercur, Utah, since 1894, has resigned as general superintendent.

W. J. ADAMS has returned to San Francisco, Cal., from a month's visit on mining business at the copper mines at Copperopolis, Calaveras county, Cal.

M. L REQUA, vice-president of the Pacific Wire & Steel Co. of San Francisco, Cal., has returned to San Francisco from New York and other Eastern cities.

SUPERINTENDENT DENTON of tbe Baltic and Trimountain copper mines, near Houghton, Mich., has resigned as assistant superintendent of the Atlantic mine.

J. GORDON is general superintendent for W. E. Hurd, of Portland, Or , on the Granite Boulder group and Smuggler mines, near Greenhorn, Baker county, Or.

T. COLE, a former superintendent of the Butler-Liberal mines at Bingham, Utah, has accepted a similar position at the Silver Shield mine, in the same camp.

E. MCCORMICK is superintendent of the American Cornfield M Co , near Joplin, Mo., vice W. R. Crandall, who will give his entire time to the Missouri Zinc Fields Co.

PRESIDENT J. E. BAMBERGER of the Daly West mine, Park City, Utah, returned to Salt Lake City, Utah, last week from inspecting his oil interests at Los Angeles, Cal.

W. C. TRACY, recently superintendent of the Wheeler & Wilson mine, near Alta, Utah, is superintendent of the Clara C. Co , south of Thompson's Springs, Grand county, Utah.

W. H. BRAY, superintendent of the Posey & Huron mines near Nevada City, Cal , has been elected vice-president and manager of the consolidation of the Red Cross M. Co. and the Huron M. Co.

R. N. DIGGLES, assayer for the Melones M. Co., has retured to Melones, Calaveras county, Cal., from a trip to Siskiyou county and San Francisco, Cal., on mining business for the H. J. Diggles Estate Co.

G. A. BAST, of Springfield, Mo., is superintendent of the Boston-Get There mine, near Joplin, Mo., vice T. Chapman, who will take charge of the Chapman mine, near Prosperity. Chapman is also superintendent of the Mt. Ararat M. Co.

J. K. TURNER, consulting engineer of the San Cristobal C. Co. at Arroyo Seco, Taos county, N. M., has been appointed consulting engineer for the Rio Grande M. Co. and the Pueblo Chieftain M. Co , both operating in northern New Mexico. He returned last week from a business trip to New York.

Commercial Paragraphs.

THE Western Supply Co., manufacturers' agents, bave opened offices at 578 Mission St., San Francisco, A. Norman Dempsey, manager.

THE Brown Corliss Engine Co., Corliss, Wis., is in receipt of an order from tbe Lorain Steel Co. of Lorain, O., for a 30 and 60x60-inch cross compound Corliss engine.

THE Trenton Iron Co, tbrough tbeir Denver, Colo., agent, R. D. Seymour, have an order for 1000 feet of tramway at the new mill of Lundberg, Dorr & Wilson, to tbe mine at Terry, S. D.

THE Bouse Hydraulic Machinery Co. bas opened a business at 503 Mission street, San Francisco, Cal., witb a complete line of bydraulic and mining macbinery. Estimates or information along these lines will be furnisbed promptly upon application.

L. P. HAMMOND, manager of tbe Denver branch of the Crocker-Wheeler Co, Ampere, N. J., reports among recent sales made by his office: Two 15 K. W. generators; two special motors to develop 90 H. P. at 150 revolutions per minute and standard motors, aggregating 340 H. P., to Portland Cement Co; two 7½ H. P. motors and one 15 H. P. motor to Nock & Garside; to Copper Queen Con. M. Co, Bisbee, one 12 H. P. electric hoist; United Globe mine, one 12 H. P. electric boist; one 8½ K W. dynamo to Fairbanks, Morse & Co; to Allis-Chalmers Co. one 23 K. W. dynamo and switcbboard; one 9 K. W. direct connected dynamo; to Eaton Sugar Co one 30 K W. direct connected dynamo, with 9½x10 Erie ball engine; one 15 H P. motor and centrifugal pump; to Victor Fuel Co. one 14 H. P. specially compounded motor direct connection to box car loader; to Mine & Smelter Supply Co. one 25 H. P. motor; to Locke Drill Co. two 4½ K W. dynamos for electric drills.

THE Fred. M. Prescott Steam Pump Co., Milwaukee, Wis., reports the following among their recent shipments of pumping machinery: Oce triple expansion mine pumping engine to the Buffalo & Susquehanna Iron Co., Hibbing, Minn., and one triple expansion mine pumping engine to the Iroquois Iron Co., Hibbing, Minn., each with a capacity of 1200 gallons per minute; part of a large order, which includes two triple expansion pumping engines of large capacity, to the El Oro Railway & Mining Co., Ltd., El Oro, Mex; a deep mine triple expansion pumping engine to the Penn Iron Mining Co., Vulcan, Mich., with a capacity of 1000 gallons per minute against a 1200-foot bead; a triple expansion high service pumping engine, with a capacity of 1,500,000 gallons per day against 175 pounds water pressure, to the New Castle, Pa, Water Works; a compound and condensing mine pumping engine, with a capacity of 500 gallons per minute against 1200-foot head, to the Calumet & Arizona Mining Co, Bisbee, Ariz Among recent orders, they report having hooked tbe following: One vertical heam condenser for tbe Denver Tramway Power Co., Denver, Colo., with a capacity of 70,000 pounds of steam per hour; two triple expansion mine pumping engines for the Mesabe Iron Range in Minnesota, each with capacity of 2000 gallons per minute; one triple expansion pumping engine for the East St. Louis, Ill., Water Works, capacity 6,000,000 U. S. gallons water per day.

Catalogues Received.

The Temple Pump Co. note their 50th year hy a 1903 description of their gasoline engine, of which three sectional views are given, beside additional detailed illustration and description of the "Master Workman" gas engine, which they make and furnish from Meagher and 15th Sts., Chicago, Ill.

"Balances and Weights of Precision," finely illustrated, from Christian Becker, whose factory is at New Rochelle, N. Y., his New York City office being at No. 7 Malden Lane. These goods are guaranteed by the maker, and are for assaying, analytical and scientific uses, where accuracy is required, each instrument heing described and the price plainly stated.

"Jeffrey Power Drills for Rock and Coal" gives a clear cut description of the Jeffrey Mfg. Co.'s new line of coal and rock drills. The Badger, rotary, electric, air-power, pin, and hand-power drills are illustrated in detail. Other of the Jeffrey Co.'s manufactures, such as the water elevator, coal mining machines, electric locomotives, conveyors, screening plants and labor-saving appliances are given attention. This fine trade treatise is issued by tbe Jeffrey Manufacturing Co., Columbus, Ohio.

Obituary.

PATRICK RYAN, a former mining man, stock raiser and member of tbe first Legislature of Montana, died at San Bernardino, Cal., Oct. 5th.

S. HASKINS, a pioneer miner of Calaveras county, Cal, and one of the original owners of the Champion mine at West Point, died Sept. 30th. Deceased was a native of New York, aged 71 years, and leaves a widow and a son.

HUGH ASBURY, a pioneer miner of Baker county, Or., and wbo is said to have given the town of Sumpter its name, died at Baker City, Sept. 28th, from paralysis. Ashury was one of a party of West Virginians who, in 1862, discovered the placer diggings where Sumpter now stands. The log cabin which they built after panning the sands and gravel of McCullay's Fork of Powder river and finding they contained gold, still stands, 1 mile west of Sumpter.

Books Received.

"Data Concerning Platinum" is a dainty little volume from the Baker Platinum Works, Newark, N. J, with illustrated description of articles made from platinum and data of general interest to anyone having anything to do with that precious metal. Accompanying it, as a separate leaflet, are stated sizes of platinum rivets for use as contact points in telephones and other electrical apparatus. Baker & Co. are authority on platinum and its uses, and their publications thereon are of standard value.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR WEEK ENDING SEPT 29, 1903

739,973.—LAMP MOUNTING—S. H. Anderson, Los Angeles, Cal.
740,080.—BASEMENT DOOR—Berry & Gale, Los Angeles, Cal.
740,082.—OIL BURNER—G. W. Boyd, S F.
739,981.—RAILWAY—W. P. Bryant, Corona, Cal.
739,827.—TRICK BASS VIOL—G. H. Britzbach, S. F
739,883.—THRESHER FEEDER — F. A. Colwell, Oakesdale, Wash.
730,990.—BED AND TABLE—J. F. Cook, Oxnard, Cal.
740,006.—ARTIFICIAL TEETH—C. A. Davis, Pasadena, Cal.
740,104.—IRONING BOARD—I. M. Dillman, Oakland, Cal.
740,107.—TOOL HOLDER—G. H. Dworzek, S. F.
740,008.—CAN HEADER—J. A. Gray, S. F.
740,272.—TROLLEY POLE—C. Harter, South Pasadena, Cal.
740,130.—WIRE GRIP — H. D. Hazard, Yakima, Wash.
740,015.—WINDOW—E. Hipolito, Los Angeles, Cal.
740,019.—HORSESHOEING STAND—J. C. Hutton, Jr., Waterloo, Or.
740,145.—SAFETY GAS PIPE—F. W. Krohn, S. F.
740,026.—RATCHET SWIVEL—H. H. Krohn, Los Angeles, Cal.
740,027.—CONCENTRATOR—M. S Leve, Fruitvale, Cal.
739,923.—OIL BURNER—C. Petrini, Bakersfield, Cal.
740,318.—HAY LOADER—Romwall & Pitt, Lovelock, Nev.
740,048 —VEHICLE GEAR—C. O. Sohmand, Winlock, Wash.
740 057.—VOTING MACHINE—St. Louis & Jackson, Colusa, Cal.
740,058.—VOTING MACHINE—St. Louis & Jackson, Colusa, Cal.
740,059.—VOTING MACHINE—St Louis & Jackson, Colusa, Cal
740,064.—TIRE HEATER—F. Thomson, Santa Ana, Cal.
740,205.—TROLLEY CROSSING—O. Vanorman, Los Angeles, Cal.
739,953 —FRUIT PEELER—C. J. Vernon, Los Angelee, Cal.

Notice of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

SAFETY GAS SUPPLY PIPE ATTACHMENT —No. 740,145. Sept. 29, 1903. F. W. Krohn, San Francisco, Cal. This invention relates to improvements in means for preventing gas escaping from the jet in case the gas is turned off at the meter or its flow through the mains otherwise interrupted while the jet cock is still open and then turned on again before the jet cock has been closed. The object of the invention is to provide a safety device of simple construction which is adapted to be interposed in the supply pipe between the meter and the gas jet whereby the flow of gas through the pipe will be controlled by the gas pressure.

HYDROCARBON BURNER —No. 740,082. Sept. 29, 1903. G. W. Boyd, San Francisco, Cal.; one-half assigned to J. O. Low and L. M Bourhand of same place. This invention relates to improvements in oil burners in which the steam necessary for effecting volatilization and combustion is generated by and within the burner itself. Its object is to provide a simple practicable burner adapted for use in stoves or furnaces, and particularly wherever a source of steam supply is not generally available Experience has shown this burner to be well adapted for use in continuously operating furnaces, and once the necessary amount of oil and water is ascertained and regulated by proper valves the burner practically requires no further attention.

Latest Market Reports.

SAN FRANCISCO, October 9, 1903.

METALS.

SILVER.—Per oz., Troy: London, 27⅞d (standard ounce, 925 fine); New York, bar silver, 59⅝c, refined (1000 fine); San Francisco, 59½c; Mexican dollars, 47c @49c; San Francisco, 45½c New York.

COPPER. — New York: Standard, $13.25; Lake, 1 to 3 casks, $13.25; Electrolytic, 1 to 3 casks, $13.25; Casting, 1 to 3 casks, $12.87½; San Francisco: $15.00. Mill copper plates, $17.00; bars, 18@24c. London: £54 17s 6d spot per ton.

A slight falling off is noticeable in copper, but these small fluctuations are always a feature of the market, at whatever price prevails. One authority thus expresses the situation: "The copper business, like every other business, must necessarily feel the ups and downs of the general conditions. People just now are in a somewhat depressed frame of mind and inclined to await developments. Under the circumstances it is only natural that the copper market should be very slow, that consumers should hold off on their orders until the outlook is clear, and that prices should show a slightly weakening tendency. As to the future, it still, as we regard it, has a reasonably satisfactory outlook. In due season the demand for copper is likely to show itself as other lines of industry shall improve, and it needs only this stimulus to advance prices to a higher level. Inquiries for copper at the present time are light; but, on the other hand, we, in common with other lines of business producers, are not making much of an effort to sell the metal. The time for a change for the better in the demand is, however, not far off."

LEAD.—New York, $4.50; Salt Lake City, $3.50; St. Louis, $4.00; San Francisco $4.50, carload lots; 4¾c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5¾c; pig, $4.75. London: £11 6s 3d per long ton.

SPELTER. — New York, $6.00; St, Louis, $5.00; London, £20 10s per ton; San Francisco, ton lots, 6½c; 100-lb lots, 7c.

In the United States for the year 1902 the total output of lead for the entire country was 220,000 short tons, and of zinc 156,297 short tons. The lead production was about the same as in 1901, but there was an increase of about 10% in zinc production.

TIN.—New York, pig, $26.00@26 35; San Francisco, ton lots, 28c; 500 lbs., 28½c; 200 lbs., 29½c; less, 30c; bar tin, ℔ lb, 30c @32c. London, £114 spot.

PLATINUM.—San Francisco, crude, $18.00 ℔ oz.; New York, ingot, $19.00 per Troy oz. Platinum ware, 75@80c per gram.

QUICKSILVER.—New York, $46.00@47.00; large lots; London, £8 7s 6d; San Francisco, local, $43@44 ℔ flask of 76½ lbs.; Denver, $49.50. Export, $42.50@43.00.

BABBITT METAL.— San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

SOLDER. — Half-and-half, 100-lb. lots 18.75c; San Francisco, Plumbers', 100-lb. lots, 15.50c.

ZINC.—Metallic, chemically pure, ℔ lb., 50c; dust, ℔ lb., 10c; sulphate, ℔ lb., .04c.

NICKEL.—New York, 50@60c ℔ lb.; ton lots, 45@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 34c.

ANTIMONY.—New York, Cookson's, 7½c; Hallett's, 6¾c; San Francisco, 1000-lb. lots, 8c; 300 to 500 lbs., 8½c; 100-lb. lots, 10½c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, $16.85 @17.35; gray forge, $15 35; San Francisco, bar, 3c ℔ lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $27 00@29.00; open hearth billets, $28.00 @30 00; San Francisco, bar, 7c to 12c per lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer	$17.50@18.50
Foundry Northern 1	17.50@17.75
Northern 2	17.00@17.25
Northern 3	16.50@16.75
Southern 1	16.35@ ——
Southern 2	15.85@ ——
Southern 3	15.35@ ——
Forge	14.85@ ——
Charcoal	20.50@21.00
Billets, Bessemer	28.00@29.00
Bars, Iron	1.55@ ——
Bars, steel	1.75@ 1.80
Ralls, standard	28.00@30.00
Ralls, light	34.00@40.00
Plates, boiler	1.90@ 2.00
Tank	1.75@ 1.80
Sheets, 26 store	2.90@ 3.00
No. 27	2.90@ 3.00
No. 28	3.00@ 3.10
Angles	1.75@ ——
Beams	1.75@ ——
Tees	1.80@ ——
Zees	1.75@ ——
Channels	1.75@ ——
Steel melting scrap	14.00@15.00
Relaying ralls	26.00@28 00
Dealers forge	12.50@13.50
No. 1 railroad wrought	14.50@15.00
No. 1 cast, net ton	13.50@14.50
Iron ralls	18.00@19.00
Car wheels	19.00@20.00
Cast borings	5.50@ 6.50
Turnings	10.50@11.50

LUMBER.—(Retail): Pine, ordinary sizes, $24.00@25.00; extra sizes higher; redwood, $28.00@30.00; lath, 4 feet, $4.50 @5.00; pickets, $21.00; shingles, $2.50 for No. 1 and $2.25 for No. 2; shakes, $13.50 for split and $15.00 for sawed; rustic, $28.00 @35.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, $3.35; Cut, $3.55; 10d to 16d, Wire, $3.45; Cut, $3.35; 8d, Wire, $3.50; Cut, $3.50; 6d and 7d, Wire, $3.60; Cut, $3.60; 4d and 5d, Wire, $3.70; Cut, $3.70; 3d, Wire, $3.85; Cut, $3.85; 2d, Wire, $4.10; Cut, $4.10. Special rates for carload lots.

LIME.—Santa Cruz, $2.35; Roche Harbor, $2.35 per bbl.

CEMENT.—Imported, $2 50@2.75 ℔ bbl; California carload lots, $2 25 f. o. b. at works; small lots, $2 50 ℔ bbl. in sacks, 4 sacks to bbl.

GENERAL SUPPLIES.

COAL. — San Francisco, coast, yard prices: Wellington, $8.00; Seattle, $6.50; Coos Bay, $5.50; Southfield, $8.00. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania, bd., $14.00; Scotch, $8; Cumberland, $13; Cannel, $8 50; Welsh Anthracite, $13.00; Rock Springs, $8.50, long ton; Colorado Anthracite, $14.00. Coke, $10.50 per ton in bulk, $13 in sacks; Sunnyside, $8.50, long ton.

POWDER.—F. o. b. San Francisco: No 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s, 11c ℔ set; 14 oz., 40s., 10c.

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BONE ASH.—Extra No. 1, 5@6c per lb. No. 1, 4@5c.

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RED LEAD.—500 lbs. and over at one purchase, per lb., 6½c; less than 500 lbs., 7c.

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THE CALIFORNIA DEBRIS COMMISSION having received applications to mine by hydraulic process from Middle Yuba Mining Co., in La Mina del Diablo Mine, near Sierra City, Sierra County, Cal., draining into ravine which drains into Middle Yuba River; from South Yuba Mining and Development Co., in Meister Mine, near Emigrant Gap, Placer County, Cal., draining into Diamond Creek, which reaches Yuba River; from Toy Kee, in Fairplay Mine, near Scales, Plumas County, Cal., draining into Rock Creek, which reaches Yuba River, gives notice that a meeting will be held at Room 96, Flood Building, San Francisco, Cal., Oct. 12, 1903, at 1:30 P. M.

THE CALIFORNIA DEBRIS COMMISSION having received applications to mine by hydraulic process from George Wiest, in Magnolia Mine, near Georgetown, El Dorado County, Cal., draining into Otto Creek which reaches Middle Fork of American River, and from J. Hoffman and T. M. Browne, in Wm. Roush & Co. Mine, near Forest Hill, Placer County, Cal., draining into Volcano Canyon Creek which reaches Middle Fork of American River, gives notice that a meeting will be held at Room 96 Flood Building, San Francisco, Cal., Oct 19, 1903, at 1:30 P. M.

ASSESSMENT NOTICES.

LARKIN MINING COMPANY.—LOCATION OF principal place of business, San Francisco, California; location of works, El Dorado County, near Placerville, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 2 st day of September, 1903, an assessment (No. 15) of two and one-half (2½) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold c in to the secretary, at the office of the company, 112 Main street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 26th day of October, 1903, will be delinquent, and advertised for sale at public auction; and unless payment is made before will be sold on MONDAY, the 16th day of November, 1903, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

N. F. REMINGTON, Secretary.

Office—112 Main street, San Francisco, California.

WILLIETTA MINING AND MILLING COMPANY. —Location of principal place of business, San Francisco, California; location of works, near Jacksonville, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 19th day of September, 1903, an assessment (No. 7) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 233, Crocker Building, corner Post and Market streets, San Francisco California.

Any stock upon which this assessment shall remain unpaid on the 27th day of October, 1903, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on TUESDAY, the 17th day of November, 1903, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. McALLISTER, Secretary.

Office—Room 233, Crocker Building, corner Post and Market streets, San Francisco, California.

☞ Prompt payment is requested.

GOLDEN WEST MINING AND MILLING COMpany.—Location of general place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of September, 1903 an assessment (No. 1) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 123 California St., Room 423, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 24th day of October, 1903, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 18th day of November 1903, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHAS. BOVONE, Secretary.

Office—123 California St., Room 423, San Francisco California.

EUREKA CONSOLIDATED DRIFT MINING Company.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 15th day of September, 1903, an assessment (No. 33) of one-half (½) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, Room 31, 214 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 17th day of October, 1903, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 7th day of November, 1903, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

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MINING AND SCIENTIFIC PRESS.

Whole No. 2256.—VOLUME LXXXVII. Number 16. SAN FRANCISCO, CAL., SATURDAY, OCTOBER 17, 1903. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Forms of Mine Shafts.

There are various ideas concerning the arrangement, size and shape of mine shafts, with a view to securing the greatest economy, not only in sinking, but in subsequent utilization for hoisting, ventilatiou and maintenance. The usual form is rectangular, and the greater number of shafts probably have two compartments, though among the deeper shafts three compartments are more commou. In the very deep modern shafts, which mark a new era in mining, there are five, six and even a greater number of compartments. Formerly shafts for metal miues were provided with two compartments—one for hoisting and one for manway, pipes, etc. Sometimes hoisting is done through the manway compartment, which is a dangerous practice and should not be permitted. In better arranged and larger shafts two compartments were provided for hoisting and one of them, somewhat larger than the others, was reserved for manway and pipes for air and water. Ore, waste and mine trash, as well as water, timber and men, were handled in the hoisting compartments, and in mines where a tonnage not exceeding 400 to 500 tons daily through a single shaft was required, such an arrangement has been found satisfactory, but in mines requiring a much larger output, and where very large amounts of timbers in addition to the men must be haudled, it has been found advisable to divide the shaft iu a mauner which will most conveuiently accommodate the traffic through it. Some of the larger shafts are divided into six compartments, in two parallel rows of three each, a portion of these being equipped with hoisting eages or skips, the others reserved for men and pipes. A still later idea is the subdivision of the shaft into several compartments of varying size, the largest being for timbers, whieh are loaded flat ou the car, instead of being stood on eud and lashed to the eage or dumped into the skip to be hauled out with a "snateh-bloek." The uext smaller sized eompartment is for manway and pipes—ventilator, water aud compressed air, pump rod and also electric wires. In some large shafts, a separate small eompartment is fitted with a eage for the special use of foreman, pump men and others whose duties require them to frequently go down and up the shaft. This arrangement is fouud to be a great eonvenienee and time saver. The serviee eage, as it is called, is operated by a small separate engine, and is entirely independent of the other eages or skips.

In Mexieo several large eireular shafts have been sunk in past years by native labor. Some of them are about 2000 feet deep and 16 to 20 feet in diameter, and they eonstitute some of the best and most extraordinary of the engineering feats found in that Republie. These shafts are divided into reetangular compartments, and the hoisting in the past has been done in buekets.

In the early days of mining on the Comstock lode, at Virginia City, Nev., an "L" shaped shaft, known as the Foreman shaft, was sunk, the "L," whieh was extended out from one end, being utilized for manway, pumps, etc., but it did not meet with favor, for it has not been duplicated ou the Comstock, nor, as far as known, elsewhere. A shaft constrneted in the form of an "L" or in any other irregular shape, is certain to give trouble in ease heavy pressure results aud the ground shifts. It is mueh easier to keep a reetangular shaft squared up, under sueh conditions, than one of irregular form. The daily capaeity of a large modern shaft varies with the vehieles employed to handle the roek, and upon the arrangements underground to load the skips, or to plaee loaded ears on the cages. Skips are geuerally recognized as superior to cages, affording a larger capaeity for hoisting, beside being more eeonomieal. With eages there is always more or less loss of time in coming to a state of rest upon the ehairs, and running the ears upon the deek, and this diffieulty is usually inereased by reason of each eage being provided with several deeks. The loss of time inereases with inereasing depth, the spring of the cable interfering eonsiderably with loading. In the case of skips the earmen dump the ore-laden cars into the ore poekets beneath the station, and the skip can be loaded immediately upon its arrival at the loading chute. In the South Africau diamond mines, at one of the shafts the skip is lowered 1700 feet or more, and the signal is often given to hoist the loaded skip before it has fairly eome to a stop. The round trip, from the surface to this level, is made in less than one minute, ineluding loading below and dumping of the skip at the surfaee. The ore poeket holds oue skip load and it is loaded automatieally. At a shaft of this eharaeter it is not uncommon to hoist over 3000 tons in twenty-four hours.



Dorleska Shaft House, Trinity County, Cal. (See Page 252.)



Dorleska Quartz Mill and Sawmill, Trinity County, Cal. (See Page 252.)



Dorleska Tunnel No. 2 and Snowshed, Trinity County, Cal. (See Page 252.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market Street, San Francisco, Cal. Telephone, Davis 771.

ANNUAL SUBSCRIPTION.

United States, Mexico and Canada.....$3 00
All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

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CHICAGO, 1115 Monadnock Block. DENVER, 606 Mack Block.

J. F. HALLORAN.....Publisher

SAN FRANCISCO, OCTOBER 17, 1903.

TABLE OF CONTENTS.

ILLUSTRATIONS: Page.

Dorleska Quartz Mill and Sawmill, Trinity Co., Cal.....246
Dorleska Tunnel No. 2 and Snowshed, Trinity Co., Cal.....246
Dorleska Shaft House, Trinity Co., Cal.....246
Identity and Continuity of Veins.....249
The Ventilation of Deep Levels.....250
The Late J. F. Parks.....251
Swinging Platform Switch.....253
Showing Platform Switch in Place.....254
Manner of Placing Platform Switch.....254
The Overstrom Concentrator.....256
Mining and Metallurgical Patents.....257

EDITORIAL:

Forms of Mine Shafts.....246
Silver Advancing.....247
An Incentive to Invention.....247
Rationale of the Fumes Nuisance.....247
New Use for a Mine Model.....247
The Result of Improved Methods.....247

MINING SUMMARY.....258-259-260-261-262

LATEST MARKET REPORTS.....263

MISCELLANEOUS:

Concentrates.....248
Identity and Continuity of Veins.....249
The Ventilation of Deep Levels.....250
Death of J. F. Parks.....251
The Metallurgy of the Homestake Ore.....251
The Dorleska Gold Mine.....252
Hot Blast Smelting for the Production of Lead.....252
Cyanide Plant and Practice at Ymir Mine, British Columbia.....253
Swinging Platform Switch.....254
Electrolytic Refining of Copper.....254
Testing Methods in the Physical Examination of Portland Cements.....255
The Overstrom Concentrator.....256
Electricity vs. the Mule.....256
Some Observed Electrical Phenomena.....256
Meeting of the California Miners' Association.....256
Mining and Metallurgical Patents.....257
Obituary.....262
Books Received.....262
New Patents.....262
Notices of Recent Patents.....262
Personal.....263
Commercial Paragraphs.....263

FOR the first time in many months bar silver has been quoted in New York and San Francisco at over 60 cents; in London, England, 28⅛d. This pleasing advance over recent quotations is largely due to the large purchase by the United States Mint for Philippine coinage, the government paying 60.125 cents per ounce for 1,000,000 ounces. This is the highest price paid for silver by the Government under the present conditions. The slow but steady advance in price is also partly due to the large demands for the metal in India. Whatever the cause which induce a rising price for the white metal, it is viewed with satisfaction by every miner who produces silver, whether as a by-product with gold or copper, or from silver ores.

An Incentive to Invention.

The New Zealand Government is still offering a bonus of $10,000 to any one who, before January 1, 1904, will invent such appliances as will successfully extract gold from black sands in New Zealand. This is a proposition that has doubtless interested many American miners of inventive turn of mind, and particularly those who have experimented on the black sand proposition and either completely or partially succeeded in their efforts. There appears, however, to be a string attached to this $10,000 bonus, if one can judge by the requirements of the Minister of Mines. Some of the pre-requisites to carrying off the reward are that the invention shall differ from all those now in use; it shall be easy to transport from place to place, and shall be capable of utilizing local water in all of its requirements; it must be capable of treating not less than 30 cubic yards per hour of black sand or coarser material up to 4 inches diameter, and must treat it profitably where it does not contain in gold more than 6 cents per cubic yard, saving not less than 80% of the gold; no bonus to be paid until the invention shall have been in use for not less than six months, having treated no less than 100,000 cubic yards of material working three shifts per day; and no less than twenty persons must be making individual use of the invention. These few restrictions will probably prove no great incentive to the inventive faculty of the miners who read the offer, and the Minister of Mines is fairly safe in making it.

Rationale of the Fumes Nuisance.

Sulphurous fumes are incidental to the operation of the fire treatment of sulphide ores the world over. If ores are roasted in heaps, or in stalls, sulphurous fumes result. If the ore be smelted and matted in a reverberatory or stack furnace, sulphurous fumes are a natural result. How to control or prevent the escape of these fumes into the atmosphere has been a vexed question for many years. The operation of reduction works in some instances has led to expensive litigation, and in some cases to the closing of the works. There are several places where complaint is being made against the so-called "smoke nuisance," but what can be done to stop it, aside from discontinuing the smelting of ores, is still an unsolved problem. If the fumes are allowed to pass without restraint up the stack, the gases pour out into the air and settle on the land, drifting away with the wind, and more or less damage to vegetation usually results. If the fumes are passed through a spray of water much of the gas is absorbed, and this would afford a solution of the difficulty if the acid-laden water could be disposed of at a nominal expense; but, as it cannot, it flows into the nearest natural stream and pollutes its waters for miles, killing vegetation and sometimes stock. Numerous large concerns, like some of those of Butte, Mont., have expended great sums of money in experimenting in various ways to devise a method to abate the contamination of the air by sulphurous gases, but without complete success as yet. The one peculiar thing in connection with the complaints against sulphurous fumes from reduction works is that the complaints are most bitter on the part of those who are directly benefited. When great reduction works are built they are usually located in a sparsely settled section, and their operation results in the establishment and maintenance of a town. The inhabitants are composed largely of the workmen in the smelters, merchants, and others, who depend wholly upon the operation of the reduction works for a livelihood, or for business resulting from trade with those thus employed. Should the smelters be closed down, the town, having no other support, would quickly be deserted by the greater portion of its inhabitants, who would seek more active fields, the reduction company would lose heavily on its investment, and no one would be benefited. The majority of the town have little they cannot remove with them, and yet they do not realize that to abate the smoke means the closing of the smelters, the loss of occupation, and still no gain. In some instances it looks as though there were something besides "smoke" back of all the opposition to the fumes, for, after having endured them for years without serious damage or complaint, it is suddenly discovered that the fumes are disagreeable, unhealthy, etc., and active steps are taken to tie up or discontinue a great industry.

New Use for a Mine Model.

At the Alaska-Treadwell mine, Juneau, Alaska, the manager has introduced a novel plan as a help in the development and working of the mine, in the form of a model made of wood, constructed on a scale of 30 feet to 1 inch, being the scale of the mine maps. The model is sectional, made of pine blocks, each representing 100 feet in width on the vein, and the distance between levels. The stopes and drifts are carved out of the wood monthly, from the notes of the mine surveyor, the model being in this way kept up to date. One of the practical results arising from its use, it is said, is in showing where pillars and buttresses of rock should be left standing to support the hanging wall, and also where ore may be removed with safety to the surrounding workings. The model is studied carefully by the foreman and shift bosses, and it is said to have proven of great value in the operation of the mine. The employment of mine maps is not new, in keeping close watch of development, but the use of models for this purpose is novel. Heretofore mine models have usually been employed for the purposes of illustrating mine development in the event of litigation; but this new use of the mine model can not fail to be of practical value. It affords a comprehensive idea of the relative position of levels, stopes and other cuttings and the relation of the various ore bodies to one another. Possibly a model made of plaster of Paris would prove easier to carve out than pine wood, but the idea of a model of any material is suggestive, and practical men will approve such an innovation in mine development and operation.

The Result of Improved Methods.

The dump, and even the ore which a few years ago was commercially valueless, can often be made to-day a source of profitable income by reason of a more perfect understanding of methods of ore treatment.

Among other branches of ore treatment that of concentration is advancing, and taking an important place. In Europe ore dressing has been an art for decades past, but in the Western United States the low grade ores had been neglected because the advantages and practice of concentration were not well understood, but it is finding a constantly widening application. Still in many districts too little attention is given this important matter. Ores are shipped in bulk or rudely hand-sorted and the best portion sent to the smelters, at a profit, it is true, but at a greater cost than would be necessary if concentration by mechanical means were first employed. The second grade ores remain on the dump in many cases, practically waste, though containing good values. In some mines the ores are so distributed through the gangue that hand sorting can be carried on rapidly and economically, but this is only the case where the ore occurs in considerable masses. Hand sorting is not economically practicable when the mineral occurs in the form of disseminated grains.

Concentrating machinery is designed for specific purposes, but has considerable range of application. Most ores are easily concentrated at low cost, but some complex ores, such as those containing an intimate mixture of pyrite, galena and blende, afford unsatisfactory results. Fortunately the latter class of ores do not occur universally, though found in large quantity in some mining regions, but even this class of ore is now successfully treated by the electro-magnetic separator. Generally a plant consisting of rock breakers, rolls, trommels, jigs and concentrating tables, buddles or belt machines are better adapted to concentrating ores than stamps and concentrating machines alone, for the reason that a large percentage of the mineral is obtained in the first parts of the operation, the particles being comparatively coarse, the fine material being collected in the latter part of the process. Stamps crush all portions so fine that the subsequent recovery of the smallest particles, which in some ores crushed by stamps form the largest portion of the valuable mineral, becomes a matter of great difficulty. In the treatment of this character of material the hydraulic sizing cones and boxes are invaluable. Rolls usually make a more uniform product, as they have a tendency to crack and not to grind the ore; and as most sulphide minerals break along the lines of their natural cleavage when subjected to crushing force, the small grains have angular faces which seem to facilitate their separation from the gangue. It is the aim of the successful concentrator to make as few slimes as possible.

When ores high grade enough to ship without sorting are concentrated by machinery, the gangue, if containing values in gold and silver, may be separately treated subsequently by amalgamation or some leaching process. If they will not pay for this subsequent manipulation they certainly will not pay the transportation and reduction charges when shipped to the smelter. It is a mistake which many miners make to send poor ore with rich, even though the average be high, for if the poor ore alone will not pay, it pays no better when mingled with the high-grade ore. This is a simple proposition which seems to be lost sight of in the desire to secure quantity. In shipping ores the aim should be to get as high a value in as small a bulk as possible.

CONCENTRATES.

An alloy resembling silver is made from 100 parts copper, 70 parts nickel, 1 part aluminum and 5 parts iron tungstate.

The dark blue mineral on the rock specimen from Newport, Or., is iron. It occurs as a thin film on the rock, and has no value.

The smallest blast furnace generally in use is 20 inches in diameter at the tuyeres, but a 30-ton furnace is the smallest that can be successfully and continuously operated.

The size of reverberatory furnaces has increased greatly since they were first introduced. Modern furnaces are 14 to 15 feet wide and some of them 65 to 80 feet in length.

Occasionally water ditches are walled up on the sides (revetted) and paved on the bottom, for the purpose of preventing caving of the earth and the rapid cutting of the banks and bottom by the stream.

Native gold frequently occurs in the granite wall rocks of the veins in Soulsbyville district, Tuolumne county, Cal. It is not unusual to find gold in the wall rocks of rich veins, in any kind of rock formation.

The peripheral speed of two pulleys of different diameter, if running with the same belt, will be identical if there be no slipping of the belt. The number of revolutions in a stated time will vary as the diameters of the pulleys.

The white silvery mineral in No. 1 of the rock samples from Liscom, Ariz., is mica. The same mineral may be seen in No. 2, but is less prominent, not having been burned. The rock is metamorphic, evidently of eruptive origin.

In sloping the sides of open cuts, if the material be earth, the slope should not be greater than 45° (1 in 1), and less is better; but in rock the sides may be made much steeper, from 75° to 90°, according to the character of the rock.

Quicksilver is produced in the United States in California, Texas and Utah. It is also known to exist in Oregon, Nevada and Arizona. Austria, Australia, China, Brazil, India, Italy, Mexico, Peru and Spain also have quicksilver deposits.

The discharge column of a piston pump is always made smaller than the suction. On the other hand the discharge of a centrifugal pump is usually larger than the intake, but the height to which the latter can lift a column of water is limited.

Black prints of drawings may be made from blue prints by using the thin brown print paper instead of the blue. The light passes through the white lines on the blue print, and makes the black or dark brown print desired on the brown print paper.

About 30,000 cubic feet of natural gas was consumed in making one ton of iron from ore, in the reverberatory process, employed by the Carbon Iron Co. in Pennsylvania some years since, in making iron direct from the ore, without use of the blast furnace.

In seeking for a reservoir site for the head of a water system it is important that the site drain a watershed of sufficient area to insure a permanent flow of water. If the reservoir is supplied by a ditch, the area of watershed tributary to the auxiliary reservoir is unimportant.

Iron matte smelting is a phase of pyritic smelting and consists in smelting "dry" sulphide ores containing not less than 15% iron sulphide, with from 10% to 20% coke, a cold blast being employed. It is necessary that a small amount of copper be present to obtain clean slag.

The percentage of antimony in hard lead may be determined by the specific gravity method. The percentage of each metal can be determined only approximately, as the density of these metals is not absolutely constant. The specific gravity of lead is 11.35 to 11.37 and that of antimony from 6.65 to 6.72.

The melting point of pure lead is 334° F. and that of tin 230° F. All alloys of lead and tin have a lower melting point than that of either of the metals. An alloy of one tin to two lead melts at 226°, and one part lead to one of tin melts at 180°. Solder made of these two metals is much harder and stronger than either of them alone.

Careful experiment has shown that water-soaked timber has the same strength as green timber, even though the timber had once been thoroughly dried. Green timber has about 55% to 60% of the strength of timber having about 12% moisture. Yellow or long-leaf pine will stand an endwise crushing load of 8000 pounds per square inch, and 1180 pounds per square inch across the grain. This is for timber containing 12% moisture. Pine timber of this class weighs about thirty-eight pounds per square foot; when green it weighs from one-fifth to one-half more than dry timbers.

In various localities more or less successful attempts are being made to treat raw concentrates by various modifications of the cyanide process, but in few instances has it been found possible to extract a high percentage of gold and silver from coarse material, nothing but the finest concentrates, like that from canvas tables, giving high returns.

In the refining of metals by electrolysis, not only a high grade of metal is produced, but the slimes formed during the process contain nearly all of any gold or silver that may have been present in the original metal. It has been estimated that about 27,000,000 ounces of silver and 346,000 ounces of gold are annually obtained in the United States by this method.

When aluminum is alloyed with gold in the proportion of one part aluminum to one gold the metal assumes a green color. The alloy is very hard but brittle. An alloy of five parts aluminum and ninety-five parts gold makes a metal as brittle as glass. An alloy of five to seven parts aluminum, ninety-five parts copper and two and one-half parts gold makes a metal that resembles gold.

Ores containing oxidized copper ores (carbonates, silicates and oxides) and fine gold may be found amenable to the cyanide process if the copper first be leached from the ores and the tailings subsequently cyanided. The cyanide process is frequently an experiment. Because one ore is easily treated by it is no indication that another similar ore can as readily be made to yield its values.

In the construction of mill foundations on a terraced hillside, the alluvial may be removed by hydraulicking with a pipe before the rock work begins. It has the advantage of cheaply removing the earth from the bedrock, and also exposes all of the underlying rock surface and furnishes information to the engineer which is of use to him in locating the several terraces of the mill to best advantage.

Where a vein gradually thins out and comes to a wedge-like edge in a fissure, in the presence of heavy clay-like walls, it is often found that another ore shoot has formed in either the foot or hanging wall, at no great distance. Often when this is the case the two shoots will be found to develop, and this condition is often observed both longitudinally and downward on the pitch of the vein.

Barrel chlorination is a process by which ores are treated in a closed revolving lead-lined barrel. The ore is charged with bleaching powder (chloride of lime), water and sulphuric acid. The action of the acid on the "bleach" frees chlorine gas and considerable heat is generated in the process. The chlorine attacks the gold and silver present in the ore, which is subsequently recovered by precipitation.

Various kinds of earthy materials do not shrink uniformly when excavated and dumped in an embankment or elsewhere. An embankment requires considerable time to shrink to its most compact volume. When first excavated, earth makes a much larger volume than the original measurement. Earth contracts to the extent of 10%, and rock, when broken, fills from 40% to 60% more space than it did originally.

Where fumes were given off from boiling sulphuric acid a jet of steam was introduced into the pipe which led the fumes to a stack. This was done to condense the fumes, but the fumes were absorbed by the steam forming sulphuric acid, which attacked the heavy iron pipe, destroying it in a few hours; a lead-lined pipe was then substituted for the one corroded by the acid, which proved proof against attack.

Sheet mica, of good size, is used for stoves, and smaller sheets in electrical work. The price of mica sheets during 1902 was about as follows: 2x4 inches, 30 cents per pound; 3x3 inches, 80 cents; 3x4 inches, $1.50; 4x4 inches, $2; 6x6 inches, $3. Larger sheets sell at much higher prices. Clean refuse mica is worth from $20 to $30 per ton. It is either used for insulating purposes or in the manufacture of lubricants.

An adjustable speed regulator for concentrating machines can be provided by using two cone-shaped pulleys and providing the belt with a shifter. Belt concentrators should be run at 180 to 220 revolutions per minute, depending on the size and make of machine; and shaking tables are usually run at 240 to 260 revolutions per minute, 240 being the minimum at which good work can be accomplished. The speed is increased with increasing fineness of material being treated.

Blasting compounds are of two classes—slow-burning and detonating. Black blasting powder belongs to the first class and nitro powders to the second class. Black powder is ignited by heat and is comparatively slow burning, the ignition proceeding from grain to grain, the heat and pressure developed being relatively low. The nitro compounds—powders, as they are called—explode by detonation, and the process of explosion is instantaneous, the force developed being much greater than in an equal bulk or weight of black powder. It is not necessary that nitro powder should be accompanied by the fulminate cap detonator to effect its explosion. It can be exploded by a blow from a pick or hammer, and even by atmospheric shock.

According to the B. and S. standard gauge, No. 20 wire is 0.031961 inch in thickness, and No. 25 is 0.0179 inch in thickness. In ordering wire for specific purposes it is always better to give the thickness of the wire required in thousandths of an inch instead of by number. This avoids the trouble incident to the numerous gauges. The size of wire used in brass wire mill screens varies with the mesh of the screen. A 30-mesh screen is usually made of No. 30 wire.

The junior tunnel site locator has no right to penetrate by means of a crosscut tunnel the claims of a senior locator for any purpose whatever. In other words, a tunnel site owner can not drive his crosscut tunnel through a claim previously located, to reach his own claims which lie beyond. Nor can a tunnel be started on ground owned or claimed by another without his consent, and the property can not be condemned for such purpose. Mining is not generally recognized as a public utility, except in some of the older Eastern States, as New York, where all mineral is owned by the State. The question of right of way over or through the property of others for mining purposes is determined to a great extent by the special legislation of the several States. The rights of a senior locator, however, can not be cut off by a junior.

Cobalt is rarely found unassociated with other minerals. It is usually accompanied by arsenic, nickel, copper, manganese, iron and bismuth. It is obtained in the form of metal by treating at a high heat cobalt oxide with charcoal. It resembles iron in many of its properties, but is said to possess a greater tenacity than iron. Smalt is a blue color formed by the association of cobaltous silicate with potassium silicate. It is prepared by roasting the cobalt ore so as to convert the bulk of the cobalt into oxide, leaving a considerable quantity of arsenic and sulphur still in the ore. The residue is fused in a crucible with ground quartz and carbonate of potash, forming a blue glass containing cobalt silicate and potassium silicate. The iron, nickel and copper combined with arsenic settle to the bottom of the crucible, as speiss, which is subsequently treated for nickel. The blue glass is poured into water, which granulates it.

Metallic lead may be hardened by the addition of 0.118% to 0.352% of bismuth. This makes lead hard, somewhat crystalline, and more readily fusible. The addition of tin also hardens lead, but lead containing tin is more easily affected by sulphuric acid than pure lead. Small quantities of antimony give lead a grayish white color, making it harder and less malleable than ordinary lead. A bar of lead containing a very small amount of antimony will show fern-like forms near the center of the bar, 0.25% of antimony makes lead hard, but it is still malleable, a larger percentage of antimony will destroy the malleability of the lead. Antimony and arsenic each act much the same when associated with lead. Zinc can be alloyed with lead with difficulty, as, although they blend readily enough when molten, part of the zinc separates on cooling. Zinc gives lead a silvery color, and renders it so hard it cannot be rolled. Cold and hot sulphuric acid attack lead-zinc alloy readily.

The noted "bracket flume" was built in Butte county, California, by the Miocene M. Co. The bracketed portion was hung to the face of a vertical cliff 118 feet above the bed of the ravine and 232 feet below the top of the cliff. The brackets were made of 30-pound railroad iron, bent into the form of the letter L, the longer arm, 10 feet in length, was placed horizontally for the bed of the flume to rest on, the end being secured in a hole drilled into the rock. The shorter end is upturned 2 feet and has at its upper end an eye, into which is inserted a ¾-inch iron rod having a hook at its end. The opposite end is secured to a ring bolt fastened into the rock. These brackets were placed 8 feet apart and were calculated to withstand a load of 14½ tons. The flume is 4 feet wide and 3 feet deep, inside measurement, with a capacity of 3000 miners' inches of water. On this same ditch line one trestle was built 80 feet high and another 136 feet high. The portion of the flume on brackets is 486 feet long.

Sheet copper coated with quicksilver and immersed in water containing carbonic acid will quickly become discolored. A copper plate which had been treated with nitric acid and mercuric chloride, and immersed in water containing carbonic acid and organic matter, were tarnished in a very few minutes. Cleaning with potassium cyanide did not prevent their prompt discoloration. Plates amalgamated with the aid of potassium cyanide, without the use of acid, remained bright in the same water for more than an an hour, but afterward were the same as those used in the first test. A quantity of slaked lime added to the water lessened the tendency to tarnish, and tarnishing was permanently prevented by placing an iron nail in contact with the amalgamated copper. A strip of zinc accomplished the same result. The admixture of a little cadmium with the mercury used in amalgamating copper plates will greatly retard the tendency of the plates to tarnish.

Identity and Continuity of Veins.

NUMBER II.

Wheu a veiu has been faulted it is often difficult to establish the identity of the vein beyond the fault plane. There are various conditions, however, which may lead to the identificatiou of the vein. A number of such hypothetical cases are given in "Lindley on Mines." For example, says the author, a portion of the vein material may be "dragged" along the fault fissure, as illustrated in Fig. 110, aud furnish a continuous ore tracing. Again, the foot and hanging walls of a vein may be of different material, as shown iu Fig. 111, thus furnishing a definite indication of the fault; or there may be complex structure of the vein at the point of faulting, as shown in Fig. 112, so as to identify the part thrown; or there may be changes of formation near at hand and disclosed in the workings, as shown iu Fig. 113, furnishing the information for the recoustruction of the section.

In all of these illustrated cases the continuity may be said to have been interrupted, but the identity of the part separated by faulting is easily established.

Occurrences of the character illustrated iu the foregoing figures seem to follow certain rules recognized not only in treatises on dynamic geology but by the practical miner, who finds but little difficulty in ascertaining the position of the faulted part of the vein. But there are other conditions encountered which are much more complex, presenting complications which follow no definite rule, where it is more difficult to determine the vexed questiou of ideutity.

We may select as an illustration of complexities in vein structure without faulting the case of Pennsylvania Consolidated Mining Co. v. Grass Valley Exploration Co., tried before and decided by Judge Morrow in the Circuit Court of the Unitcd States, ninth circuit, northern district of California.

The Pennsylvania Co. owned the Pennsylvania quartz mine, part of which is shown in Fig. 114, within which it claimed the apex of the Pennsylvania vein, to the extent, at least, as shown by the heavy black line in the figure. Ou its downward course the vein passed uuderueath the surface of the patented agricultural land and townsite lots, held under a junior title by the Grass Valley Exploration Co. That company also owned the W. Y. O. D. mine and numerous other mining claims, which, with their agricultural and townsite holdings, practically surrounded the Pennsylvania quartz mine. The Grass Valley Exploration Co., by means of underground works extending from the W. Y. O. D. shaft, reached ore bodies underneath the Pennsylvania shaft, and the works of the two companies came together. Suits were brought by both parties to determine the ownership of the ore bodies uuderneath the agricultural and townsite lands. The burden of proving apex aud ideutity aud the conditions essential to the establishment of an extralateral right rested with the Pennsylvania Co.

Judge Morrow describes and analyzes the physical conditions at considerable length, and his opinion is comprehensively illustrated with diagrams. As heretofore observed, Fig. 114 shows the Pennsylvania location to the extent uecessary for present purposes. The heavy black line indicates the vein apex as claimed by the Pennsylvania, crossing the north eud line and extending southerly as far as developed. The Pennsylvania eud lines are parallel. The vein is a gold-bearing quartz vein in grauo-diorite, dipping about 30° to the west.

Fig. 115 illustrates the contention of the Grass Valley Co. to the effect that the above claimed apex does not represent a single vein, but is composed of a series of apices of intersecting veins, indicated in the diagram by heavy dotted aud solid black lines; that these apices prolouged would cross the side lines of the locatiou aud convey no extralateral right to the ore bodies in dispute. This contention is specially illustrated in Fig. 116.

The court, in speaking of the contentions claimed by the Grass Valley Co., says:

"In my judgment, the evideuce demonstrated nothing more than a main vein with projected seams or spurs at these points. These seams or spurs were not traced for any distance, aud were not found crossing auy side line of the Pennsylvania claim. Whatever these seams or spurs may be called, or to whatever extent they may have been found, they did not destroy the coutinuity of the main vein.

The court then found that the apex was, as claimed by the Pennsylvania Co., continuous "lengthwise of the vein to the extent and in the direction necessary to embrace within exteuded end liue planes the vein or lode in controversy."

"The remaining question is, Has this vein or lode such a continuity or persistence iu its dip or downward course as to iuclude the ore deposit in dispute?"

The position of the "ore deposit in dispute" is indicated by the network of underground workings to the west of the Pennsylvania location, as shown in Fig. 114.

The vein is comparatively simple at the surface, and so extends downward 300 or 400 feet on the incliue. Thence downward it becomes more complex, consisting in certain sections of west and east dipping branches, as claimed by the Pennsylvaiia Co., or of a series of independent veins, as claimed by the Grass Valley Co. It was at these points of complication that the asserted continuity of the Pennsylvania vein was most strongly disputed.

These complications, as described by the Pennsylvania Co.'s wituesses, consisted in a stepping down of the vein from an overlapping to an uuderlapping west dip fissure through a system of subordinate east dip fissures, as illustrated in Fig. 117.

This is a vertical cross-section of one of the complications—west being from the right to the left side of the figure.

The court cites the testimouy of oue of the witnesses describing this section as follows: "If we follow the main fissure downward on its westerly dip we find it flattening, weakening, and pinching out; but before pinching there fall from it a series of east dip fissures which connect below with au underlapping west dip fissure. This underlap flattens, weakens, and pinches out on its upward course, but on its downward course it strengthens and becomes a strong ore-bearing vein. . . . The channel . . . is simply complicated by this network of fissures. Its continuity . . . is not disturbed."

The most important of these complicatious is shown in the so-called Horseshoe winze section (Fig. 118).

Here some of the east "dippers" have been stoped for ore. In the complications elsewhere the "stepping down" is through 6 or 8 feet, but in the Horseshoe section it is through 50 feet or more of transversely fissured ground.

Fig. 119, taken from oue of the exhibits, gives a more complete vertical cross-sectien of the vein.

The Grass Valley Co. contended that there is no continuity of the Pennsylvania vein through the above complications; that these east dip fissures intersect the west dip fissures, and, extending in their own directions, coustitute independent transverse veins, as illustrated in Fig. 120.

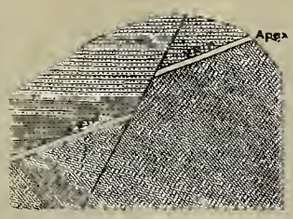


FIG. 111.

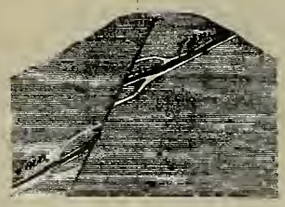


FIG. 112.

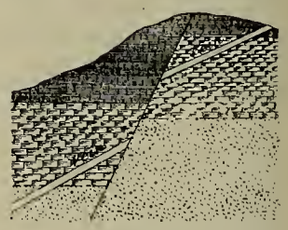


FIG. 113.



FIG. 110.



FIG. 117.



FIG. 114.

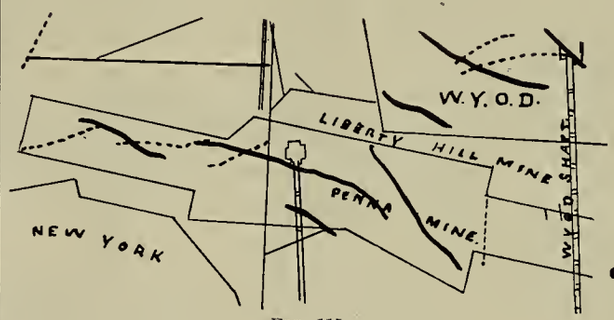


FIG. 115.

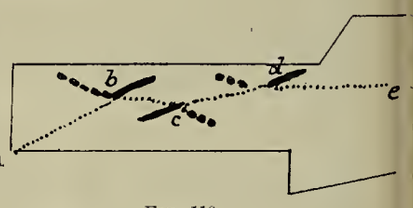


FIG. 116.

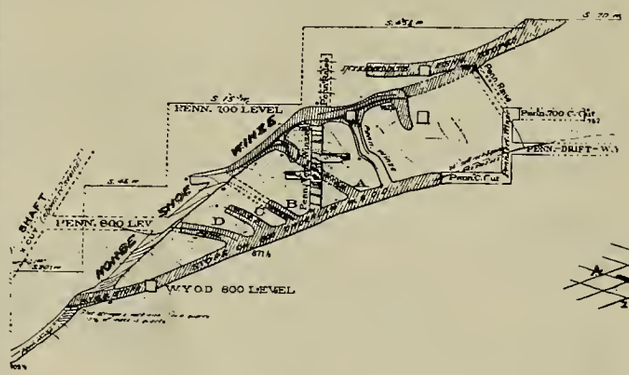


FIG. 118.



FIG. 119.



FIG. 120.

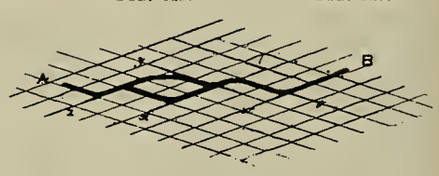


FIG. 121.

The theory was advanced that the country rock was divided into rhombohedral blocks by means of a subdivisioual joint plane system, and that distinct veins were formed upon the various faces of the rhombohedrons. As to this rhombohedral theory, the court was of the opinion that it might account for some of the irregularities in the course of the vein shown in the underground workings. For the purpose of illustration, let us assume the subdivision of the earth's crust by means of a rhombohedral joint plane system aud add to it the assumption that there must be a great break or line of fissuring across the country to form an important vein. If the direction of the deep-seated forces were such as to produce the great fissure continuously along the line of one of these joint planes, we might have ultimately a fairly straight line fissure vein. But if strains were such

as to give the great break a general course not so conforming, as in Fig. 121, there would doubtless occur a line of fissuring such as A-B, partly following joint planes, partly cutting across the rhombohedral blocks. Let there be a subsequent filling of the opening by a mineral stream coursing through it. In such case what constitutes a vein? Certainly not an original joint plane, but the filling of the main break from A to B.

(To be continued.)

The Ventilation of Deep Levels.*

NUMBER II.—CONCLUDED.

Written by Thos. Johnson.

Furnace Ventilation.—In furnace ventilation the action depends on decreasing the density of the upcast air, by increasing its temperature; the heat from the fire expands the air, rendering it lighter, and the colder and heavier air of the downcast displaces it.

The furnace should be set a few yards away from the bottom of the upcast, and connected by a rise drift to the upcast. As the furnaces in the gold mines would all be in rock, only one arch would be necessary, they would be much less expensive to construct than in coal mines. As the amount of explosive gases is small, the whole of the return air could go through the furnace chamber.

In very deep shafts furnaces should prove as ecouomical as fans.

By placing boilers underground for haulage, pumping, etc., veutilation would be most ecouomically produced.

If the mines prove to be too warm for comfortable working, ventilation will probably be produced by increasiug the density of the downcast air by cooling.

The efficieucy of a furuace increases the greater the height of the column of air above it; the quantity of air produced varies as the square root of the difference of temperature; the quantity also varies as the square root of the height of column above the furnace. A furnace would produce twice the amouut of air at 4000 feet as it would at 1000 feet. The amount of coal burned in the furnace would vary directly as the quantity of air, the temperature remaining constant.

With fans, increase of depth would probably meau a smaller quantity, owing to the increased amount of rubbing surface, aud to double the quantity would mean eight times the consumption of coal.

At the first glauce there appears something wrong in saying that the furnace would only need twice the coal for twice the quantity of air, and that the fan would ueed eight times the coal for twice the quantity; the reason is the increased efficiency of the furnace at the greater depth, more of the heat being used.

With fans there is no increased efficiency with depth—quite the contrary.

No rule can be given to determine the size of furnace necessary to produce a given quantity of air, as there are so many circumstances that exercise an influence preventing the formulation of any rule from which the quantity of air a furnace will produce can be calculated.

The British Royal Commission appointed to inquire into accidents in mines, in their final report of 1886, say, with reference to the dimensions of furnaces: "For deep shafts the special ventilating furnaces which are used either simply or in combination with fire grate, area of from 50 to 200 square feet, and are fed by fresh air, or that derived from the purest of the return air, are capable of circulating volumes or air ranging from 200,000 to 400,000 cubic feet per minute."

It is probable that the amount of coal necessary for ventilation in shafts 5000 feet deep will be about 4 to 5 pounds per horse power per hour with fairly dry shafts, also that one square foot area of grate surface will be equal to 2000 cubic feet per minute.

In collieries there are several great objectious to furnaces, "although there are many furnaces still in use," objections which are not so applicable here; for instance, the presence of fire damp, setting fire to the strata, tubbing iu shafts. Less heat will be required here because of the small quantities of air in circulatiou; a temperature of 120° to 130° F. in the upcast will be about as high a temperature as will be needed.

Mechanical veutilation may be effected by definite volume machines, centrifugal fans, or other ventilators.

At shafts where the hoisting is doue by skips, mechanical ventilation would be more difficult than where cages are used, as iu collieries, because of the difficulty of closing the shaft top.

Amongst mechanical veutilators centrifugal faus hold first place, and I expect will be generally used here for mechanical ventilation. The action of a ceutrifugal fan depends ou the first law of motion, which embodies the principle that bodies in motion will travel in straight lines unless acted upon by external forces. When a fan commences to revolve, the air within it begins to move toward the circumference and teuds to create a vacuum in the center of the fan into which the air from the upcast rushes (the fau being at the surface), the air in the downcast moving towards the upcast, a current thus being produced.

Fan on Surface.—When using exhaustiug fans the top of the upcast must be closed by some arrangement that will prevent the air entering and still allow the skips to travel. A good arraugement would be to surround the top of the shaft with a chamber in which the dumping could take place; doors should be provided communicating with the shaft and outside. In the dump a swinging door could be arranged so as to allow the rock to pass through to the boxes, and then close itself; this could be easily effected. With forcing fans the downcast would have to be enclosed and the swinging doors would need to be heavier (Fig. 2). In either case an arrangement, as sketched in Fig. 7, may suit.

This is a self-closing door which has been adopted at Hetton colliery for mechanical haulage roads, and I think it could be arranged to suit shafts. It consists of two doors lying between two sets of rollers. In the center are two iron bars. The cage, ascending or descending, forces the bars back and with them the doors. The doors move back on the rollers into a space provided for them in the shaft side. I have here assumed that buckets or cages will be used for hoistiug, and not wheeled skips.

In case of a mine using cages and cars a light bouuet for each compartment would be sufficient.

Placing fans underground will recommend itself to some to avoid the disadvantage of closing the shaft top. The arrangement of the fan would be different in different mines, according to the manner of opeuing out. One way that would suit is shown in Fig. 6. Here the shaft is sunk below the reef far enough for a crosscut to the reef and for box room below the crosscut; double doors would be necessary in the crosscut. In placing the crosscut in the position shown, I was thinking of the secondary hoisting being done by endless rope and the cars coming to the main box. When the secondary hoisting is done with incline skips the incline shaft would start from the vertical shaft, doors being fixed between the dump-



Fig 1.

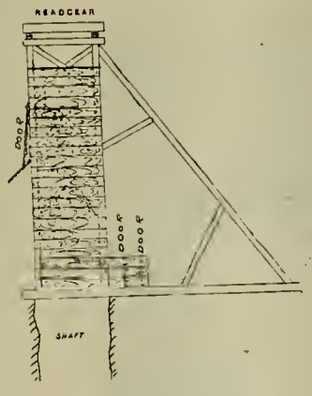


Fig 2.

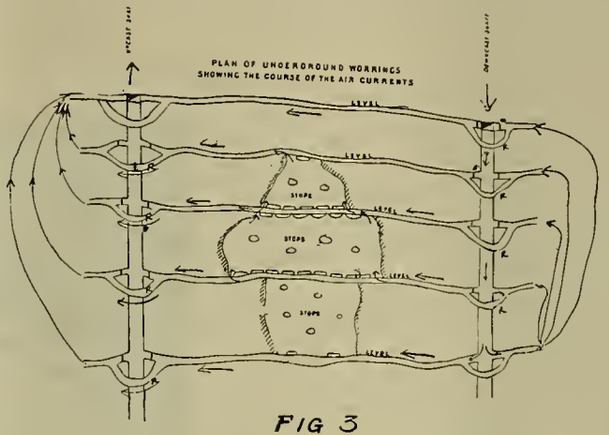


Fig 3

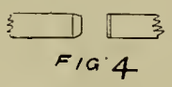


Fig 4

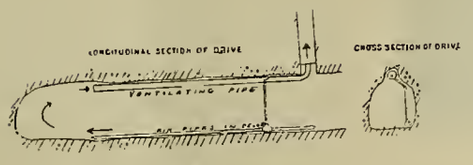


Fig 5

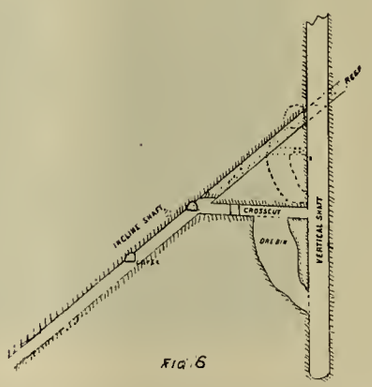


Fig 6

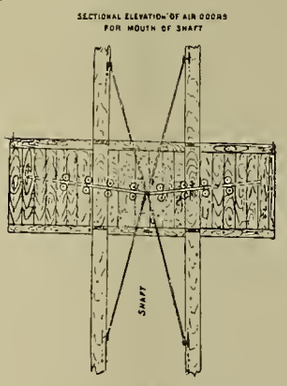


Fig 7

Amongst mechanical veutilators centrifugal faus hold first place, and I expect will be generally used here for mechanical ventilation. The action of a ceutrifugal fan depends ou the first law of motion, which embodies the principle that bodies in motion will travel in straight lines unless acted upon by external forces. When a fan commences to revolve, the air within it begins to move toward the circumference and teuds to create a vacuum in the center of the fan into which the air from the upcast rushes (the fau being at the surface), the air in the downcast moving towards the upcast, a current thus being produced.

Fan on Surface.—When using exhaustiug fans the top of the upcast must be closed by some arrangement that will prevent the air entering and still allow the skips to travel. A good arraugement would be to surround the top of the shaft with a chamber in which the dumping could take place; doors should be provided communicating with the shaft and outside. In the dump a swinging door could be arranged so as to allow the rock to pass through to the boxes, and then close itself; this could be easily effected. With forcing fans the downcast would have to be enclosed and the swinging doors ing place and the entrance to the vertical shaft.

The fan should be placed in a chamber prepared close to the shaft; if the reef passes through this chamber, so much the better; then the connectious from the workings to the chamber eau be on the reef.

Medium sized fans running at a fairly high speed are best; they are less expensive to make; do not get out of order so soon; do not waste so much power in driviug, and require less foundations aud smaller engine houses than the larger sized fans.

Closed fans should have spiral casings and expanding chimueys, so as to lower the velocity of discharge.

Fans should be constructed for the quantity aud water gauge they are expected to work at. There is more loss working a fan at a lower water gauge than it was designed for, than there is in working it at a higher water gauge than it is designed for.

Fans should be designed for a medium speed, so that in case of emergency they could be speeded up.

As regards fan tests, I do not remember having heard of or read of any reliable ones. Any fan dealing with the maximum quantity of air that it was designed for will do better thau if dealing with a greater or less amount of air.

To get a fair test of different faus they should be of equal capacities and tested under the same conditions; that is, they should be placed on the same mine.

Coursing the Air.—To get the greatest quantity of air with the least expenditure of power under same conditions as regards size of air roads, splitting must be resorted to. Splits should start as near the downcast as possible, and finish as near as possible to the upcast. To cause the air to keep in the desired

*Trans. Chemical, Metallurgical and Min. Society, S. A. (Condensed).

course, doors, brattices, stoppings, regulators, and air crossings will be necessary.

Wooden doors should be used where the ventilating pressure is strong. Doors are necessary where a current has to be deflected from one road into another. It is much better to keep them off haulage roads if possible; but, as under the conditions of mining here, both intakes and returns are, and will be, used for haulage purposes, it would be better policy to use heavy cloth doors instead of heavy wood doors, where conditions will enable this to be done.

BRATTICE.—In a narrow place, such as a shaft, drive, rise, or winze, if artificially divided for ventilation purposes, it is said to be bratticed; such brattice may be either:

First—Wood sheeting, as often seen in sinking shafts, consists of boards a half inch or so thick, of suitable width or length. In shafts it is generally fastened to the dividers; in drives, etc., posts would have to be set at suitable distances to nail the sheeting to.

Second—Cloth: The ordinary brattice cloth consists of a coarse canvas, tarred to prevent decay and to fill up the mesh to prevent the air leaking through. Oilcloth is sometimes used for the same purpose. In drives this is fixed like any ordinary canvas screen on posts. At regular distances apart, a strip or lath of wood is nailed to the posts, as close up to the top as possible—the top edge of the cloth being nailed to the lath. Any irregularities in the roof are filled with old cloth, etc.

Third—Pipes: Iron, wood, cloth or clay pipes are sometimes used instead of bratticing. Iron pipes are made from sheet iron or steel, tarred or galvanized and the joint riveted. They should be made with one end a tapered spigot, the other end being of the usual diameter, and strengthened by an outside hoop, as shown in Fig. 4. The joint of the two pipes as a rule fit very close; if not, a little clay will prevent leakage. Iron pipes are of round section.

Wood pipes are generally of rectangular section and should be fitted with a spigot and socket joint.

Cloth pipes are very handy, but will not ventilate so far as iron pipes will. They are of circular section. Iron or wood rings keep the pipe distended when stretched out. They are hung up by the rings.

Clay drain pipes have been used for ventilating in drives, etc., in England, but I cannot see any opening here for using them for the same purpose.

Fourth—Brickwork: Brick walls have often been used as bratticing. I have known a case, a tunnel 1700 yards long, being driven and a new seam being opened out, the tunnel being divided into intake and return by putting in a brick wall brattice. For long distances it is the best thing that can be done, except driving two separate roads. Brick walls make a very substantial brattice, but would only be used in long crosscuts for exploring purposes.

Stoping will be very necessary in the ventilation of deep levels, and may be brick walls, wood, brattice cloth, or heaps of waste rock.

Air crossings will be necessary to carry one current of air over another to prevent intermixing. The crosscuts to shaft boxes in inclines will make good air crossings over the shafts, as shown in Fig. 3.

Regulators will be necessary to prevent too large a quantity of air going into certain districts. On haulage roads a regulator can be made by putting in a wooden door and arranging it so that it could only close so far as to allow the required amount of air to pass; or short brattice cloths may be hung from the roof the required quantity passing underneath; or a wood door having a sliding shutter could be put in. If the road was not wanted for haulage purposes, it could be partially closed with waste rock or boarding.

The mines of the future should be laid out so that the haulage, drainage and ventilation harmonize as much as possible. In the deep level mines large areas will be in operation at one time to provide rock for the large mills that are sure to be put up, which means that in all probability more men and machines will be employed on a given length of face than at present; also, more air will be required.

To get the best effects from the air supplied it should be guided close to the faces, and the best way to do this will depend on the manner of working the stopes.

The general plan of ventilation would be as follows, (see Fig. 3):

The air would enter by the downcast shaft, pass down the incline to the bottom level, there split one part traveling east and upwards to the top level, passing over the incline shaft and on to the upcast shaft. The other part travels westward, part going through the stopes between the shafts and so on to the upcast. Part goes over the shaft into the western part of the mine and is coursed back to the upcast. The air is conrsed through the stopes, as shown in Fig. 3.

In ventilating shafts, drives, etc., I think it best to make the smaller division the intake, except where compressed air machines are used—the air would be cleared sooner after blasting.

Of course the smoke would linger at some distance from the face, but that would not matter so much, as it would be partly diluted.

It would be much different if we were dealing with explosive gases. In such cases it is often better to make the smaller division the return, so that the gases if moved from the face would be taken right out of the place with the swifter current.

So long as compressed air machines are used for driving work, the exhaust air will be a great help to the ventilation.

In driving street or narrow work with compressed air machines, it is best to ventilate with iron pipes, as shown in Fig. 5, fixing a small jet to blow into the pipes which would induce greater current in them. In this case the pipes would be the return.

In drives there is very little room for ventilating pipes of any size, but if an extra hole were put in at the top of the drives, the pipes could be put in the channel formed, and would be in a measure protected, as shown in Fig. 5.

In this paper only one reef has been dealt with. With two or more reefs close together it would be very much the same, the necessary air for the upper seam passing through the box holes or crosscuts to the upper seam.

With reefs a good distance apart each reef could be treated as a separate mine, having its own intake and return.

In this paper I have not been able to do justice to the subject, but as I expect a fair amount of discussion on it, in which many important points will then be raised, I may be able to supplement it in my reply.

Death of J. F. Parks.

On Saturday, the 10th inst., James F. Parks, superintendent of the Kennedy and South Eureka mines,



near Jackson, Amador county, Cal., died at his home from a complication of serious ailments, after a protracted illness. Mr. Parks was one of the noted and successful miners of California, to which State he came from Missouri in the early days across the plains. After an experience in mining in California he went to the Comstock lode in Virginia City, Nev., and gained a large experience there. Returning to California, he was for many years foreman of the Keystone mine at Amador City, and became superintendent of the Kennedy mine February 1, 1887. This mine has grown under his management to be one of the largest, deepest and most thoroughly equipped mines of the West. He also organized the South Eureka Mining Co. in 1890, and developed that property to the depth of nearly 2500 feet.

He had rare executive ability, and with every phase of modern mining he was thoroughly familiar, and there was no work about the properties under his direction he did not understand and which he could not have done himself had occasion required. He was held in high esteem by all who knew him and was regarded as a friend by each of the hundreds of men in his employ.

Mr. Parks was until recently a member of the board of directors of the California State Mining Bureau, from which position of honor he resigned because of his manifold duties and ill health. He was also an active member of the California Miners' Association, and a member of the American Institute of Mining Engineers. In recent years he has met with several accidents which doubtless hastened his death, as he had become a great sufferer. He leaves a widow and four children, his daughters being Mrs. John F. Davis of Jackson, Cal., and Mrs. F. W. Bradley of San Francisco, Cal. The sons are J. F. Parks Jr. and Samuel T. Parks, who is now returning home from Korea, where he has been engaged in mining.

The Metallurgy of the Homestake Ore.*

NUMBER III.

Written by C. W. MERRILL, B. S.

PRECIPITATION.—The effluent solution resulting from the leaching with strong solution is run to the weak precipitation tanks, and has a value of, approximately, $2 per ton and a strength of 0.10% KCN. When one of these weak precipitation tanks is full, the stream is turned to the other, and the former is then ready for precipitation. It contains 300 tons of solution, which is brought into agitation by means of compressed air, and about sixty pounds of zinc powder, in the form of an emulsion, is sprayed in during the agitation. The pump, which is of the compound, duplex, outside-packed, plunger type, is then started, and the mixture pumped through two large filter presses 36 inches square, of the flush-plate and distance-frame pattern, containing twenty-four frames, each 4 inches in depth.

While the gold, silver and excess of zinc remain in the frame and on the cloth, the barren solution passes through the cloth and on to the weak solution storage tank below (of the same size as the sand vats), whence it passes again to the sand as weak solution. Its value has been reduced by this operation from $2 to 5 or 10 cents per ton, being a precipitation of 95% to 97.5%. The efficiency of this method lies largely in the fact that cloths of the presses are coated with about ⅛ inch of powdered zinc and precipitate, so that every particle of solution, having to pass through the cloths, gets a molecular contact with the fine zinc, which is true of no other precipitation process. The presses are run without opening for a month, at the end of which the press gauges indicate about ten pounds pressure, notwithstanding the fact that they then contain about a ton of precipitate worth, say, $50,000, when they are cleaned up by two men in about six hours, including the putting together with new cloths. Figures covering the labor of cleaning up $50,000 from the zinc boxes and from electrolytic precipitation would form an interesting comparison.

We will now return to the effluent solution, resulting from the contact of the tailings with weak solution during the latter part of the leaching. This is run to the strong-solution collecting vats. When these are filled, they are strengthened to 0.14% KCN and pumped directly, without precipitation, to the strong-solution storage tank, of the same capacity as the weak storage, whence it goes on to the early treatment of the charge, as before mentioned. Its value is from 30 to 50 cents per ton. It will thus be seen that the strong solution of one day becomes the weak solution of the next day, and that the values are all accumulated in the weak precipitation tanks. The strong solution thus has an approximately constant value, that is to say, only one-half of the total effluent solution is precipitated, the other half being of a constant low value.

REFINING PRECIPITATES.—As the refining of cyanide precipitates is of some importance, owing to the well-recognized losses taking place in the ordinary methods, which are from 2% to 6%, a description of the process we use at the Homestake, in which the loss is less than 0.1%, may be of interest.

The precipitate, after removal from the presses, is treated first with dilute hydrochloric acid in a lead-lined mixing tank, equipped with a mechanical agitator, a hood and a powerful exhaust fan. After agitation and settling, the supernatant liquid is forced through a filter press by air pressure. Sulphuric acid is then added, agitation begun, and the mixture heated. It is then settled, and the supernatant solution put through the press, as in the case of the hydrochloric acid. Wash-water is then added to the mixing tank and the whole mixture put into the press, where it is further washed. The aggregate value of the acid liquors and wash water flowing from the press is less than $20 from $50,000 worth of precipitate. A portion of this value is recovered from a large settling tank, into which the effluent solutions flow, and the remainder constitutes the only loss we have been able to find in this process of refining.

The resultant, acid-treated precipitate is then removed to a large steam drier, where a part of the moisture is expelled, but never all, and the precipitate mixed with litharge, borax, silica and powdered coke. When thoroughly mixed, it is sprinkled with a solution of lead acetate and the whole mass briquetted under a pressure of 4000 to 6000 pounds per square inch. The zinc having been removed, and the briquettes having been dried, a borax slag develops upon the outer surface upon being charged to the cupel, and they fuse quietly, quickly and at a low heat, without dust or volatilization losses. The lead absorbs the values, sinking to the bottom, and the slag is tapped off. All the slag having been removed, the lead is cupelled off as litharge, and the resultant metal, 975 to 985 fine, is ready to run into bars.

*Read at Am. Min. Congress, Lead City, S. D., and to be read at Oct. meeting Am. Inst. Min. Eng., New York City.

(TO BE CONTINUED.)

The Dorleska Gold Mine.*

Written for the MINING AND SCIENTIFIC PRESS by H. Z. OSBORNE.

The Dorleska gold mine has attracted no little attention the past two or three years by reason of its rapid development from a prospect to a regular bullion producer. It is situated in the northern part of Trinity county, Cal., on the boundary line of Siskiyou, on the north and south ridge separating the South Fork of the Salmon river from Union creek, the ridge also being the dividing line between the two counties. The mine is at an elevation of from 6000 to 7000 feet, the collar of the shaft being 6550 feet above sea level. The snowfall at the Dorleska is very great in winter, and a depth of from 10 to 15 feet on the level is not uncommon in the latter part of the winter. This necessitates thorough preparation in summer in the way of providing feed, fuel and supplies, to enable work to be continuous throughout the winter.

The Dorleska was discovered and located in 1897 by the late R. D. Lawrence, an old Colorado prospector. There was no outcrop, and but little quartz, in the way of float, and Mr. Lawrence made the discovery by "tracing" with the pan, finding, as he did, rich prospects in the soil for some distance below the vein. He ran a small and shallow tunnel, at no place more than 30 feet below the surface, on a narrow vein of talc, calcite and rich quartz. At first Mr. Lawrence used an old-fashioned rocker in washing the surface dirt and fine eroded material from the vein. Later he put up a small horse arrastra, which his wife operated while Mr. Lawrence dug at his mine. Only the richest material was handled, and that necessarily in a small way. In two seasons Mr. and Mrs. Lawrence, from their arrastra, and from shipments of a few tons of rich ore, took out about $14,000. Finding the arrastra too slow he purchased a little prospecting mill of five stamps, the stamps weighing about 125 pounds each, and a small engine and boiler combined. He erected the mill under the mouth of his tunnel, but was unfortunate in operating it. An overwhelming difficulty was that it was so high that sufficient water could not be obtained for amalgamating purposes. Thus he was compelled to move the mill farther down the mountain. At about the same time he had run out of rich ore, and this fact, with the worry of the, to him, unfamiliar work of the mill, litigation with the owners of the adjoining mine on the south—the Yellow Rose of Texas—and bad health aggravated by the altitude, determined Mr. Lawrence to sell out. The mine looked very bad at the time, with no ore in the vein at the face of the tunnel, 162 feet in, an inch or so only at the bottom, and all the ore (apparently) stoped out above the tunnel.

To make a long story short, the Dorleska was purchased by the writer, who had been familiar with the mine from its discovery, in the latter part of September, 1900, for $5000 cash. The Union Consolidated Gold Mines Company was incorporated in Los Angeles, Cal., with a capital of $50,000 to operate it, and work was at once commenced and has been continued without interruption to the present time. Rich ore was struck by the new owners, branching out to the southwest from Mr. Lawrence's tunnel, March 15, 1901. A vertical shaft was started about the same time, first as a winze from the tunnel, and afterwards raised to the surface, and at a depth of 81 feet a drift again intersected rich ore 10 feet north of the shaft June 19, 1901. In the meantime the little prospecting mill had been put in order and was started up for the purpose of testing the ore. Although its capacity was but a ton to a ton and a half a day, it did clean work, and in six months turned out over $30,000 in bullion. A 3½-foot Huntington mill was put up in the fall of 1900, and commenced work on December 6 of that year. About 750 tons of ore had been crushed by the two mills when the heavy snow prevented the hauling of ore and stopped milling for the season on February 25, 1902.

In September, 1901, tunnel No. 2 was started. The first 400 feet was a crosscut and about 800 feet was on the vein. The tunnel was completed early in December, 1902, connecting with the shaft at the third level, 172 feet deep. The tunnel is 1315 feet long. Rich ore was struck on this third level June 4, 1902, at a distance of 78 feet north and west from the shaft. Tunnel No. 2 drains the mine to this level, and all ore is now discharged through it, reducing the cost of transporting the ore from the stope to the mill, heretofore done on the surface, from 50 cents to 15 cents per ton. A substantial snowshed, 650 feet long, was built from the mouth of the tunnel to the top of the ore bins at the mill (see illustrations front page), in the fall of 1902, and by this means the mill is supplied with ore the year around, and without regard to the depth of snow in winter.

Following the completion of tunnel No. 2, work was resumed in the shaft December 23, 1902, and 128 feet of shaft was sunk by hand in seventy-one days, the fourth level, at a vertical depth of 300 feet, having been reached March 5, 1903. A station was cut out, a crosscut run west to the vein 89 feet, and a drift north entered the ore shoot in rich ore June 18, 1903, at a distance of 75 feet, making the distance from the shaft 164 feet.

Before snowfall in 1902 a 5-stamp battery, 850 pound stamps, made in sections for mule packing, was got in, and was put in operation March 25, 1903. During this season another 5-stamp battery, a duplicate of the first, has been put in, and will be put up and in operation about November 1. The mill is thus equipped with ten 850-pound stamps, a 3½-foot Huntington, an 8x12-inch Blake rock breaker, two 6-foot Frue and one 4-foot Woodbury concentrators, and two Atlas boilers and engines—the rock breaker being worked separately from the mills.

The shaft, which is timbered, and is of two compartments, is equipped with a Lidgerwood hoist, Worthington pump and Atlas boiler.

The mine also has a sawmill, and about 250,000 feet of lumber is sawed and used per year, in addition to about 25,000 running feet of peeled timbers. The company also has a store—the Union Creek store—and a pack train of about twenty mules. The machinery and supplies are all packed in (the last 15 miles over trails), excepting the boilers and a few of the heaviest pieces, which were sledded in over rough mountains, without roads. There are now four levels opened and about 4000 feet of excavations.

Up to September 14, 1903, about 5100 tons of ore had been mined and milled by the present company, producing $106,041.86, in forty-five bars of bullion, a yield of a little over $20 per ton. This was the result of amalgamation alone, as nothing has been received from concentrates excepting $328.02 from a lot of two tons of specially good grade shipped to Selby. The concentrates, which are accumulating at the mine, average about 1½% of the ore, of a value of about $50 per ton, though in the richest ore they run from $150 to $500 per ton. The concentrate values are in iron and lead sulphides—principally iron. The tailings are banked, and vary from $1 to $5 per ton. The ore is divided into two grades. The first grade is taken down on canvas and sacked, and about 350 tons of this grade has produced an average of over $190 per ton. The second grade ore, 4750 tons, has produced in the battery and on the plates about $8 per ton. The bullion runs from 790 to 816 fine in gold, and from 160 to 175 in silver, varying in value from $16.40 to $17 per ounce, and averaging about $16.60.

A large quartz-porphyry dike, frequently 300 to 400 feet wide, extends north and south near the summit of the divide between Trinity and Siskiyou counties, immediately west of the Dorleska. This great dike is traceable from 8 to 10 miles north and south. West of this dike, on the Siskiyou county side, are belts of schists—mica and hornblende—of 1 or 2 miles in width, extending to the granite mountains west of the South Fork of the Salmon river. East of the big dike, where the Dorleska is located, the country is mainly serpentine, which is cut up by smaller dikes of diorite, diabase and quartz-porphyry. While the general course of these smaller dikes is parallel to the big ones, they vary somewhat, and occasionally intersect each other; and one black dike, known as "Preacher's Peak," runs nearly east and west, at right angles to the others.

The Dorleska vein occurs in a calcareous-diabase dike, which runs north and south, parallel to the great dike of acid rock first mentioned and about 500 feet distant from it. The diabase dike varies from 20 to 60 feet wide, and Mr. Lawrence's first discovery was on the east contact of the dike with the serpentine, where there was a vein of mixed talc, quartz and a little calcite, from 1 foot to 4 or 5 feet wide. The rich ore was narrow, from 1 inch to 1 foot wide, and consisted of white quartz with an abundance of free gold and fine grained galena, associated with which is a small quantity of the tellurides, petzite and nagyagite. Coarse gold is not only found near the galena, but imbedded in the galena itself, forming beautiful and interesting specimens. Soon after they commenced operations the new owners discovered that the ore was not confined to the contact, but that it branched out into the dike in the form of small quartz veins and seams, these often being very rich. The dike rock itself frequently appears to have been replaced by quartz, wholly or partially, in portions where the dike has been cracked and broken by movement, and in such places the mineralization is often sufficient to make good ore for a considerable width. At the third level rich ore was found on both the east and west contacts of the dike, and through it diagonally from northeast to southwest, and for a length of 75 feet there was an average of 10 feet in width of ore. The single drift through this ore, taking out the full width of the ore body, which at some points was 15 feet, produced about 400 tons of ore and over $8000 in bullion.

Between the second and third levels the rich ore was highly concentrated at some points, and one lot of forty-six tons of first-class ore produced over $25,000 in bullion.

At the fourth level the dike was crosscut opposite the shaft and found over 60 feet wide. Seventy-five feet north rich ore was encountered running across the dike, and the ore was of good milling grade for a width of 20 feet. The dike at this point had narrowed to 29 feet in width. The ore was breasted out laterally for a length of 30 feet, the ore averaging 17 feet in width, and as all the ore bins and receptacles were then filled a single drift was extended north, and at 200 feet from the crosscut at the present writing it is still in ore, though not of high grade.

The fourth level is 120 feet deeper than the third, and no ore has been taken out between the two. All the ore milled, except that from the drift in the fourth level, has come from above the third, or 180-foot level.

A second ore shoot was found last summer in a north branch of tunnel No. 2, about 900 feet north of the main ore body, on the east contact of the Dorleska dike. At this point there is a vein of mixed talc, quartz and calcite on each contact of the dike. On the east contact the ore has been drifted on 172 feet, and varies from 6 inches to 5 feet in width of good milling grade. Frequently rich ore with visible gold and galena has been encountered in this drift, but so far less continuous than in the first ore body.

The shaft will be sunk 100 feet deeper the coming winter and a fifth level will be run at a depth of 400 feet. The company have purchased several hundred acres of timber land in the immediate neighborhood, and have compromised the lawsuit with the Yellow Rose on an agreed line between the properties. The principal owners comprise the directors and officers of the company. All are residents of Los Angeles, Cal. They are as follows: H. Z. Osborne, president and general manager; C. E. Keller, vice-president and treasurer; W. M. Van Dyke, secretary; O. Wellborn and S. B. Osborne.

*See illustrations on front page.

Hot Blast Smelting for the Production of Lead.*

Written by S. E. BRETHERTON.

We have made a short run with hot blast at Val Verde, Ariz., upon lead sulphide, containing a little, partially oxidized, iron; but the test was not long enough to decide the question of the value of a hot blast in smelting lead ores, whether as to saving of fuel, regular running of furnace, loss of metal or general technical efficiency or economy. Nevertheless, it has confirmed my impression that warm blast can be employed in the lead blast furnace with considerable resultant saving of fuel, if care be taken to secure the reduction of the lead without too much loss by oxidation; and before we resort to extensive roasting and cold blast smelting (in a place where all fuel is so dear as it is at Val Verde), we shall certainly give the warm blast another fair trial.

For the past three years I have had to contend with my metallurgical colleagues, who hold that, to be of any benefit by reason of its temperature, the blast must be heated to 600° F. or more. Admitting the theoretic advantage of the higher temperature, I still maintain that 500° F. is the limit for technical economy in pyritic smelting; and the amount of fuel that can be saved by using blast at only 200° or 300° F. is surprising. In general practice, I believe 16% coke would be used with cold blast, and (since a part of the sulphur in the charge is utilized even with cold blast), under favorable conditions, the amount of coke needed for that system of smelting may be as low as 12% of the charge. But we have been running regularly here for months on 5% of coke, and sometimes, for several days at a time, with only 3%.

At present (June, 1903), we are running one rectangular copper matte smelting furnace, and doing excellent work on material containing very little copper, our blast for this furnace being heated with the hot-blast stove originally constructed to do this work for the small round furnace. The charge (including 400 pounds of slag) is 2540 pounds, containing twenty-five pounds of copper. The product is matte containing 20.5% to 23% of copper. The furnace works perfectly; the only trouble being that the men employed as feeders have hard work to keep up with it. Our raw concentrates are moulded into briquettes in a press, and these briquettes are used to flux sulphide ores carrying silica in excess.

The general propositions, as to the use of heated blast in the treatment of sulphides in the blast furnace, seem to be:

1. That the heat required for effecting what may be called the "net" reduction of the raw material of the charge into metal or matte, and for effecting and maintaining the fusion of the metal, matte, slag, etc., may be furnished by the fuel actually put into the furnace, and burned by the blast, or by the preheating of the blast, or by the oxidation of sulphur, etc., in the charge.

2. That of these sources of effective heat, the first two cost money, while the third does not.

3. That the third can be more effectively utilized if the second also be called into play (that is to say, if the blast be preheated.

4. That the economic limits and advisability of this measure of economy in smelting must be determined in each case after due consideration of all the conditions, including not only the difficulty and cost of securing a suitable ore mixture, but also the local cost of coke and other materials involved in the problem.

5. That, for many localities in the United States, the use of a warm blast in matte smelting or lead smelting is worth considering.

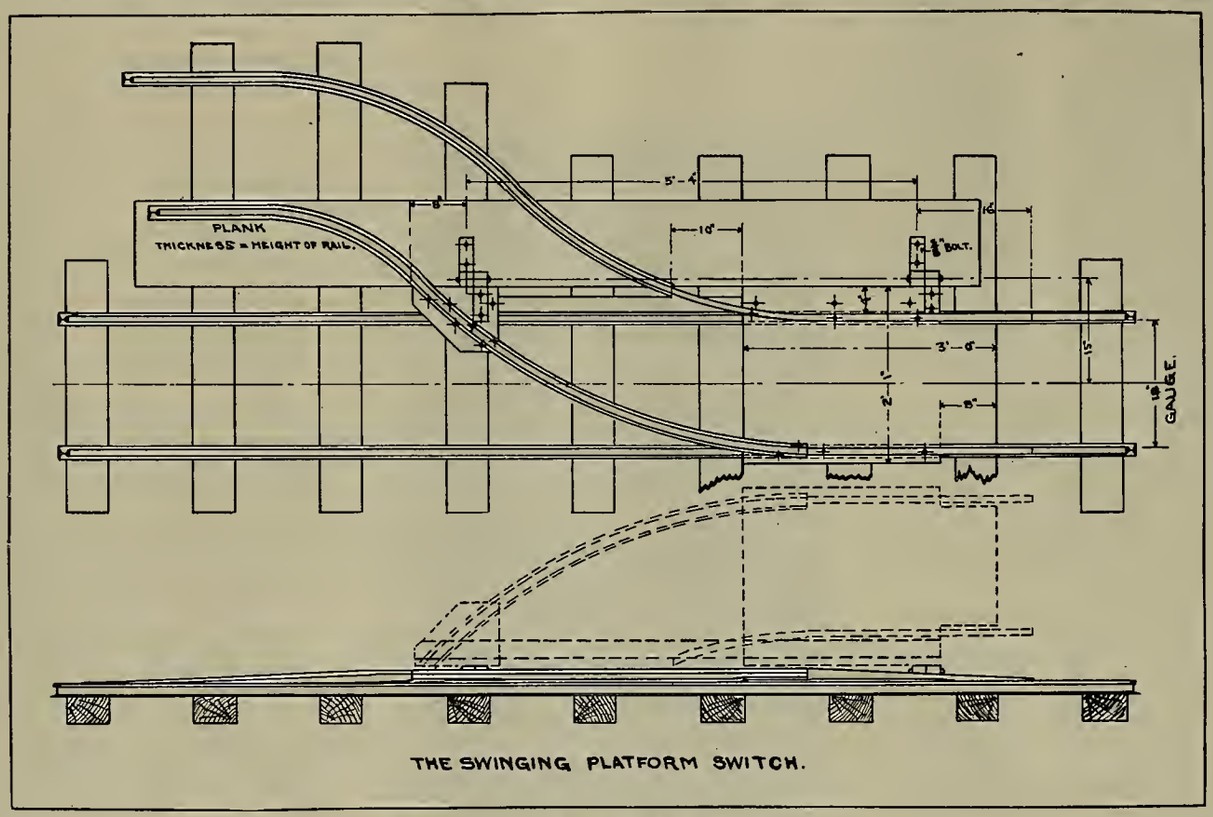
*Abstract Trans. Am. Inst. Min. Engs.

Cyanide Plant and Practice at Ymir Mine, British Columbia.*

Written by EDWIN C. HOLDEN.

In making the original estimates for a report recommending the cyanidation of Ymir stamp-mill tailings, the writer was unable to find in any of the standard works on cyanide practice certain data applicable to the local conditions; nor has he as yet seen the same practice recorded in the rapidly growing literature of cyanidation. To present these figures, together with a few novel features of local practice, the present paper is offered.

The ore treated is obtained from a fissure vein of steep dip, occurring in a slate country. The ore body is lenticular in plan, swelling from 4 feet in width at one end to a maximum of 42 feet, and tapering irregularly to less than 18 inches, where pay values cease. In the wider portions of the fissure the ore is mixed with more or less horse-matter from the walls. The clean ore is white, massive quartz, with from 8% to 12% of sulphurets; the latter being pyrite, sphalerite and galena, the predominance be-



Swinging Platform Switch. (See Opposite Page.)

ing in the order given. The precious metal tenor is variable, the gold more closely following the pyrite, the silver the galena. The present mill supply is practically all from below the oxidized zone.

The unavoidable admixture of horse-matter and stope filling, with the ore as mined, affects more or less the character of the mill feed, which sometimes contains from 10% to 25% of slate. During the last three months of 1902 the mill feed carried 0.3977 ounce gold and 1.903 ounce silver per ton of 2000 pounds, 2.65% lead and 2.92% zinc. The iron, unfortunately, was not determined.

The ore, which will pass a 2-inch grizzly, is fed into sixteen 5-stamp batteries. The mortars are narrow; the stamps average 850 pounds and drop 6.5 inches from 98 to 100 times per minute. The height of issue is from 3.5 to 5 inches, and the screens (diagonal slot) are No. 9 or 11, depending upon the height of issue. The crushing capacity is from 2.5 to 3 tons per stamp per twenty-four hours. There are no inside plates, and but one 56 by 144-inch apron plate to each mortar. The saving on the plates was 61.9% of the gold and 9.4% of the silver.

The plate tails from each ten stamps were, without classification, put over three Frue vanners. A slightly variable concentrate was made, averaging 20.6% lead; 1.17 ounce gold and 12.5 ounces silver per ton; and, approximately, zinc, 12.9%; iron, 23%; and insoluble, 6%. There was an extra smelting charge on zinc in excess of 8%; and it was a delicate matter to determine how high the grade of the vanner tails could be raised with profit, so as to throw over the zinc and reduce the concentrate tonnage. The gold saving in the concentrates was 16%, the silver 35.4%, and the lead 42%. The total saving in the stamp mill was thus 77.9% of the gold and 44.8% of the silver. These totals were higher before the tailings plant was installed, when both battery and vanner work were necessarily closer.

The vanner tailings during the quarter ended January, 1903 (and all the figures here given, unless otherwise stated, are for that period), assayed 0.0882 ounce gold and 1.051 ounce silver per ton; lead, 1.3%, and zinc, 2.2%. Of this material, 65% would pass a 100-mesh screen.

The vanner tailings being of comparatively low grade, the writer felt himself practically confined to the adoption of the system of direct filling and percolation; and, as slimes treatment was not at the same time to be provided for, the object was to treat as large a proportion of the slimes as possible with the sands; or, in other words, to make charges having the lowest practicable rate of percolation. This minimum rate is usually stated as 2 inches per hour.

It is also a current conception that a much larger proportion of slimes can be handled in an intermediately settled charge than in a directly filled one. To determine whether this possible difference in tonnage was important enough to justify the increased cost of installation and operation of a plant with settling vats was an important problem, which our experimental plant decided.

After the usual laboratory tests, the experimental plant, consisting of two 35-ton leachers, 5 feet deep, with solution tanks, zinc boxes, etc., was erected. One leacher was charged direct from a Butters' distributor, which was fed by the bottom discharge of a pointed box carrying the vanner tailings from twenty stamps. The box got rid of excess water and a little of the finest slimes. The second leacher was charged from a two-compartment box in which the vanner tailings were settled, the sands being dropped from the compartments alternately as filled, and shoveled in the leacher as in ordinary intermediate filling plants. We were thus enabled on a commercial scale to compare results of the two systems of filling with the same character of material. A comparison of results from fifty-two charges is here given, screen tests being 100-mesh:

Charged.	Fines. Per Cent.	Gold Recovery. Per Cent.	Silver Recovery. Per Cent.
Direct	44.2	76.5	52.2
Intermediate	39.8	77.2	54.1

The average minimum rate of percolation in the direct filled charge was 1.9 inch per hour. In the intermediately filled charges the rate was quite variable, but the average minimum was over 3.25 inches.

Owing to structural difficulties in the experimental plant, which had to be squeezed into an unoccupied corner of the stamp mill, we could not give the settling boxes area enough to settle regularly charges carrying the same proportion of fines as the direct filled ones; but eight of these charges, made when some of the stamps were hung up, carried 43.7% fines, and the gold and silver recoveries averaged, respectively, 73.6% and 46.5%.

These results led to the rather unexpected conclusion that direct filling, when properly done, not only leaves a charge in as good condition for treatment as the intermediate method, but renders it possible to treat a larger proportion of the slimes. It may be suggested as an explanation that in a charge settled under water the grains of sand are free to arrange themselves most compactly, with a minimum of voids, and the slimes are held near where they originally settled, because the interstitial currents are not marked enough to disturb them; whereas, in charges shoveled into a vat with less than 15% of moisture, the voids are a maximum, and the slimes which originally coated each grain of sand are washed off and settle through the charge, and, thus segregating, prevent uniform percolation. The fact that direct filled charges never pack nor settle more than 1%, while indirect ones frequently contract over 10%, during treatment, tends to confirm this view.

The final plant is located half a mile from the stamp mill and 300 feet vertically below it. The site, from which over 400 cords of timber were removed in clearing, is on a hillside, and required about 5000 yards of excavating and 630 yards of masonry for footing and retaining walls. All the plant is housed, the buildings being heavily framed, as required by the deep snowfalls.

The vanner tailings are carried to the plant by a box launder 6 by 8 inches in section, and the excess of battery and vanner waters allows of a minimum grade of slightly under 5%. At that grade, and with 1-inch riffles set 5 inches apart in the bottom of the box, the durability even of the local soft hemlock and cedar lumber used is quite satisfactory.

To make the required fall of 300 feet to the plant, a series of drop boxes is inserted where the topography is favorable; and a 12-inch sand pocket at the bottom of each drop, to prevent wear, should also be an efficient saver of escaping amalgam or mercury.

The tailings enter the top of the storage solution room; and when, as in the period under consideration, from forty to sixty stamps are running, the classification is done in two boxes, the first being 18 by 24 inches wide by 18 inches deep, with two vertical sides and false ends sloping 60° to a 0.5 by 24-inch slot, under which hydraulic currents can be applied. This box settles only the coarse sands, which are drawn off through a 2-inch nipple into the charging launder. The second box is pointed, 3 feet 6 inches in width and depth, and 7 feet long, with a 3-inch outlet. A plug valve in this outlet, in combination with the hydraulic current in the box, regulates the speed of the distributors, while maintaining the same separating action in the box. The overflow from the box, carrying about 60% of the water and 20% of the total tailings, is run to waste. This overflow should all pass a 100-mesh screen, and is mostly impalpable material.

All of the vats and tanks, except the sumps, are of steel. The leachers, 32 feet in diameter by 6 feet deep, are on timber foundations with masonry footings. Caps and sills are parallel, an arrangement which renders jacking-up easier than the usual right-angled structure. Bents and posts are spaced 4 feet between centers, and the bracing does not extend above the post, the shimming being done between posts and caps. On the caps are 4 by 8-inch joists, spaced 18 inches between centers. There is no flooring on any of the vat or tank joists, and there is headroom under them all, so that leakages occurring in the plant cannot be unknown or inaccessible. The

*Trans. Am. Inst. Min. Eng. (Condensed).

vats are fitted with top annular overflow launders; and, to preserve a level rim, a soft wood strip, projecting above the edge of the vat, is fastened with stove bolts to the side plates, the joint being calked with oakum. Any settling of the vats which is insufficient to require jacking-up from below can thus be easily rectified, as with tongue-shaped wooden vats.

The distributors are of the usual type, and have twenty 1.5-inch arms. This area of discharge openings, with our quantity of tailings, never allowing any head to accumulate in the distributor hopper, renders uniform distribution difficult. The slightest throw of the stream from the chargiug drop box off the center of the hopper results in uneven chargiug, most of the slimes going to the low side of the vat. Many devices were tried to remedy this, and to prevent twisting of the drop stream, which motion also has a classifying effect; aud the last and simplest plan was successful. The drop was made square; and inside the lower end of it au irou strip was fastened to each side. The square drop prevents twisting, and to throw the stream toward the low side of the charge small wedges were driven under the irou strips, as ueeded. These details may seem trifling; but wheu the object is to treat the maximum quantity of slimes by percolatiou they will be fouud of prime importance in obtaining a uniform charge.

(TO BE CONTINUED.)

Swinging Platform Switch.

Herewith is illustrated a swinging platform switch, for use in mines or other places where such switches are necessary or desired. This switch is especially adapted to narrow tunnels which admit of only a single track. It dispenses with any need of frogs, tongues or turnouts. The switch can be located at any point in the main track without the necessity of making any alteration therein.

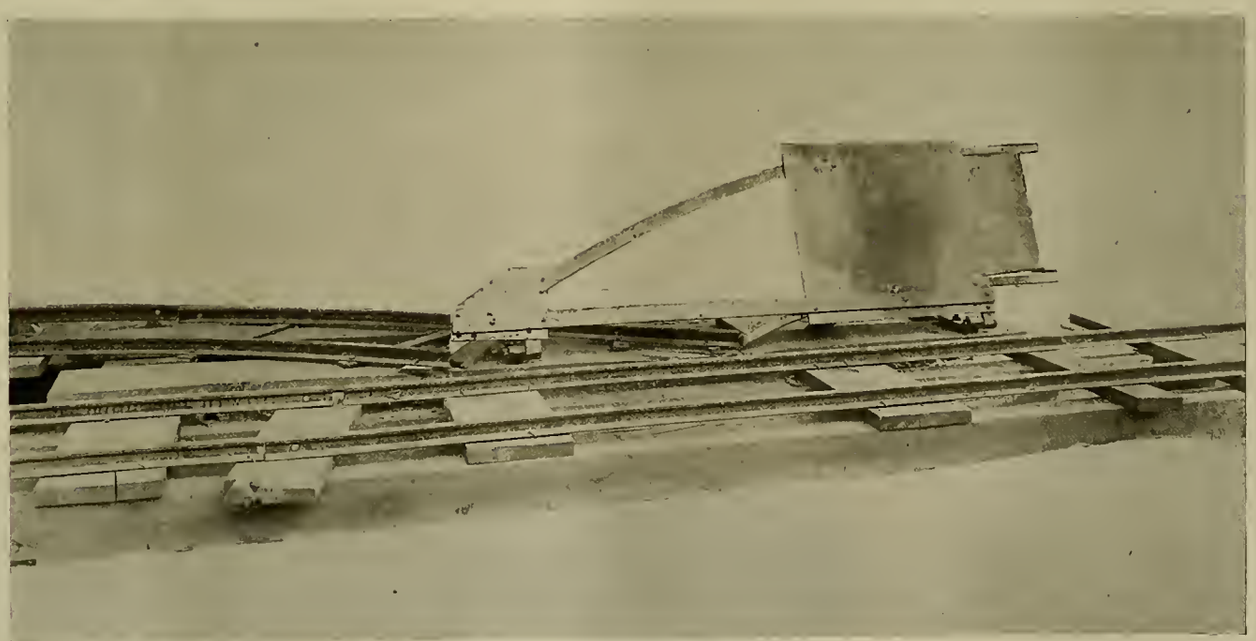
As will be noted, this swinging platform switch is a simple arrangement, consisting of a hinged plate, carrying 8, 12 or 16 pouud rail. Wheu this switch is lowered in place the rails thereon fit to gauge of track in use. The rail is rigidly bolted to the plate which carries the hiuges, the hinges being connected to each other by a strip of steel and theouter rail, which is riveted to the edge of the plate on the head eud aud the steel plate at the rear end, make a strong, rigid coustruction, at the same time being light and easy to handle. The rail on the switch is counected to the main track by a tapering bar, over which the car rises ou a gentle grade and crosses over to the branch track. The mine rails to the brauch track are conneeted to the rails of the switch in the usual manuer—with splice bars and track bolts. The switch is 7 feet 4 inches long over all, and is made to any gauge desired. The car is raised in passing over this switch the height of the rail in a distance of 2 feet 8 inches, making a slight grade, which is easily traveled over by the cars going in the tunnel, the cars coming out having the advantage of a small down grade at this point.

The hinges of this switch are securely fastened to a heavy plank, which can be spiked or bolted to the cross ties of the main track at any place along the line, and a branch or parallel track can be taken off at that point.

These switches are manufactured and for sale by the Mine & Smelter Supply Co., Denver, Colo.



Showing Platform Switch in Place.



Manner of Placing Platform Switch.

Electrolytic Refining of Copper.*

NUMBER II.—CONCLUDED.

Written by W. D. BANCROFT.

COMMERCIAL TEST.—In this test an attempt was made to duplicate commercial conditions in the precipitation of electrolytic copper. Through the courtesy of the Baltimore Copper Co. several hundred pounds of their commercial anode plates were obtained.

As the current efficiency could not be computed from the results of this run on account of a short circuit which occurred, an extra determination was made with a commercial auode, using the current-efficiency apparatus previously described. This run was made at 45° Centigrade and a current density of two amp/qdm. From the current efficiency obtained it is clear that the impurities in the anode do not cut down the current efficiency to any extent. The current efficiency of commercial tauks does not reach this high figure, probably due to leakage of the current through the slimes ou the bottom.

CALCULATIONS FOR COST OF REFINING.—Basis—One tank, inside dimensions 2 by 2½ by 9 feet. Outside dimensious taken as 29 by 34 by 16,000 square inches. Ratio of radiating surface of small experimental tauk to commercial tauk is about 1 to 100.

SOLUTION D.—The basis for the following figures on the cost of production is as follows:

Oue tank, cotaining 130 electrodes of two plates each.

Weight of copper per tank = 5700 pounds.
Value of copper per tank = $800.
Cost of power = $20 per H. P. year.
Plant temperature = 20° Centigrade.

The calculation is made on the basis that the heating of the electrolyte is done by meaus of the electric curreut. In such cases, where the cost of heating the solution is greater thau the cost of precipitating the copper, we have taken as the figures of cost the former, and vice versa, since, in precipitating the

*Trans. Am. Electro-Chemical Society, Niagara Falls, N. Y., Sept. 18, 1903.

eopper, the energy is consumed simply in overeoming the resistance of the eleetrolyte, and thereby heating it. The following table gives the results of the ealculations:

COST OF REFINING TANK OF COPPER.

Amp./qdm.	Temperature Degrees.	K. W. Hours to Deposit.	Cost to Deposit.	K. W. Hours to Heat.	Cost to Heat.	Interest on Copper.	Total Cost.
1	20	390	$1.195	000	$0.00	$2.975	$4.17
1	50	196	0.601	793	2.425	2.975	5.40
1	70	153	0.468	1,550	4.755	2.975	7.73
1	90	134	0.411	2.360	7.205	2.975	10.18
2	20	608	1.86	000	0.00	1.487	3.35
2	50	362	1.11	396	1.21	1.487	2.70
2	70	274	0.84	775	2.38	1.487	3.87
2	90	233	0.71	1,180	3.60	1.487	5.09
3	20	795	2.43	000	0.00	0.99	3.42
3	50	519	1.59	264	0.81	0.99	2.58
3	70	400	1.22	517	1.58	0.99	2.57
3	90	341	1.04	787	2.40	0.99	3.39
4	20	1,000	3.06	000	0.00	0.74	3.80
4	50	647	1.98	198	0.61	0.74	2.72
4	70	519	1.59	388	1.19	0.74	2.33
4	90	433	1.33	590	1.80	0.74	2.54

While these figures are based on experiments with the series system. it is probab'e that the conclusions to be drawn would apply equally well to the multiple system.

Exception may be taken to these estimates of the eost on the ground that, in practice, the solntions are heated by steam eoils, and that this eosts less than electrical heating. To meet this objection the results have beeu ealeulated on the basis of eleetrical power at $20 per horse-power-year, and steam heating at one-thirtieth the price of eleetrical heating. The data for the two calculations are given in the table, and show cost per ton of copper instead of per tank.

COST PER TON OF COPPER.

Amp./qdm.	Temperature Degrees.	Cost 20—20.	Cost 20—30.
1	20	$1.46	$1.46
1	50	1.89	1.28
1	70	2.78	1.25
1	90	3.57	1.27
2	20	1.17	1.17
2	50	0.95	0.91
2	70	1.36	0.83
2	90	1.79	0.80
3	20	1.20	1.20
3	50	0.91	0.91
3	70	0.90	0.78
3	90	1.19	0.72
4	20	1.33	1.33
4	50	0.95	0.95
4	70	0.82	0.82
4	90	0.89	0.89

It must be kept in mind that these estimated costs do not include the eost of labor, aud are based on the assumption of 100% current efficiency.

CONCLUSION.—Summing up the results obtained for the different runs, it is now possible to draw conelusions as to what are the most finaneially economical conditions under which to refine eopper electrolytieally.

Two sets of curves were plotted, one showing the relation between the cost to precipitate a ton of copper and the operatiug temperatnre, the seeond set showing the relation between the cost to precipitate a ton of copper and the operating current density. From these curves, it is evident that to operate at a temperature of 90° and a low-current density is entirely out of the qnestion, not only on aceount of the cost of power to heat the solntion and precipitate the copper, but also on account of the deterioration of the solution, whieh takes place very rapidly under these conditions. At this high temperatnre and the higher current densities, the cost rapidly approaches a minimum, bnt here also the deterioration probably more than offsets the advantage of reduced cost of power. To operate at 20° Centigrade is not so costly as would seem at first thought. The cost is maximum at the lowest and the highest eurrent densities, reaching a minimum between two and one-qnarter and two and one-half amp./qdm.

At 50° it would not be economical to operate at one amp./qdm, but the cost drops off very rapidly between one and two amperc. At the higher current deusities the cost fluctuates but very little, reaehing a minimum at about two and one-half amp./qdm.

The result at 70° seems the most satisfaetory, and it is at this temperatnre that we shall get the best results. Althongh the cost runs very high at this temperature for a curreut density of one amp./qdm, it begins to drop off very rapidly as the current deusity increases, until it assumes a practieally constant value at the higher eurrent densities. Between 3.5 aud 3.75 amp./qdm would be the best current density for obtaining economical results, for at this density no extra power would bc reqnired to heat the solution. Operating at this current density, and with the tanks covered, the current alonc would be sufficient to heat the electrolyte to over 80°. In order to secure a good circulation, essential for a good deposit with high-current densities, thc present method of pumping could be retained.

The lower the cost of heating, the greater the advantage of a high temperatnre. Lowering the rate of interest decreases the advantage of a high-current density. With covered tanks it will be possible for men to work in the tank room with the electrolyte at 70°.

If we compare the cost of working under the so-called standard conditions of open tanks, a current density of 14 amp./sq feet and a temperature of 50° with the eost of working with the covered tanks at 70° and a current density of 3.5 amp./qdm (31.5 amp./sq feet), the saving by the latter method will be very close to $1 a ton of refined copper when all power is figured at $20 per horse-power-year.

Therefore, in order to operate a plant most economically, copper should be refined electrolytieally under these eonditions:

1. Covered tanks.
2. Current density 3.5 amp./qdm.
3. Temperature 70°.

Testing Methods in the Physical Examination of Portland Cements.*

NUMBER III.—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by A. H. CEDERBERG.

TIME OF SETTING TEST.—This test is in many cement works practically part and parcel of the test for tensile strength, and iu other works, again, it is made entirely separate. For practieal purposes and the saving of time and labor, the first way of testing is amply snfficient. The separate test is, however, very simple. The setting of the cement can properly be divided into two periods:

First—Time elapsed in which the cement has obtained its initial set.

Seeond—Time elapsed in which the cement has obtained its final set.

When this test is made in connection with the making of the briquettes, it consists merely in applying the standard testing needles to the exposed surface of the briqnette and time in minntes recorded, when the ganges fail to show any impression on these exposed surfaces.

For scientific work the so-called Vicat needle is used. The sample of cement to be tested by the Vicat needle is prepared and kneaded into a dough in the same manner as when making briquettes. It is now formed into a ball, also, with the hands and pressed very gently into the rubber ring through the larger opening, smoothed off on both sides with a trowel, and when done it is pnt—small end np—on the glass plate and placed directly nnder the rod bearing the cap at the npper eud and the needle at the lower. The needle is now slowly bronght in contact with the exposed snrfaee of the cement paste and quickly released.

Initial setting has, according to standard rule, taken place when the needle stops at a point 5 m.m. (0.2 inch) above the npper surface of the glass plate on which the "dough" is restiug.

Final setting has, according to standard rnle, taken place when the needle fails to sink in the paste at all.

Every time the needle is used it shonld be well cleaned.

Modern standard Portand cements are supposed to be slow setting—that is, initial setting shonld not take place within 60 minutes or more in neat cement, after being mixed with water. The general standard is about 90 to 180 minntes, resulting in a final set in 4 to 6 hours. Sueh slow setting cements were formerly obtained without the aid of a foreign admixture, but the tendency among modern eement manufaeturers to prodnce a more finely grounu cement has necessitated the addition of a limited amount of calcined plaster or gypsnm in order to overeome the quick setting properties of the fiuer ground eement.

It must be understood that the setting of a cement involves a chemical action, hence the setting is accelerated by heat or fineness of grinding, aud rctarded by cold or coarse grinding. This faet explains that if a cement has normal setting properties at normal temperature (say + 70° F.) these properties will be proportionally modified at a higher or lower temperature.

This fact also explains why the manufacturer who does not hesitate to test his fresh cement has a decided advantage over the one who sticks to the idea of not testing the cement until it is seasoned.

To the expert tester the setting of the cement is very interesting, as it gives him a valnable aid in jndging of the value of the eement as a whole. Samples that show erratic time in setting are generally insufficiently plastered cements.

The marked rise in temperatnre that takes plaee owing to the ehemical action involved in this test begins in a normal cement when the initial set has taken place. From then on the temperature rises rapidly until a maximum is reached, when it gradually recedes and assumes normal temperature again. The intensity of rise of the temperature in this ease has no effeet on the sonndness or unsonndness of the eement, providing the previous boiling test has been satisfactory. If, on the other hand, a rise in temperature occnrs before initial setting has taken place, it is generally a good sign for a more or less overlimed or overplastered eement.

The amount of ealcined plaster that ean be added to a moderu cement is confined within very narrow limits, or from 1½% to 2%. Below 1½% the setting properties are too erratic and above 2% the amount of sulphuric acid gets too close to the danger line.

An insufficiently plastered cement, ground very fine and otherwise perfect, is often slow setting when fresh, but becomes quick setting even after only a few hours' aerating. This ehange in the eement has often resulted in large shipments being rejected, and, while justly so, the fact remains that the cement is perfeetly sound, but it does not meet the speeifications.

A sound cement mixed in right proportions with an insuffieiently calcined plaster also exhibits the same aggravating symptoms after aerating.

A sound cement mixed in good proportions with poorer grades of gypsnm is also very erratic in its setting properties after aerating.

A sound plaster-free cement that has become quick setting on account of fine grinding can be made slow setting by an increased proportion of water, either sea or fresh, although at a slight loss in tensile strength.

A sound and plastered cement, that has become qnick setting after aerating, on the other hand, will get still more qnick setting by an inereased proportion of sea or fresh water.

A plastered cement shows a higher tensile strength than the same cement plaster free.

An overplastered cement (2½% or more) is very dangerous, aud especially in sea water. A briqnette made of snch cement will soon show signs of eraeking and disintegration. In faet, if eement is to be nsed in sea water construction, I personally believe that a plaster-free cement ground abont 88% or 90% fine on 100 mesh is the best all-aronnd, whether qnick setting or not.

An erratic setting cement, while sound as far as boiling test goes, is equally as erratic in its tensile strength.

If, as is the custom in several cement works, the plaster is mixed in with the cement only when ready for shipment, only the most thorough and carefnl mixing will accomplish good results. The most irregular setting has been recorded in cements thus imperfectly treated—and no wonder, because even the naked eye eould easily discover the plaster in streaks all through the sample tested. Only ten days ago such a cement—new brand at that—was shown to the writer, the contractor wondering if there was any "flour" in it.

All np-to-date cement manufacturers mix the calcined plaster in with the clinkers, thus saving themselves all the above recorded troubles.

Iu a few instances I have saved a "disobedient" plastered cement by adding an exceedingly small quantity of finely ground and thoronghly slaked hydrate of lime, mixing same in thoroughly. No matter how irregnlar the setting was before, ranging from 1½ minute to 17 minutes, I brought the cement to time and got an initial setting in from 52 minntes to 90 minutes or more, even after continued aerating. Although I am not in position to jndge from lack of personal observations, I will, however, not hesitate to pronounee as a belief that cements destined for export to tropical climates, especially, would be benefited by this little addition of lime.

SPECIFIC GRAVITY TEST.—If the foregoing testing methods have been strictly adhered to, and satisfactory results have been obtained, the specifie gravity test of Portland cement is of little or no consequence.

The specific gravity is very variable in different brands.

The specific gravity is higher in fresher cements than in older, and a difference is recorded even after 30 days.

The speeifie gravity may vary from 2.90 to 3.20.

Hence the idea of rejecting a eement on accounnt of its specific gravity not being in harmony with the speeifie gravity stipnlated in a specification is just as ridiculous as the man who insists on putting certain specific gravity in the speeifications, without giving due allowance for modification from his normal figure, and it smacks entirely too much of "fixing."

Specific gravity should not enter as an exclusive test by itself in any specifications.

This test becomes of interest in the following instances:

First—If cement refuses to stand the boiling test, a specific gravity of less than minimum normal (2.9) will then indicate nnderburned clinkers.

Second—If cement, otherwise perfect, is far below modern staudard of tensile strength, the specific gravity will then tell yon in some cases, but not in all, that the cement has been adulterated.

As all Portland cements have hydraulic properties—that is, can set nnder water—the ordiuary methods in obtaining the specific gravity cannot be applied here. Numerous devices are in the market. The Le Chatelier apparatus, reeommended by the committee heretofore referred to, is the best. It can be had at any laboratory supply honse. Benzine or kerosene, free from water, should be nsed only in making the determinations. Full description accom-

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panies every outfit and is so complete that no additional mention of the same on my part will add to its accuracy.

As all modern and fair concrete specifications call for boiling test of cement to be used, and rejection of cement refusing to stand this test is a matter of right down fact, the specific gravity is only of secondary importance to the engineers.

As all modern and fair concrete specifications call for standard tensile strength, and nine out of every ten brands submitted will show figures considerably above standard requirements, it is evident that only the highest testing cement, all other tests being satisfactory, will be chosen. Hence here the specific gravity test is of only secondary importance.

Color, Etc.—Of other characteristics sometimes stipulated in specifications for concrete there is very little to say. Once in a while one sees color specified. The color in the "non-colored" cement depends entirely on the amount of iron present, but its darker or lighter color has nothing whatsoever to do with the soundness or unsoundness of the cement. There is no need, therefore, to describe the "Portland color." Only, if the Portland cement shows a color more like the light-colored natural cements, there is reason to believe that the cement is underburned, and the boiling test or specific gravity test will soon check that. The cement that is most attractive is naturally the one that is lighter in color. The so-called La Farge cement, a French Portand cement, is almost white, and, being very expensive, is used only in stucco or mosaic work. Cement used in mortar to lay brick or colored building stone may be colored with certain coloring matter and without danger to harmonize with the color of the brick or stone. For construction purposes, however, the question of color should be left out entirely. The word Portland cement is sufficient. To stipulate such a petty detail in this case is generally another case of either ignorance or "fixing."

Adulterated Cements.—I am sorry to say that in the United States adulterated Portland cements have made their entrance into the market and are being palmed off as "Portland cements." They are very few, however, and it is to be hoped that they will not be spread much. They are very difficult to detect, and only to the trained eye they present a somewhat "sluggish" Portland color. Specific gravity will in some cases be of help, but not always. The writer has had two samples submitted to him which have shown specific gravity test and all other tests O. K., with the exception of unusually slow setting properties. This cement was adulterated with a certain foreign matter to the extent of 15%, and after obtaining a sample lot of this foreign matter and grinding it up to the same fineness as a sample cement with which it was to be mixed for further tests, the mixed samples up to 32% with foreign matter showed no physical properties different from the pure Portland cement, except in being extremely slow setting. Above 32% the tensile strength in the mixed samples showed a steady decrease, which became unusually pronounced at a 70% adulteration, but aside from outrageously slow setting and low tensile strength, both neat and sand, all other tests were O. K. The chemical analysis was the only successful "discoverer" in that case. But it is paramount to fraud to sell such a cement as a true Portland cement, and if I am not mistaken I believe the United States government forbids anyone selling a cement as Portland cement that does not contain a chemical composition within the following well-defined limits:

	Per Cent.
Lime	60 to 66
Silica	18 to 24
Alumina	6 to 10
Iron oxide	3 to 5

I have on purpose not said anything about the presence of magnesia in Portland cement. Its injurious qualities on Portland cement, if found in excess (above 5%), is so well known that commenting on same is out of date. Every prospectus that has been sent me indicates that the new manufacturer or promoter entering this remunerative field has a wholesome terror for this particular compound, and it is doubtful if any Portland cement manufactured in the United States shows a quantity of over 4% of magnesia. So there is no need of "fording the river to get a bucket of water."

Conclusions.—The above would go to show that the tests required for practical purposes in order to prove a cement submitted to be a Portland cement should be as follows:

First—Boiling test.
Second—Sand test for tensile strength (1-3).
Third—Neat test.
Fourth—Initial and final setting.
Fifth—Chemical analysis.

If boiling tests show cracks very quickly, or warping, etc., reject the cement, and don't go to the expense of making any further tests with it, because, as stated, there are dozens—aye, scores—of cement brands that will stand up under the test. After having failed on the boiling test, the subsequent tests are of benefit to the manufacturer only, and neither the contractor nor the engineer should carry his burden.

A buyer of Portland cement should insist on a certified shipping test sheet from the manufacturer on every shipment bought, no matter how small or how large, and if a domestic brand is bought the buyer should also be informed by the manufacturer at what period the plaster of paris was mixed in the shipped lot. All foreign cement cargoes are accompanied by such certificates. It does not cost the manufacturer anything more to do it, as he has, if he wants to be in the swing, a permanent testing staff that can do the work in no time. This shipping certificate should embrace the following tests:

Cold water test.
Boiling test.
Neat—
Tensile strength, 1 day.
Tensile strength, 7 days.
Tensile strength, 28 days.
Sand (3 to 1)—
Tensile strength, 7 days.
Tensile strength, 28 days.
Initial setting.
Final setting.
Fineness on 100-mesh sieve.

The ending of this certificate should be worded as follows:

The ..... Company does herewith certify that the cement shipped to ..... by { rail / steamer } this date to ..... tests as per above, and that if cement of this shipment is tested in manner prescribed below it shall show up an equally satisfactory test.

(Signed) N. N..... Co.
Per N. N....., Supt.

If such rules and regulations are observed, such distressing—not to say revolting—exhibitions of concrete work that have lately been made with the use of several new brands of domestic Portland cement "superior to any imported braud" (of course) and "the standard of excelleuce," etc., would never have occurred.

Addenda.—The following "dou'ts" may be of interest to such testers or manufacturers who think they are not too old to learn something new:

Dou't use any but pure, clean water in making pats or briquettes.

Dou't use a water below + 65° F. or above + 75° F. for mixing.

Don't do your testing in a "sweat box." Try to keep, if possible, a normal temperature of about + 70° F. If not, give due allowances.

Don't, when testing quick setting cements, stop to light your pipe, look for a chew of tobacco, or go to sleep. A moment's suspension in your labor, and you may have the "pleasure" of doing it all over again.

Don't try to work a dough after initial setting has once commenced.

Don't use but one and the same method in testing various brands of cements for comparisou.

Don't, when you advertise or favor a special brand, hold up as a club for comparison your own up-to-date test of the favored brand with your dead ancestor's test of the non-favored brand; and last, but not least,

Don't think you alone are wise, or, as the old Romans used to say, "Abusus non tollit usum," which in very free, good, old Euglish may be translated as follows: "Your abusiug me is uot an argument against the truth of what I have said."

Errata.—In chapter No. 2 of this paper, which was published in the issue of October 10th, in the table on page 237, the tensile strength of the Dragon brand at two months should have read 464 pounds instead of 764, as published.

Electricity vs. the Mule.

Mule haulage is to be replaced by electric traction on the De Beers diamond mines, at Kimberly, South Africa. The locomotives are of the Westinghouse Manufacturing Co. and have four wheels, each pair driven by a motor of 10 H. P. capacity at a conservative rating. They can thus develop a full load drawbar pull of about 900 pounds, running at from 6 to 10 miles per hour on the level. The most interesting feature of these tractors is that, the gauge being very narrow, 18 inches, the motors have to be mounted clear of the wheels. The motor pinion meshes in the ordinary way with an additional intermediate gear-wheel. The journals of the shaft carrying this gear-wheel run in boxes working in pedestals over the main journal boxes of the locomotives, and rigidly connected to them. Thus the locomotive frame, which is supported on springs in the usual manner, is free to rise and fall on the axles without disengaging the gears. The motors are hung on the shafts of the intermediate gear as if these were the ordiuary wheel axles, and the usual "nose" suspension is employed.

Some Observed Electrical Phenomena.

From midnight to morning electricity decreases.
From morning to early noon electricity increases.
From noon to early evening decreases.
From evening to early midnight increases.

Electricity decreases from winter months to May or June, and then again increases until the winter months are reached again.

In the earth the electricity is generally negative.

In the clouds the electricity is generally positive, but can be negative.

In clear weather the electricity is generally positive.

In foggy weather the electricity is geuerally positive.

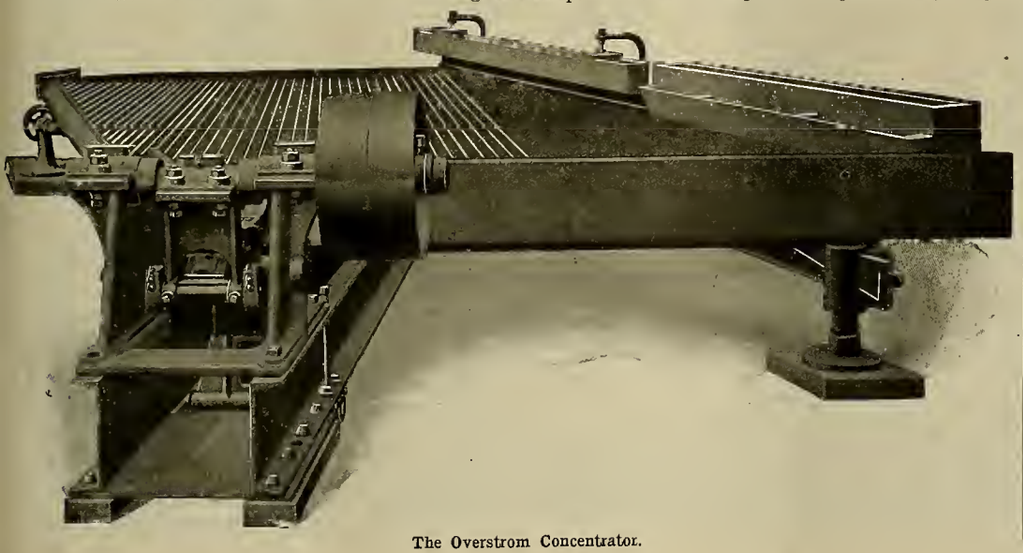
In wet weather the electricity is generally positive, but can be negative.

During snow storm the electricity is generally positive.

During thunder storm the electricity is generally negative.

The Overstrom Concentrator.

The Overstrom concentrator has been redesigned, and No. 3 is now on the market. In the new machine all of the good features have been retained, and the improvements adopted embody many new and important ones. The table is built of steel and iron throughout, with the exception of the top. It has a new head motion, which, it is claimed, advances the mineral particles more rapidly than before. Rocking arms have been provided to impart a reciprocating motion. The table top rests on four long rollers, which extend the whole width of the table, giving over 24 feet of bearing surface, and it is said by the manufacturers that no lubrication is required, and that the rollers cannot wear flat. The riffles on this No. 3 table have a double taper, a feature which, it is claimed, is a decided advance in table concentration. The machine is made by Allis-Chalmers Co. of Chicago, Ill., and is illustrated in the accompanying engraving. The pulp is fed along one end by a short box, the water feed occupying the remainder of the upper edge of the table. The makers state that the adjustment and mechanical action of the table is such that the waste water and the gangue pass off of the table on the side opposite the feed, the concentrated mineral passing over the end of the machine into a pointed box, from which it drops into a box or other receptacle for sacking or other further treatment. Catalogue No. 12, the Overstrom concentrator, fully describes the machine and its working results.



The Overstrom Concentrator.

The executive committee of the California Miners' Association will meet at the Union League Club, San Francisco, Cal., on the 19th inst., to fix the date of the 1903 convention, and outline future work and policy of the association.

Mining and Metallurgical Patents.

PATENTS ISSUED OCTOBER 6, 1903.

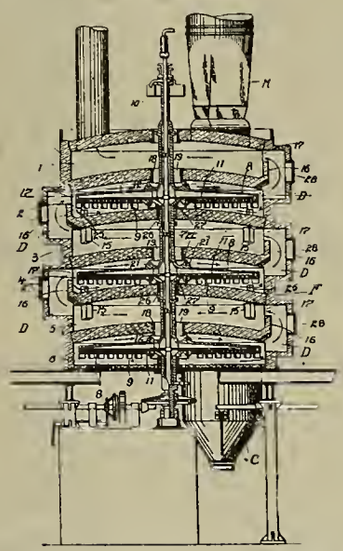
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

CARRIAGE FOR LADLES USED FOR CARRYING AND TIPPING BLAST FURNACE SLAG.—No. 740,405; J. H. Dewhurst, Sheffield, England.



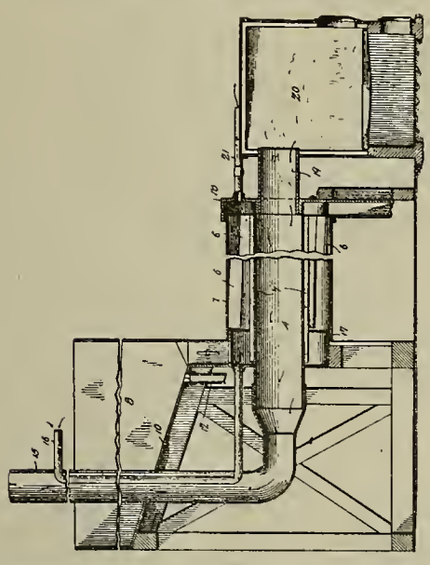
In combination, in carriage for ladles having double or twin trunnions, pedestal bearing for trunnions comprising hollow bearing bracket, one for each side of ladle, three rotary disks arranged in each bracket with spindles resting in bearings in each side of hollow bracket, center roller being made of less diameter than two outer rollers.

ROASTING FURNACE.—No. 740,589; C. H. Repath and F. E. Marcy, Anaconda, Mont.



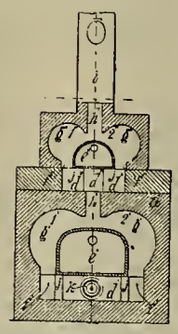
In furnace having plurality of vertically disposed hearths, peripheral chambers establishing communication between several hearths, central vertical stirring shaft in hearths, series stirring arms radiating from shaft and extending into several hearths, spouts or chutes leading from and extending suitable distance beyond margins of alternate series of hearths to series immediately beneath for permitting descent of material, yet excluding gases, and special rakes carried by stirring arms for removing material delivered through spouts.

FURNACE FOR CALCINING QUICKSILVER ORES.—No. 740,539; J. M. Cutler, Ukiah, Cal.



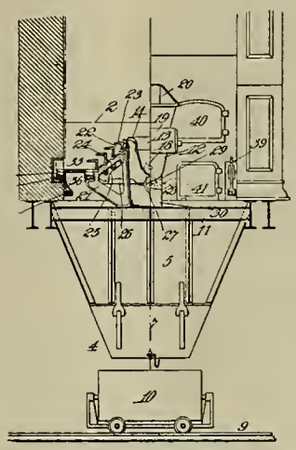
Combination in ore calcining furnace, of rotatable hollow cylinder, inner hollow cylinder concentrically arranged within first mentioned hollow cylinder, ore bin at one end of furnace opening into outer cylinder, fire box at opposite end of furnace communicating with inner cylinder, smokestack connecting with inner hollow cylinder and extending upward through ore bin, hot air pipe within smokestack communicating with interior of outer cylinder, and fume escape pipe at opposite end of furnace communicating with interior of outer cylinder.

FURNACE.—No. 740,528; H. B. Cary, Los Angeles, Cal.



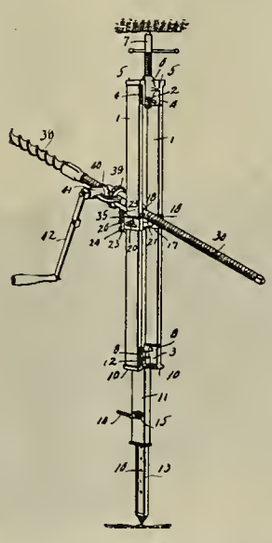
Furnace furnished with primary combustion chamber, contracted outlet leading therefrom, secondary combustion chamber forming abrupt expansion of outlet, contracted outlet from secondary combustion chamber at top of same, tertiary combustion chamber forming abrupt expansion of outlet from secondary combustion chamber, and contracted outlet leading from tertiary combustion chamber walls of tertiary combustion chamber being returned inward toward outlet therefrom.

FURNACE.—No. 740,669; J. MacCormack, Bayonne, N. J.



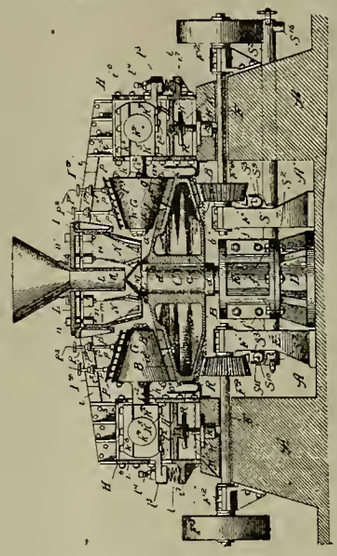
In furnace, combination with automatic stoker having fuel magazine and air chamber partially surrounding magazine, of triangular bracket secured to side of air chamber, inclined bank of rectangular grate bars on each side of fuel magazine, each bank of grate bars resting pivotally and loosely with vertical members in sockets on one side of bracket, an arm on each grate bar, connections between arms and cam for simultaneously rocking grate bars of each set.

COAL OR ROCK DRILL.—No. 740,720; I. Wantling, Peoria, Ill.



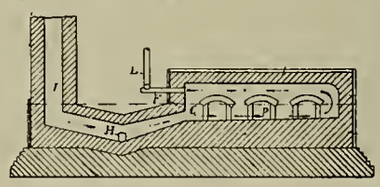
Drilling machine, comprising suitable uprights, boxing of two hinged sections together forming feed nut, support for boxing vertically adjustable on uprights having upwardly and downwardly disposed sustaining points, means for supporting boxing between sustaining points of support.

PULVERIZING APPARATUS.—No. 740,764; W. A. Kouemau, Chicago, Ill.



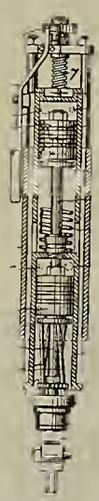
In pulverizing machine, combination with stationary base, rotary crushing bed and crushing roller above crushing bed having outwardly extending shaft, of journal box in which shaft is mounted to rotate, provided on opposite sides with trunnions, journal box support having bearings for trunnions, jackscrew on which support is mounted working through nut on base, spring bearing on support, removable and replaceable spring bearing on under side of journal box projecting beyond outer end thereof, spring confined between spring bearings, and stop on support beneath inner end of journal box.

REVERBERATORY HEATING FURNACE.—No. 740,786; S. Uren, Sacramento, Cal.



Combination in furnace of inclosed heating chamber having vertical sides and ends, discharge passage leading from one end at floor level and inclining downwardly therefrom, floor being also inclined from opposite end toward discharge flue, burner inlet passage located in end wall in line above discharge flue and near top of chamber, burner being directed to discharge hydrocarbon fuel against opposite end of chamber from which it is deflected and returned along floor to discharge flue.

ROCK DRILL.—No. 740,800; W. Brady, San Francisco, Cal.



Combination in apparatus for striking blows of cylinders fixed axially in line and having intermediate space, pistons movable in cylinders, piston rod common to both pistons and extending through end of one of cylinders, tool-carrying head fixed to piston rod, inlet and exhaust valves connected with rear ends of each cylinder, means for advancing apparatus to follow work, and cushion spring 19 surrounding piston rod and located between two cylinders, spring having one end abutting against rear of cylinder and having opposite end lying within open end of other cylinder, and collar or disk on rod in front of piston of last-named cylinder adapted to strike spring, the spring serving to check momentum of parts.

Mining Summary.

Specially Compiled and Reported for the Mining and Scientific Press.

ALABAMA.

Birmingham reports say that 12,000 coal miners in Alabama have had their wages reduced, the cut having become effective Oct. 1st. Those of the Tennessee Coal, Iron & Railroad Co. have been lowered to 52½ and those in the employ of the Sloss-Sheffield Co. to 55 cents. This is brought about by the drop in the average price received for pig iron by the two companies last month, says the News.

ALASKA.

The annual report of the Alaska-Treadwell G. M. Co., operating on Douglas Island, for year ended May 30, has been issued, showing total development work amounting to 6145 feet, including 2158 feet of drifts, 292 feet crosscuts, 1979 feet raises, 896 feet intermediate drifts, 349 feet stations and 113 feet shaft sinking. The principal parts of this development were: Connection of the 220-foot level with No. 5 open pit; the continuation of the 330-foot level, and on the 600-foot level connection was made with the lowest (or 700-foot level) of the Alaska United Mining Co. Average value of ore from this level has increased. Gold bullion from mill during year amounted to $785,515, or $1.04 per ton; from concentrates, $813,448, or $1.075 per ton of ore. Expenditures amounted to $973,493, or $1.285 per ton, divided as follows: Mining, 90 cents; milling, 16 cents; concentrates, 15 cents; other expenses, including office, new construction, etc., 7.5 cents. This compauy owns two mills. In the old mill of 240 stamps, which is run part of time hy water and part by steam power, operations were carried on for 356 days 3 hours during the year, steam being used 215 days 13 hours and water for 141 days. The total ore crushed in this mill was 409,765 tons; an average of 4.80 tons per stamp per day. Steam was used for unusual length of time, owing to very dry season. The new mill of 300 stamps uses water power only, and ran 200 days 13 hours during the year. The total ore crushed was 346,560 tons, average duty being 5.75 tons per stamp per day. Time was restricted for same eause—scarcity of water. The total tonnage of ore taken out was 759,625, and total passed through the mills was 756,325 tons. During the year there was an average of thirty-three machine drills at work in the mine, seven being on development, four on cutting out, 7.5 in pits and 14.5 in underground stoping. Total number of feet of holes drilled in the mine was 783,360, and number of tons of ore broken was 906,625, making an average of 1¼ ton ore broken for every foot of holo drills. The average work on one machine per 10-hour shift was 34.4 feet of holes. During the year 3700 samples were taken from the mine on different levels and assayed, average value being $2.086 per ton. The foundry produced 459,808 pounds of iron castings and 15,738 pounds brass castings. The machine shop, in addition to repair work, made 22 mine cars, 8 mill cars and 4 skips for the mine. A wing-dam 600 feet in length was put in to keep the tailings in place. The locomotives used in delivering ore to stamp mills have been discarded and a rope system adopted. The cars are run down to the mills by gravity, while hoisting engines have been placed at the crushers to pull the empty cars back hy wire cable. This system has worked satisfactorily. Skilled labor was scarce during the year, and wages paid machine drillers in the open pit were increased to $3.50 per day, with board and lodging. Wages paid to machine drillers underground were $2.50, with board and lodging, the difference being due to the extra danger to those working in the open cut.

J. H. Hunter of Portland, Or., for $60,000, has bonded a group of claims at Yankee Cove, above Juneau. The ledge is 8 feet wide. He will put in milling machinery, and will let the contract for driving a tunnel.——W. J. Southerland, owner of the Alaska Perseverance and Greek Boy mines, near Juneau, says he is arranging to build a 200-stamp mill on the Alaska Perseverance, and a 40-stamp mill on the Greek Boy mine. Both mills are to be in operation by next summer. The development includes a 3500-foot tunnel, driven into tho mountain 1400 feet below the surface of the ledge.

Tin deposits in the Lost River and Cape Prince of Wales districts are reported by A. J. Collier, of the United States Geological Survey. The find was made by Randt & Grim.

S. I. Silverman, of Prince of Wales island, west of Ketchikan, says there are several companies engaged in developing copper and gold mines on that island, including: The Silverman-Alaska Co., of New Jersey; the Brown-Alaska Co., the New York-Alaska Co., and the Alaska S. & R. Co., all Washington corporations, with principal places of business in Seattle and head offices in New York City.

Copper properties and gold mines are being developed by the Silverman and the Brown companies. The New York Co. is organized to engage mainly in lumbering and the transportation business and owns large bodies of timber. The smelting company is building a plant, under Superintendent P. Johnson. The smelter is expected to be completed March 1, 1904, and will have a capacity of 500 tons daily, to start with, which will later be doubled. J. L. Freeburn, formerly of Spokane, Wash., associated with C. D. Lane, of Nome, and J. H. Conrad, of Great Falls, Mont., is developing a gold property near the Silverman smelter. They havo 40 feet of $20 ore and are down 50 feet. The property is within 600 feet of tide water. Another Lane property on the islaud is the Crackerjack. They have tapped the vein at depth of 350 feet with a crosscut tunnel 600 feet in length.

The Alaska-Treadwell G. M. Co. reports for month of August that the 240-stamp mill ran 30¼ days; 300-stamp mill ran 29 days, crushing 81,183 tons ore. Estimated realizable value of bullion, $91,179. Saved 1636 tons sulphurets; estimated realizable valuo of same, $92,273. Workiug expenses for month, $84,897.

The United States Geological Survey will have parties next year investigating the mining resources of southeastern Alaska, the formation in the Yukon country and the oil deposits in Alaska. If the appropriation is sufficient, parties will continue the study of the geology of the Nome district and will investigate the coal supply.

ARIZONA.

Cochise County.

East of Tombstone in the Dragoon mountains the reduction plant of the Black Diamond C. Co. is in operation. The smelter is of 200-ton capacity. The company has begun shipments of copper bullion. There are 150 men at work. A pipe line has been completed from the Commonwealth mine at Pearce, from which source 45,000 gallons per day are obtained, this being sufficient to supply the smelter at present capacity.

The Consolidated M. Co. at Tombstone is shipping ten to fifteen carloads a week. An average of one carload a day is being shipped from the main shaft, while the Silver Thread, Tranquility and the Comet contribute the balance, says the Tombstone Prospector. The station on the 700-foot level is being cut, and Superintendent Walker expects to have this station complete, and the two pumps originally intended for the 800-foot and 1000-foot levels set up by December 1. Most of the ore that is being taken from the shaft comes from the third and fourth levels, while a winze on the 600-foot level also contributes. Tho ore bins have been completed. At the Comet the number of men has been increased, and tbe 300-foot level is being cleaned up and a new track put in preparatory to stoping ore. It is the intention of the company to build a narrow-gauge road from the siding at Schusters to the Comet and a branch to Emerald. The Comet ore carries considerable manganese, and is in demand by the smelters for fluxing, says Walker. At the Emerald they have reached the 400-foot level and are repairing the shaft. The company expects to start up the west side this month. The pumps in the main shaft are handling 2,360,000 gallons of water daily.

The Calumot & Arizona mine, near Bisbee, produced 2,535,800 pounds of blister copper during tbe month of September.

Maricopa County.

(Special Correspondence). — The La Gloria M. Co., operating in the White Tank mountains, have completed a wagon road from their property to Beardsley, on the Santa Fe, Prescott & Phœnix Railroad, a distance of 12 miles. One earload of ore has been shipped and two more ore teams will be put on.

C. Rampf, at his gold claims on Lime creek, is doing development work.—— Fleming Bros., in Cave Creek district, north of Phœnix, have opened up a ledge 6 feet wide, showing ore that carries 15% copper and $25 in gold.

The Michigan G. M. Co., who have been dry placering (with power machines operated by gasolino engines) near the Santo Domingo mine, near Morristown, have suspended operations indefinitely. This company bought the machines that were formerly used by the Marieopa G. M. Co.

Phœnix, Oct. 5.

F. X. O'Brien, manager of the Interior M. & T. Co. mines, near Wickenburg, has forty men at work and two shafts are being sunk. Preparations are being made for the operation of the 10-stamp mill. More stamps will be added.

F. X. O'Brien, manager of the Interior M. & T. Co., near Wickeuburg, has forty men at work and two shafts are being sunk for the operation of a 10-stamp mill.

Mohave County.

Operations on the De la Fountaine mine at Stockton Hill, near Cerbat, are suspeuded temporarily, and it is proposed to put in a hoisting plant and other machinery. The main shaft is down 327 feet.

Pinal County.

The Golden Quiver group of mines, in Mineral Hill mining district, 16 miles northeast of Florence, has been sold to C. G. Wernor of Los Augeles, Cal. There has been 1000 feet of work doue. Work will be started next week, and later a reduction plant will be built.

Yavapai County.

(Special Correspondeuce).—The Whipsaw mine will resume operations this week. A gasoline hoist will be put in and the other machinery repaired.

It is reported that the Crown Point stamp mill will be put into operation next week. Men will be put to work on the road to tho Crown Point mine from Wickenhurg.——The Kingston M. Co. is preparing to resume.

Prescott, Oct. 12.

At the Poland mine, at Poland, more men have been put on the tunnel and two shifts are at work on a drift off the tunnel, says Superintendent Martin. In the main tunnel, in 4000 feet, operations are retarded by the heavy flow of water from overhead.

ARKANSAS.

Boone County.

Reports from the Anna mine, 3 miles east of Harrison, say the eight miners at work are taking out jack.

Marion County.

The Arkansas Dev. Co. of Yellville was incorporated last week, with J. M. Clokey, H. Wells, R. J. Williams and R. W. Hess as officers.

CALIFORNIA.

Amador County.

The cyanide plant for treatment of the accumulated sand and tailings at the Sand Pile mine, near Forest Home, is nearing completion, says the Amador Ledger. These tailings are from the Plymouth mills. The plant consists of six tanks, each with a capacity of 240 tons, and it is expected to discharge one tank each day. The contract for the delivery of 240 tons per day of sand to the cars has been awarded at 10 cents per ton. The tailings are said to carry $1 per ton in gold. The plant will keep twenty men at work.

Calaveras County.

At the Bluejay quartz mine, on the Calaveras river, near Jesus Maria, 3 miles east of Mokelumne Hill, the Fanny Marie M. & M. Co. has built a pole line from the Standard Electric Co.'s main line, and put in an air compressor, with motors for power drills, fans, etc. They are running the double track crosscut tunnel 1200 feet to strike the lead, which will he at a point 700 feet from surface. The tunnel is in 700 feet, says Manager F. P. Cortmarsh. Cortmarsh & Gnecco are owners of the north extension of the Bluejay and are developing the lead. Open cuts have shown a 7-foot vein that prospects in free gold.

Work has started again on the Gold Hill Con. gravel mine, near Mokelumne Hill.

The Petticoat Con. group at Railroad Flat, consisting of ten locations, have been bonded by J. L. Green. He says he will sink a three-compartment shaft, 1000 feet on the north end of the Petticoat lode, and a 500-foot shaft at north end of Afterthought ground, and run a crosscut tunnel from Spruce gulch, 1000 feet, that will cut all the veins 350 feet from surface. An air compressor will be put in at Spruce gulch, wbere water can he had from the Calaveras Dev. Co. canal under 550 feet pressure to ohtain power for hoists, mill and drills.

El Dorado County.

(Special Correspondence).—The Gentle Annie mine, owned and operated by the River Hill M. & M. Co., is preparing to sink from the drainage tunnel level (735-foot) to the 1000-foot point. There are forty men at work and twenty stamps are dropping full time on ore which runs 3% sulphides. They are working two parallel veins. The Clay Hill mine at Placerville is being developed. —— Tho Fisk, owned and operated by J. H. Skinner, has a 5-stamp mill running one shift.

In excavating for the abutment of a bridge across the creek in town last week a piece of bedrock was uncovered that had never been worked, and $50 in gold was taken out. Placerville is improving in a business way, both from mining and lumber interests.

Placerville, Oct. 14.

Fresno County.

The Union Oil Co. at Coalinga is down 250 feet on No. 2 and are getting ready to drill No. 3 well. Their lease calls for five wells. —— The Southern Pacific Railroad Co. has teams and men at work on their pipe line, which when completed will tap the entire west side field in Coalinga district.

Inyo County.

The Gold Crown M. Co., operating near Ballarat, is preparing to put up a quartz mill.

Kern County.

(Special Correspondence). — Saturday, the 10th inst., was the first pay day of the Yellow Aster M. Co. at Randsburg since the strike. There are but few of the former employes and strikers left in town. Superintendent Barton has 130 stamps dropping in their two mills, crushing 500 tons of oro per day. There are 200 men on the payroll, and moro are being added.

Atkinson Bros. have their 3-stamp mill in steady operation.

The Pinmore mine and mill at Johannesburg are in operation, under lease to W. F. Ernst & Nelson, on a royalty basis.

Randsburg, October 14.

(Special Correspondence).—At the Exposed Treasuro mine, 5 miles southeast of Mojave, Manager C. de Kalb says thoy propose to add thirty stamps to their 20-stamp mill.——The Karma M. Co. at Mojave has bought a second-hand 10-stamp mill and will add to it teu stamps more. J. R. Gerner is president and superintendent.

The Echo M. Co. at Mojave propose to add a centrifugal or a rotary mill to its 10-stamp mill. Superintendent J. Keith reports opening a rich shoot in the mine carrying horn silver and black sulphide of silver. G. H. Hooper is president and manager.

Mojave, October 12.

Dividend No. 51 ($10,000) of the Yellow Aster M. & M. Co., Randsburg, makes a total to date of $543,789.

The Rayo M. Co., operating in Pioneer distriet, near Randsburg, is putting up a hoisting plant, stamp mill and concentrator at its White Star mine. Superintendent J. H. Parker expects to have the stamps dropping by December 1st.

The oil well which is being drilled near Hiawatha is down 1280 feet. Gas is reported coming from the well and there is oil showiug on the water.

The coal company at Garlock is preparing to prospect its ground witb diamond drills.

Nevada County.

Bourn & Co., who have bought the North Bloomfield Hydraulic Co.'s mining and water properties, will begin drifting operations at the Malakoff gravel mine, near North Bloomfield, next week, says R. A. Thomas of Birchville, superintendent.

In Boston ravine, in southern part of Grass Valley, several men are at work with primitive rockers on the banks of the creek washing out gold. A piece of ground has been struck not touched by early-day miners, and, it is reported, out of two wheelbarrow loads $5 in gold was washed out.

The 3-stamp mill at the Roso Hill mine, near Grass Valley, is in operation. Power is furnished hy a gasoline engine.

The Phelps Hill M. & Dev. Co. has been incorporated, with W. H. Martin, C. R. Quackenbush, W. H. Dunlap, D. E. Morgan, P. F. Simonds, W. P. Ketcham and C. A. Poage as directors, the last named being general manager, with headquarters at Nevada City. The directors met and elected W. P. Ketcham president, C. A. Poage vice-president, C. R. Quackenhush secretary and treasurer. Mr. Quackenbush, who is from Chicago, will remain here and care for Mr. Ketcham's interests.

The Old Home Con. M. Co.'s property, in Blue Tent district, near Nevada City, was sold by the sheriff last week on decree of foreclosure, being bid in by F. Schnittger.

Work is under way at El Oro mine, near Mayhert (formerly the Yuba mine). Lumber and supplies are on the ground and machinery will be taken in, says Superintendent J. L. Bryson.

The Irish-American quartz mine, embracing a number of claims, among them being the claims of the Grass Valley-Carson City Co., the Vulcan, Venus and the Central M. Co.'s properties—a surface area of sixty acres—have been sold to J. D. Hague, president of tbe North Star M. Co. at Grass Valley, for $17,000. The property is between the North Star and Central Shaft mines.

San Bernardino County.

(Special Correspondence).—The Roosevelt M. & M. Co. at Camp Rochester is

preparing to put in a 10-stamp mill, which is expected to be in operation by December 1st. C. R. Emery is superintendent. ——The B. E. Chase G. M. Co., E. H. Stagg, manager, intends to build a 10-stamp mill and a cyanide plant at its mines at Camp Rochester.

Camp Rochester, October 13.

Shasta County.

(Special Correspondence).—The Mountain C. Co. at Keswick has four furnaces in blast and three converters. The output is being increased and more men put to work. There are over 1500 men now on the payroll.

Keswick, Oct. 13.

The Bully Hill C. Co. at De Lamar is building a concentrator between the mine and the smelter, to handle its low grade ore. Work is progressing on the new furnace.

Sierra County.

D. F. Meiklejohn, operating cyanide works at the Young America mine, near Sierra City, has closed down for the winter, but will resume next spring, says the Mountain Messenger.

Siskiyou County.

Jillson & Co. expect to start up work on their gold-bearing quartz ledge, near Henley, next week. They shut down in August on account of a strike at the Gladstone mine in Shasta county, which they also own.

Solano County.

Manager Tregidgo of the St. John Con. Quicksilver M. Co. reports work progressing on their mines 5 miles from Vallejo and a mile north of Vallejo White Sulphur Springs. The property covers 712 acres of mineral rights on which considerable development work was done between 1873 and 1880. The country rock on the west is metaphoric sandstone and serpentine, and on the east sandstone and blue talcose slate, accompanied by a magnesian schist. Cinnabar is found in seams and impregnations. Within a distance of 2800 feet eight shoots of ore have been found and worked, varying in length from 40 to 80 feet. The mine has been developed mainly by tunnels and drifts which give 300 feet of backs. A shaft has been sunk 250 feet below the main adit, which gives a depth from the croppings of 600 feet. There are two furnaces with 12,982 cubic feet of condensing space, and three retorts with 2500 feet of condensing space. Additional machinery has been put in and an improved oil-burning furnace is being built, also an aerial tramway, sawmill and electric lighting plant. C. Bone is president.

Trinity County.

The owners of the Headlight mine will rebuild the cyanide plant burned last summer. It will have 100 tons daily capacity. The mine is on Trinity river, across from Carrville.

T. Hancock of Chicago, Ill., has an option on a one-half interest in the Blakemore placer mine of eighty acres, near Lewiston. The transfer is to be perfected on fitting up of the properties by the grantee with reservoirs, ditches, giants, flumes, etc., work to begin by Nov. 1. The same parties have sold to E. H. Hughes and T. Hancock of Chicago the First Chance, Copper King and Rattler quartz mines in Eastman Gulch mining district. A. J., J. M. & C. Blakemore have appropriated 1000 inches of the waters of Jennings gulch to be used on the Blakemore placer mines.

E. H. Wakeman for Eastern men has a bond to work the Weaver creek properties, near Weaverville, of the Junkan estate by dredging process.

Preparations have been made to work the Senger & Hughes placer mine on West Weaver creek, near Weaverville, by Oakland men. E. F. Burrill of Alameda, who has a bond on the property, has formed a company, and M. A. Senger will superintend the work. The West Weaver water of the La Grange Co. has been leased and hydraulic equipment is being placed.

Tuolumne County.

(Special Correspondence). — W. Sharwood, superintendent of the Soulsby mine at Soulsbyville, is running a crosscut west from the 300 level of the Pennsylvania vein to intersect the west branch of the Soulsby vein. In the early history of the mine this branch was worked extensively. The crosscut has cut a large dike of pegmatite, which in this district is often an accompaniment of an ore shoot.

D. Nagle has bonded the Con. Carlotta and Pennsylvania mines at Cherokee Flat, 1 mile north of Carters. The mine is developed by a vertical shaft and has produced some rich ore. The vein is an east-west fissure in granite, and the ore heavily sulphuretted, carrying galena, blende and iron and copper sulphides, beside pyrrhotite.

Soulsbyville, October 12.

Operations will bo started on the marble quarry owned by Grant Bros., northeast of the Columbia Marble Co.'s works, near Columbia.——Operations have been resumed at the Concord mine under Superintendent C. H. Wilhelm.

At the Mohican mine, near Groveland, there are thirty men on the payroll. Steam has been installed in place of distillate. The underground hoist and machines will be run by compressed air, says Superintendent Chappellet.

E. Lanzone of Stockton has an option on the Electric and the Thunderbolt mines and millsite, on southeast slope of Mt. Elizabeth, 10 miles south of Soulsbyville, for $10,000. A stamp mill and other machinery will be put in. E. C. Hahn of Stockton is superintendent.

The Confidence mine at Confidence, on the East belt, bas been shut down due to a disagreement among the owners as to the advisability of reinvesting some of the profits obtained from the mine in its further development, says the Mother Lode Magnet.

The Longfellow mill at Big Oak Flat is being torn down and removed to the Nonpareil, near Groveland, says Superintendent Dron, of the Nonpareil.

The water is out of the Doyle gravel mine, near Columbia, and operations will be resumed by Estey & Stanford.

W. Sharwood and T. O. West have bought the Independence quartz mine, east of and adjoining the Soulsby mine at Soulsbyville, says the Banner.

The Starr King mine and mill, near Carters, C. A. Holland manager, are running with steam power and twelve men are employed.

Ventura County.

(Special Correspondence).—The Columbus Borax Co. of Chicago, Ill., operating at Griffin, has struck a high-grade body of mineral, and is preparing to make regular shipments as soon as teams enough are obtained. C. Sehliesmayer of Neenach, Cal., is superintendent. Carpenters are at work putting up buildings.

Griffin, October 14.

The Ventura Light & Power Co. has announced that Ventura and Oxnard will be supplied with natural gas for fuel purposes. During the past two months a drilling rig has been developing gas territory in Ventura River Bottom, 2½ miles north of Ventura. From four wells tbey have secured a flow of 25,000 cubic feet per day.

COLORADO.

(Special Correspondence). — Several damage suits have been filed against the Governor and the officers in command of the militia at Cripple Creek by the miners who were arrested and confined in the "bull pen." The past week has witnessed a decided improvement in the strike situation at Cripple Creek, and it will not be many weeks before the militia can be dispensed with. At Telluride the mines are starting operations with non-union men.

Denver, October 12.

The coal miners of Colorado, members of the United Mine Workers, are preparing to call a general strike, tbe operators refusing to recognize them on the following demands: That eight hours shall constitute a day's labor; that all wages shall be paid semi-monthly and in United States coin, and that the scrip system be entirely abolished; an increase of 20% on contract and tonnage prices and 2000 pounds to constitute a ton; that all underground men, top men and trappers receive the same wages for eight hours as they are now receiving for nine and one-half and ten hours and over for a day; for the better preservation of the lives and health of the employes, a more adequate supply of pure air, as prescribed hy the laws of the State, is demanded. Following is an estimate of the number of coal miners who would be affected by the order to strike in District 15, which is to go into effect Oct. 17th.

Colorado (southern fields)	12,300
Colorado (northern fields)	3,300
New Mexico	2,200
Wyoming	3,400
Utah	1,800
Total	23,000

Clear Creek County.

The Silver Plume M. & T. Co. has been incoporrated, with H. L. Roberts, W. H. Stephens, H. H. Noyes, L. L. and W. A. Roberts, as directors, to operate tbe Mary Etta group of claims in the "gold belt" on McClellan mountain, above Silver Plume. Considerable development work has been done, resulting in opening ore from which shipments have been made giving returns in both gold and silver. It is intended to drivo a tunnel to cut the lodes at depth.

El Paso County.

The Golden Cycle M. Co., of Colorado Springs, will unite with a number of other mining companies in building a reduction plant in Colorado City, which will be in operation by March 1st, 1904, says President Milliken of the Golden Cycle Co. The plant will cost $350,000 and will begin with capacity of 300 tons per day, witb arrangements made for another 100 tons if necessary. President Milliken has bought 100 acres of land east of the Telluride mill at Colorado City, for the mill site. The Golden Cycle output of 150 tons per day has heretofore been treated by the Telluride plant by means of the bromide process. The new plant is expected to use the cyanide process and will employ from 100 to 150 men per day.

Fremont County.

The Victor Oil, Coal & Refining Co. has been organized at Victor, and has bought 160 acres of oil land 3 miles south of Florence for $10,750. R. Parker, J. M. Vincent, C. Meeley, J. F. Miller, W. Jones and W. Price are directors. In addition to oil indications the ground is said to be underlaid with a 3-foot seam of coal, whicb will also be developed.

Gilpin County.

The Bluegrass M. & M. Co. are putting in a stamp mill on Beaver creek, in Phœnix district, 1½ miles from Rollinsville. Machinery is on the ground, and they expect to have it in operation by January 1st. Their rock assays $15 in gold.

The New Haven group of ten claims, at the head of Lump gulch, near Rollinsville, has been sold to the Fortunate G. M. & M. Co., in which Prebble & Randel of Rocky Ford and A. M. Stevenson of Denver are interested. New shaft buildings will he put up on the New Haven and Fortunate shafts, and each shaft will be sunk 100 feet deeper. On the New Haven a prospect tunnel run by Manager E. W. Morse showed ore with values in gold and copper.

The Wizard G. M. Co. reports operations will be resumed on its group of claims ou War Eaglo hill, between Lump and Gamble gulches, near Rollinsville. The claims have been partially developed by a tunnel, in 700 feet. At the mouth of the tunnel is a compressor plant. Missouri and Boulder, Colo., men are interested.

Siems & Ehrenbach of Rollinsville report a discovery of tungsten ore 2 miles west of Rollinsville, on South Boulder creek, and have a group of six claims located. The veins show a width of 8 feet.

J. T. McClanahan of Boonville, Mo., president and manager of the Bertba G. M. & M. Co., says development work will be increased. Their mines consist of a group of twenty claims near the Clear Creek county line, near Idaho Springs, on the line of the Newhouse tunnel, near the Sun & Moon and Arizona properties. They also own the Bertha 40-ton mill in Idaho Springs, which is working under lease at present. Work will begin in the Colfax shaft, where there is a showing of ore, but the principal work will be done on the Half and Half vein, where it is opened up in the Newhouse tunnel for a width of 25 feot.

Hinsdale County.

The Isolde mine, near Lake City, is being operated by C. F. Meek and development is going ahoad.

The Moro mine at Capitol City started operations last week with fifty men, says Manager Jamison. The mill is also running. The ore bodies have been exploited along the vein and by deep tunneling.

Jefferson County.

(Special Correspondence).—A. B. Frenzel of Denver has offered through the Colorado Scientific Society a prize of $250 to the student of the Colorado School of Mines who will write the best paper on Tungsten in Colorado. Dr. Alderson, president of the School of Mines, believes this will bring some good papers on the subject.

Golden, October 11.

Lake County.

The Yak Tunnel Co., at Leadville, is making a steady production of 2000 tons a month, and in addition is opening up considerable new ground, says the Carbonate Chronicle. There is a portion of the bore which is in soft ground through the Pilot fault, and it is being repaired and heavily timbered. The company will complete arrangements for working further into Breece hill.

The car situation at Leadville has improved, resulting in the more rapid movement of ore. Tbe A. S. & R. Co. is receiving its regular average, and the zinc smelters are accepting the full amount of ore under their contracts. Tbe September production shows 73,500 tons. There has been increase in smaller shipments from outside districts.

The Oro Leasing Co., J. R. Curley, manager, has resumed operations on Carbonate hill at Leadville. A surface plant has been built.

The La Plata gold, silver and lead mines of Leadville, owned by the Imperial G. M. Co., Ltd., of London, England, have been sold to G. D. Tower et al. of Mendota, Ill., for $30,000. It is intended to begin active operations next week. The average daily output has been twenty tons, yielding $8 per ton.

The owners of mines lying north of Big Evans gulch, near Leadville, where the Progressive, Pride of the West, Price, Hassard and other shafts are located, are organizing a co-operative plan to handle the heavy flow of water that is in this section. The project is similar to that of the Pumping Association which handles the water of Leadville basin. Added to the water in the basin proper, a large flow comes from the El Paso basin on account of the Iron fault, which will have to be handled, says the Times.

The price of zinc at present being up, has given an impetus to the industry in Leadville district, says the Times. The Empire Zinc Co. owns the Colonel Sellers mine, which has a large body of zinc ore, hut so much of this class of ore is coming from other mines that the company will probably not work this property for some time. The Eclipse, on Breece hill, after being idle for several years, has resumed, says Manager Hoskins.

The Keystone mine, in north end of Leadville district, has resumed.

Larimer County.

The Pearl Mining Times says the Coldwater M. Co., operating the Wolverine mine near Pearl, has eighty tons of high-grade ore in its bins. Development work has shown three distinct veins and 9 feet of ore. Twenty-one men are employed.

La Plata County.

There are 400 men working in the La Plata district, says tbe Times, and it is not expected the number will be decreased during the winter. The district will double its gold output of any former year. Among the new mills will be the 500-ton plant of the Bonnie Girl Co. Three other mills will be built along the La Plata river by next spring.

Ouray County.

G. Crawford says he will start work on a tunnel to drain the lower workings of the Yankee Girl, Guston and Genessee Vanderbilt mines on Red mountain, near Ouray. The deepest shaft is down 800 feet. Crawford will also start work on the Old Lot in Poughkeepsie gulch. This mine has produced gold and silver ore.

Near Ironton, tbe Barstow M. Co. proposes to build a mill, in which case the Silverton railroad will be extended from Red mountain. J. Kennedy has opened up the J. I. C. mine in Ironton, and has put in a compressor and other machinery.

Park County.

Ore shipments from Alma mines are increasing. The London mine is shipping ten cars a week and the Hock Hocking four cars. The London has forty miners at work and six ore teams hauling to the railroad. The mine will increase its number of men to sixty as soon as its new ore buildings are completed. The Hock Hocking has twenty-five men at work. The Halo M. & M. Co. has built an assay office at tbe mouth of the tunnel, and other buildings. —— Considerable tunnel work is under way in Alma district, says the Post. The Queen Bee G. M. Co., composed of Boston men, is driving a tunnel in Buckskin gulch, the first contract being for 1000 feet. It is in 200 feet. The Mosher group, in South Mosquito (the Moffat Syndicate group), has started a tunnel to develop its veins. The South London tunnel continues being drivon toward the North London workings. The Montgomery G. M. Co.'s tunnel in North Star mountain is progressing, and the Viking tunnel is also driving. Three contracts are under way on the Dolly Varden mine on Mt. Bross, one of the silver producers in the early days of the camp. Two of these contracts are for sinking and one for cleaning out workings.

San Juan County.

The Venetian M. Co., on the Peacock and other mines on Cement creek, near Silverton, has closed down for repairs, says Manager Cooper.

The men on the Silver Lake mill, near Silverton, struck last week. M. Pickell, superintendent of the mill, had a misunderstanding with W. R. Cox, manager of the Silver Lake, and resigned, and was followed by between forty or fifty men, three only remaining. No question of hours or wages was involved. The Silver Lake mine furnisbes employment for 400 miners, but so far they are not affected.

San Miguel County.

A bond and lease has been given on the Link and Jumbo lodes, in Bridal Veil basin, near Telluride, to Chicago men, who have put men at work under Superintendent W. Hutchinson.

The Butterfly-Terrible mill, near Ophir, is closed, but the management is taking advantage of shutdown to repair the mill and put in steam plant.——Development is going ahead on the Nevada mine through the Deadwood tunnel.——Work on tho Carribeau mine continues and a

portion of the mill is running steadily. Several cars of concentrates, besides some crude ore, is sent regularly to the smelters each month. When the ventilating system has been perfected in the mine more men will be put on and the entire mill put in operation.

At Ophir Loop everything is running and the Silver Bell mill is operated at full capacity, making regular shipments of bullion to the mint and concentrates to the smelters.

Teller County.

Construction work is under way on the cyanide mill for the Snowshoe claim of the Streeter & Cripple Creek M. & M. Co., near Cripple Creek.

The holdings of the Isabella G. M. Co., near Cripple Creek, and controlling interests in the Orphan Bell and Empire M. Co., have been taken over by the Isabella Mines Co., which has been organized under Wyoming laws. The damage suits of the Orphan Bell Co. against the Isabella Co. for claims aggregating $1,500,000 have been dismissed. The Buena Vista claim of the Isabella group is on Bull hill. The president of the Isabella G. M. Co. is E. W. Giddings, Jr., of Colorado Springs.

The Gillett M. & R. Co., which owns a tract of land east of Gillett, will build a cyanide plant capable of treating 100 tons of ore daily. The site of the new plant will be on west spur of Trachyte mountain, says the Cripple Creek Times.

The Jackson G. M. Co., owned by New York men, with J. Huff of Victor manager, will put in a plant of machinery capable of sinking the shaft to a depth of 700 feet. When the 300-foot level is reached lateral work will be started. The Jackson Co. owns twenty acres of ground on the ridge above Dutchtown.

According to the mine owners, Cripple Creek will be outputting its usual tonnage by November 1st. The strike is over, they say, and all that remains to be done is "some house cleaning." The fight against the Western Federation will be continued, even to the extent of refusing to grant leases on properties to any one connected with the Western Federation, employing members of that organization as miners. Secretary Hamlin of the Operators' Association says the strike as a strike is over. The Gold Sovereign mine has been non-unionized. Thirty-two union miners were discharged on the 10th inst. The property is operated by lessees, who continued work during the strike with union men. A. E. Carlton, president, and other officers of the Cold Sovereign Co., which is a member of the Mine Owners' Association, notified the lessees that the Western Federation of Miners must go, and the men were discharged. There were twenty-two men at work on the lease of the Gold Temple M. Co., whose ore is sampled by the Rio Grande sampler and shipped to Pueblo smelters. Ten men were at the Whispor shaft of the same company, operated by Haas & Mayers. Eighty-two miners arrived from Cœur d'Alene, Idaho, on the 14th inst. The mine owners say they have applications for more blacksmiths, trammers, muckers and ore sorters than they can use. The names of applicants, however, are booked and the men will be sent for when enough machine drill men are secured to work two shifts. An attempt was made on the 8th inst. to poison the garrison at Camp El Paso and every man in command, with the exception of three who were absent, was temporarily laid up. Altogether sixty-eight men were down. Poison of some kind was placed in the water tank of the mine from which water is taken for domestic purposes. Many of the miners were also affected.

Engineer Jaquith of the El Paso drainage tunnel reports that readings show the flow of water continues between 1800 and 1850 gallons per minute. No material increase in the flow of water is expected until the east lateral cuts the dike between the Elkton and El Paso mines. This will not be finished for several weeks. A number of properties, however, have already felt the result of the opening of the drainage tunnel in a decrease in the water line. The Elkton and Mary McKinney properties are receding at the rate of 4 feet per month. The American Eagles and the Ajax, on Battle mountain, are also decreasing the water line at about the same rate. The El Paso Gold King, up Poverty gulch, is also showing a decrease. In fact, nearly all of them have experienced the same result, while the Beacon hill mines are entirely dry. Material results, however, will not be experienced on Raven, Gold and Bull hills until the dike referred to is cut.

IDAHO.

Boise County.

The Boston & Idaho C. Dredging Co. propose to build at least two or more drodgers—one at Cold springs, 6 miles below Idaho City, and another below the junction of More and Elk creeks, at Idaho City. Work on the new dredgers will begin next spring, and they will be run by electricity. The power will be brought either from the plant on Boise river or be generated by steam power on the timber claims owned by the company. Dredger No. 2 (the upper one) will be remodeled next season, says Superintendent R. Winters.

Idaho County.

C. D. Hovey of the Gold Reef M. Co. of Kansas City, Mo., reports buying the Confidence group of eight claims and the Mayflower claim, 2½ miles from Warren, on the Thunder Mountain trail. The development on the Mayflower consists of 1200 feet of tunnel and 200 feet of shaft. A contract for an 800-foot tunnel will be let to crosscut the veins on the Confidence group which show on the surface. On the Mayflower a 4-foot ledge of ore has been opened assaying $25 in gold. A water right carrying 1000 miners' inches goes with the group. It has a fall of 200 feet.

D. Mackenzie has bought the Moonlight group of three claims in Thunder mountain, near Roosevelt, for $20,000. Mackenzie has had an option on the property and has development work under way.

Owyhee County.

The McKinnon M. Co. of Salt Lake City, Utah, is developing a group of five claims on War Eagle Mt., near Silver City. They are running a crosscut tunnel. C. B. McKinnon is superintendent.

Shoshone County.

The Snowshoe M. Co. has been incorporated, with principal place of business at Mullan, by A. Hutton, J. Coossa, F. J. Edwards, P. Lucia and J. Howarth.

Men have been put to work on the Dominion mine at Carbon, near Wallace. Work will continue all winter in the lower crosscut tunnel, which will cut three of the five ledges traversing the ground, the objective point being the Bright Hopes ledge. This will require 350 feet more tunnel and will tap it at depth of 500 feet, says the Telegram.

MICHIGAN.

Houghton County.

The Quincy M. Co. at Hancock is dressing its mineral higher than in the past, which cuts down the amount of mineral per month, but increases the amount of refined copper obtained, says the News. ——The September yield of the Franklin mine at Hancock aggregated 341½ tons of copper.

At the Isle Royale mine, near Houghton, two stamps at the mill are treating 900 tons of rock daily. Aside from the extension of the fifteenth and sixteenth level drifts at No. 2 shaft, no new openings are being made.

No. 4 shaft of the Trimountain mine, near Painesdale, is producing. The shaft house, which was removed from the Arcadian, is fully reconstructed, but the first cars were loaded from the rock house bins. No. 4 is hoisting from the fourth level.

Machinery for the Champion's 100-drill compressor is on the ground at Painesdale and setting up will begin next week. Masons are at work on F shaft house. The Champion mill is operating an average of three heads twenty-four hours a day, two being in service by day and four by night. The milling operations are confined to this limit on account of the inability of the mine to furnish a greater supply of rock until added air compressing facilities are available, which will be several months, says the News. The fuel economizer for the boiler battery at the compressor house is on the ground. The compound hoads at the mill, as well as the automatic stokers there, are working satisfactorily.

The Calumet & Hecla shaft in the Kearsarge lode, near Calumet, is in sand 28 feet and very wet. Repairs to the Red Jacket shaft of the Calumet & Hecla have been completed and hoisting resumed.

Machinery for the electric haulage plant of the Quincy mine at Hancock is being set up and is expected to be ready for operation by the 21st inst. The work involves 7 miles of underground trolley, fifteen electric locomotives and ten to twelve individual motors distributed about the shops on the surface, replacing the steam engines now in use. Four copper wires will convey an alternating current of 2500 volts capacity from the power house of the Houghton County Electric Co. on the Houghton side, to the mine. The power will be sent underground through No. 6 shaft to the 56th level, then across to No. 2 and down 100 feet to the 57th level, where a motor generator will transform the current into a direct current for use on the trolley. The mine is wired north of the No. 2 shaft at the 43d, 46th and 49th levels and north and south on the 50th and 56th levels. Each locomotive weighs 5500 pounds, and will haul three tram cars of a combined capacity of 1000 pounds. The cars will be dumped into pockets built in the hanging of the shaft, but on the foot wall of the lode as the Quincy shafts are sunk under the lode. On the surface motors representing 60 H. P. will be distributed through the shops about the mine.

Kewcenaw County.

The Mohawk mine, near Allouez, produced during the month of September 366 tons 1129 pounds of refined copper.

Permanent hoists for Nos. 1 and 2 shafts of the Mohawk mine, near Allouez, will be put in. Conical drums, with compound cylinders, capable of hoisting from depth of 5000 feet, will be used. No. 4 shaft is already equipped with similar hoist.

The Phœnix mill, near Phœnix, is treating 150 tons of rock per day. There are two stock piles to work on besides a large amount of mass copper that is ready for the smelter.

No. 1 shaft of the Ahmeek mine on the Kearsarge lode, near Allouez, has been connected with the drift. No. 2 shaft is 6 feet in the lode. As the overburden was only 10 feet this makes it a case of copper from the grass roots. Good stamp rock is being taken out, but it is not as rich as that from No. 1. The railroad spur 1 mile long will be completed this month.

MINNESOTA.

Saint Louis County.

Five hundred employes of the Minnesota Iron Co. are out of work through the closing down indefinitely of the Soudan mine near Tower.

MISSOURI

Joplin district prices of zinc are reported as remaining at $40 per ton and the assay basis at $34 to $36 per ton of 60% zinc. For the first nine months of the year (to Oct. 1st), while the tonnage is not so large as for the same period of 1902, the higher prices this year bring the value to an increase of $415,476 over the larger output of 1902. Production for the nine months was: Zinc 185,421.93 tons, value $6,383,010; lead 21,455.2 tons, value $1,158,890.

Jasper County.

The Williamsport M. Co., near Joplin, have their mine unwatered and are taking out lead ore.

Anderson & Colger have leased five and one-half acres of the Missouri Zinc Fields Co. at Webb City and are prospecting with a diamond drill.——Superintendent W. R. Crandall of the Missouri Zinc Fields Co. says the company proposes to replace a portion of their present mill and put in machinery for a custom plant to clean the ore of the small operators mining near the mill.

M. C. Conkey is building his mill on the incline shaft north of Webb City.

The Hudson M. Co. has rebuilt the Pleasant Valley mill, near Joplin. The Hudson mine joins it on the south and a lead of ore was followed in the drift on the south line of the Pleasant Valley lease.

The Golden Rod mill, near Joplin, is again in operation, with capacity to handle 200 tons per day.

Zinc ore is being found at the grass roots across Spring river at the north limits of Carthage, where I. C. Wheeler excavates clay for making brick, says the Joplin News-Herald. The land owned by Mr. Wheeler covers seventy acres.

MONTANA.

The receipts of gold at the United States assay office at Helena City during September were $275,655, as against $238,090 for the month last year, an increase of $37,565. The records show increases from Montana, Idaho and British Columbia, and a falling off in receipts from Nevada, Washington, Oregon and Northwest Territory. The receipts from Montana were $234,709; from Idaho, $11,438; from British Columbia, $22,472. In production of Montana gold Fergus county leads. The product of that county is almost all of free or cyanide gold, while from other counties, notably Lewis and Clark, a large proportion of the product goes to smelters, and therefore does not show in the assay office returns. From Fergus county for September, 1902, the receipts were $62,024, while for September, 1903, they were $113,650; Lewis and Clark, $26,354; Madison, $38,368; Missoula, $11,056; Park county, $17,500.

Deer Lodge County.

The Black Diamond Coal Co., which owns 320 acres of coal lands near Anaconda, reports work on its tunnel progressing. The tunnel is in 400 feet and will follow the vein, which is showing 4 feet in width.

Fergus County.

W. G. Moore has men at work on the Norman group of claims, near the Kendall mine at Kendall, prospecting with a diamond drill.

C. T. Durrell, manager of the Chicago-Montana G. M. Co., operating the Big Six group of mines, adjoining the Whisky Gulch section of the Judith range, near Gilt Edge, says he has men at work on the company's properties developing the bodies of cyaniding ores that have been opened. Arrangements have been made whereby the Chicago-Montana Co. will use the Whisky Gulch mill for treatment of its ores. A tram line, 3400 feet in length, is being built from the Big Six properties to the mill. The mill will begin crushing by December 1st.

The Barnes-King M. Co. of Kendall has incorporated under Dolaware laws by E. W. King, J. T. Wunderlin and J. P. Barnes, the last named being resident business agent.

The Kendall M. Co. at Kendall is building a dam in the gulch below the mill site to impound the slums that flow from the mill after cyaniding because of the volume of slums that runs down the gulch. Land owners along the route have complained of the overflow on their property. The dam will be 22 feet high.

M. B. Darrow and J. D. Wilcox have a lease on the Maginnis group at Maiden. They will first work on the tailings from the stamp mill, several thousand tons of which are on the dump.

The Cold Reef mines, near Gilt Edge, are working 135 men, and the Chicago-Montana M. Co. will resume operations on their group in Whiskey gulch and on the Big Six group.

Jefferson County.

It is reported operations will be resumed on the Katie mine, near Basin, owned by the Basin and Bay State M. Co.

Missoula County.

A strike is reported made on the Tarbox lead-silver mine at Saltese. The strike was made in the 400-foot level, west from where the 100-foot crosscut opened the ledge and on the hanging wall side. The tunnel is in 10 feet of ore that will carry 40% lead. The Tarbox Co. is arranging to build a 100-ton mill, says Manager Daxon.

Final payment on the Denver & Rock Island group, near Deborgia, has been made by the Duquesne M. Co. of Pittsburg, Pa. W. T. Hales of Wallace, Idaho, is manager. It is a silver-lead property, and tunnels have been driven which tap the ledge at depth of 200 feet, showing 4½ feet wide, assaying 35% in lead and 20 ounces in silver. Eighteen men are at work. It is about 6 miles from the railroad.

Silver Bow County.

The injunction proceedings involving the claim of F. A. Heinze to certain stopes of ore in the Leonard mine were ended last week, Judge Clancy ruling that Heinze had not made out a case. Heinze and his engineers claimed that a 40-foot strip of ore in the Gambetta mine, being worked through the Leonard shaft, was a portion of the so-called Minnie Healy north vein. Heinze obtained a temporary restraining order in August which threw 250 men in the Leonard workings out of employment. These men will be returned to work.

NEVADA.

Esmeralda County.

Between September 20th and October 3rd the Montana-Tonopah M. Co. at Tonopah shipped 3770 sacks (200 tons) of ore to the smelter, which averaged $100 to the ton, says the Tonopah Bonanza. The Morgan mill at Empire is making a test run on some of the ore. The north crosscut in the mine from the 512-foot station is in 360 feet. The west drift from this crosscut, at 196 feet from the shaft, is in 80 feet. The east drift from the shaft is in 400 feet. The north crosscut from the 612-foot station is in 186 feet.

Men have been started to work at Gold mountain, southwest of Tonopah, on the group of five claims belonging to the Tonopah Gold Mountain M. & M. Co. The property adjoins the Tonopah Union and the Tonopah Gold Mountain, and is owned by Philadelphia men. J. S. Stotler is manager.

At the Mizpah mine at Tonopah the diamond drill is working satisfactorily at a depth of 600 feet below the 700-foot station. The west drift at the 500 level is into the Buckboard ground and ore is being extracted.

Eureka County.

(Special Correspondence).—The Lincoln M. Co., Diamond valley, in development work have 1200 feet on a silver-lead vein and considerable ore blocked out.

The Tybo M. Co. of Ely have a new concentrator and centrifugal pump. They are shipping seventy-five tons silver-lead concentrates monthly.

The Diamond Co. have been hoisting some yellow carbonate, which will return $40 per ton.

All the companies in the Eureka district are working in reserve ground above

the water channel, and some good ore is being shipped.

Laird Bros. are working their Williamsburg property, north of Adams hill, and report prospects good.

R. Sadler is in Eureka organizing a company to work his mining property on Prospect mountain.

The men recently laid off in the Diamond, owing to litigation with owners of the Atlantic & Pacific property adjoining, have taken leases on ground in the Diamond, which they will work during the coming winter.

Eureka, October 14.

An average of 100 tons of iron ores daily are being shipped from the West iron mines, near Palisade, for which the owners are said to receive $3.50 per ton delivered at the smelters at Murray, Utah, says the Trihune. The product of the West mines is of value for fluxes. The property is owned by the West M. Co. of Salt Lake City, Utah.

The West M. Co. is working fifteen men at its mine, near Palisade, and this number will be increased to get an average daily shipment of 200 tons of ore.

Humboldt County.

The Spencer M. Co. of San Francisco, Cal., whose holdings are near the Hidden Treasure mines, near Kennedy, has several men at work grading and preparing the site for a mill.

Lincoln County.

The Searchlight M. & M. Co. at Searchlight, A. B. Day, superintendent, has its works in operation.

Superintendent A. A. Ross of the Empire M. & M. Co. has put men to work on their holdings at Newherry, near Searchlight.

B. Macready, vice-president and manager of the Saturn M. Co., at Searchlight, says he has put men on development work. The Saturn group adjoins the Quar'ette mines on the south.

Fourteen miles west of Searchlight, in the Crescent mountains, the turquoise mines (the Simmons mines) of the Toltec Gem M. Co., says Manager G. Simmons, consists of three parallel dikes, the upper one of which measures 300 feet in width. Through these dikes run shoots in which the stones are found emhedded in matrix. The deepest shaft is down 170 feet.

After a four months' idleness, due to the strike, operations are again under way at Searchlight. The Quartette M. Co. is running its mill sixteen hours and has increased its force. The Southern Nevada Co. has started up with non-union men and the Good Hope is working with union miners. Manager P. D. Carper of the Good Hope says he has resumed under same conditions as were in force at time of shut-down, i. e., an eight-hour day for all employes with exception of engineers, who will be required to work such overtime as necessary in order to enable miners to put in full time. Miners and engineers are to he paid $3.50; muckers, trammers and unskilled top labor, $3; skilled mechanics (blacksmiths and timhermen), $4. Two shifts are drifting on the 200-foot level.

Lyon County.

The tunnel being run by the Silver City Mining & Drainage Co., south of the Daney mine shaft, at Silver City, under Superintendent J. H. Kinkead, is in 1700 feet, and is heing extended along the edge of a vein of ore carrying gold values.

White Pine County.

J. Sharpe, W. McMurray, et al. of Cripple Creek, Colo., have hought the Joanna gold mine at Cherry Creek.

NEW MEXICO.

Taos County.

A strike is reported in the Tampa mine in Bromide district, 12 miles west of Tres Piedras. The vein was struck at 200 feet and is 13 feet wide. Four feet of the ore on the hanging wall carries sulphide of copper and averages $60 per ton, says the New Mexican. The property is owned by the Tusas Peak M. Co. of Manistee. Mich., and is being worked under Superintendent F. Bolton. The company owns a millsite helow the mine on the Tusas and will put in a concentrator. Eight feet of the vein is concentrating ore and the balance will be shipped.

OREGON.

Baker County.

Superintendent J. Reed of the Auburn Deep M. Co., at Auburn, a placer proposition, has discontinued sinking for bedrock, and says he will put in a prospecting drill to determine the direction in which to drift. The shaft is down 242 feet, with indications that it has entered a depression.

Manager Hennessey of the Cracker Cradle mine, in Cracker district, near Sumpter, says he has arranged to begin work next week and continue same during the winter months. He will drive a crosscut tunnel which will open the vein in 250 feet, and from that point the vein will he drifted, giving 300 feet depth.

Clackamas County.

The owners of the Northern Light quartz mine in Shena Creek mining district, 50 miles east of Portland, report opening up ore in the tunnel heing extended into Huckleherry mountain. It is within 6 miles of the Springwater hranch of the Oregon Water Power & Railway Co. The tunnel is heing driven 100 feet farther hy contract. The owners of the Northern Light mine are E. Renfer, T. S. West, V. Schmit, B. Hall and E. Mienig of Portland.

Douglas County.

The Star mine, near Bohemia, owned by G. B. Hengen et al. of New York, will huild a 10-stamp mill this fall. Work to the extent of 900 feet of tunnel has heen done on the ore. The group consists of fourteen full claims. The power line will be extended from the Oregon Securities Co., and electricity will he used to operate the Star mine and mill. The Oregon Securities Co.'s mill at Bohemia will hegin dropping its thirty stamps Nov. 1. says Superintendent Mathews.

F. J. Hard of Bohemia has closed a deal, in which he hecomes owner of the Stocks & Harlow mining property in Bohemia district. The Stocks & Harlow mine is on the west slope of Fairview mountain and joins the Vesuvius, which Hard owns.

Josephine County.

The Mountain View C. Co. mines (the Sowell mines), in Waldo district, are reported sold to the Vulcan C. Co. of San Francisco, Cal., for $24,000.

The Dutch Johnnie hydraulic placer mine, on Rogue river, helow Grant's Pass, which has heen in litigation for several years, has been settled and W. H. Flannagan has control. He will operate it this winter. Men are at work getting the piping and flumes in shape. The hanks are 60 feet in depth, and there is said to be water enough to keep the giants running nine months in the year.

Lane County.

At Blue river there are three gold mills. The Lucky Boy is operating fifteen stamps, with daily output of $400 bullion, says the Telegram. The Uncle Sam M. Co., with 5 stamps, is shut down pending changes in machinery. The Great Northern M. Co. has heen operating two stamps, hut is putting in a 5-stamp mill.

SOUTH DAKOTA.

Lawrence County.

O. N. Brown, manager of the Spearfish G. M. Co., operating in Ragged Top district, west of Lead, says they are preparing to put in additional machinery. The mill is crushing 300 tons of ore per day. ——On the east side of Ragged Top the Victoria mine is preparing to put in a 300-ton cyanide plant.

The Penohscot M. Co., near Maitland, is making daily shipments of ore to the National smelter of the Horseshoe Co. at Rapid City. The ore is hauled from Garden City to Blacktail by wagons. The shipping ore produced hy the mine amounts to seventy-five tons per day. The rest of the ore is treated at the company's plant at Maitland. The 40-stamp wet crushing cyanide plant is running steadily.

UTAH.

Beaver County.

The Wasatch King M. Co. has a ninety-day option on the Crank group, in Beaver Lake district, near Milford. The property shows a vein of iron-copper ore.—— Work on the Beaver Con. shaft was stopped at depth of 509 feet, where a station is heing cut, and crosscuts will he run in two directions. The water coming from this shaft is said to carry copper.

J. D. McAulay of Milford and C. T. Martin of Frisco, having hought an interest in the Gold King group, near the Revenue mine, in Pine Grove district, propose to work it all winter. In the hottom of a 50-foot shaft there is 14 inches of ore that carries sixty ounces in silver and values in gold. Sinking will be resumed.

Juab County.

The management of the Swansea M. Co. mine at Silver City has contracted to ship its argentiferous iron ores to the Majestic C. Co. smelter at Milford, says Manager Geddes. It is desired as a flux, the rock affording 18% iron excess with 15 ounces silver and 60 cents gold per ton.

Eureka reports of the 10th inst. say the situation is practically unchanged at the Bullion-Beck, Eureka Hill, Gemini and Centennial-Eureka mines, all of which properties are affected hy the underground fire which has heen burning since the 5th inst. The openings have been sealed up in hope of smothering the fire. Helmets carrying compressed air will he used in an attempt to locate the fire. Before reaching the openings an attempt was made to hulkhead certain drifts connecting the Centennial-Eureka and the Eureka Hill, hut the men were overcome hy the gas and smoke, resulting in the death of W. Menlove, the Centennial-Eurek shift hoss. Superintendent Allen of the Centennial-Eureka mine is shipping third-class ores from the dump so that the United States smelter will not he forced to close down.

Salt Lake County.

Articles of incorporation of the Utah-Apex M. Co. of Portland, Me., have heen filed, says W. C. Orem of Salt Lake City, resident agent. C. Dunn, Jr., is president and E. W. Guptill vice-president. The company's mines are at Bingham, and include the York and other adjoining properties on which options are pending.

To relieve the valley's customs plant, the sampler at the American S. & R. Co.'s Germania smelter was put in operation last week by Manager C. W. Whitley of Salt Lake City. To enahle them to handle a larger volume of pyritic ore at the Bruckner plant seven more of its furnaces were fired up, increasing the numher in commission to seventeen, each preparing twelve tons for the hlasts. The hlast furnaces at the Germania are also expected to be hlown in.

Summit County.

The shaft having heen unwatered at the Silver King Con. mine, near Park City, development work is heing resumed. What water may he struck between the 500-foot and 600-foot levels will he pumped up to the 500-foot level and handled there by the main pumping system.

Tooele County.

The Greene Reduction Co., having hought the Geyser-Marion mine dump at Mercur, has men to work at the old mill on that property. The plant will he remodeled, says Manager Wiswall of the Greene Co. The capacity of the mill will he increased to treat 300 tons of tailings per day.

WASHINGTON.

Ferry County.

The Pearl, Lone Pine and Surprise mineral claims of the Lone Pine-Surprise M. Co. have heen sold to the Pearl Con. M. Co., the original company retaining only the Last Chance claim. The group is in Eureka mining district, 1 mile north of Republic. The Pearl Con. M. Co. has heen incorporated hy C. D. Bihhins, L. H. Long, T. Ryan, C. P. Robhins and E. K. Schmidt.

The month of September shows a largely increased tonnage of ore shipped from the mines of Republic camp to the smelters over the previous month, says the Spokesman-Review. During August 102 cars of ore were shipped (3430 tons) with an aggregate value of $48,020. The Septemher shipments were 184 cars (6440 tons), aggregate value of $90,160.

WYOMING.

Carbon County.

C. H. Marshall et al. of Denver, Colo., have bought a group of five copper claims, north of Rawlins.

FOREIGN.

AFRICA.

Transvaal.

Glynn's Lydenburg mine, near Johanneshurg, reports output for month of August: Mill crushed 1960 tons, yielding 615 ounces gold; cyanide works treated 1460 tons, yielding 576 ounces; slime works treated 500 tons, yielding 200 ounces. Total, 1391 ounces fine gold: value, £5805. ——Henry Nourse Gold August result was: Seventy stamps running 30 days milled 9358 tons for 3356 ounces; 6234 tons cyanide for 1819 ounces; 2944 tons slimes for 226 ounces. Total, 5401 ounces fine gold.

The May Con. Gold Co. at Johanneshurg for month of August reports: Sixty stamps running 31 days crushed 9735 tons, yielding 3232 ounces; cyanide works, 5560 tons treated, yielding 1169 ounces; slimes works, 2261 tons treated, yielding 190 ounces. Total, 4591 ounces fine gold.

Van Ryn G. M. Estate for August: In mill, seventy stamps working 25 days, milled 8550 tons, recovering 2928 ounces gold. In cyanide works, 5600 tons treated for 963 ounces. Total fine gold all sources, 3891 ounces; recovery value per ton, £1 18s 8d.

The Withank colliery reports August output at 30,773 tons coal.

The Witwatersrand Deep Co. at Johanneshurg during the month of August had sixty stamps working 28½ days, crushing 7470 tons for 1920 ounces: 5614 tons of sands and concentrates treated hy cyanide works; yield 1100 ounces.

West Africa.

The Ashanti Sansu Co. in Ashanti district reports during month of August 1330 tons of ore crushed for 1130 ounces of gold. Several days' time was lost by stoppage of mill due to wet fuel.

AUSTRALIA.

New South Wales.

The Melhourne office of the Broken Hill Proprietary Co. of Broken Hill, on Septemher 25th reports in regard to the wages arhitration case: The Amalgamated Miners' Association claims were disallowed, with the exception of some preference unionists, and the company's counter claim for decrease of 10% also not allowed: The award is made for two years.

The Sulphide Corporation reports during the four weeks ending September 19, 14,427 tons of ore milled at the Central mine, producing 2917 tons of lead hearing concentrates, and 2995 tons of middlings were treated, producing 1482 tons of zinc concentrates. At Cockle Creek during same period 1502 tons of leady concentrates, 420 tons of residues and 3802 tons of purchased ores were smelted, yielding 997 tons of lead, containing 81,754 ounces silver and 14,157 ounces gold.

Queensland.

No. 2 South Great Eastern G. Co. at Gympie reports August output: Tons crushed 3350, yielding 3822 ounces gold.

Western Australia.

The following are output figures for Western Australia to September 1st:

	1903.		1902.	
	Tons Ore.	Ounces Gold.	Tons Ore.	Ounces Gold.
January	158,069	181,173	123,399	143,822
February	160,939	187,771	146,600	858,108
March	179,888	195,544	148,944	166,812
April	174,880	201,885	142,852	158,938
May	169,558	178,287	151,538	171,813
June	196,405	*224,026	157,236	173,185
July	185,458	191,681	167,617	174,494
August	183,775	183,797	167,719	182,591
September	.....	.....	173,377	186,965
October	.....	.....	169,238	188,657
November	.....	.....	165,044	187,037
December	.....	.....	175,763	199,846

*Including 26,924 ounces wbieh belong to previous returns, but, having been omitted, are herein included.

At the Lake View Consols mine at Kalgoorlie, D. E. Bigelow, manager, August returns are reported: 8060 tons of ore treated, yielding 4288 ounces fine gold, value £18,202. Costs: Stoping, 9s 11d per ton; ore reduction ("Diehl" treatment, 14s 6d per ton; general expenses, 2s 7d.

At the Anaconda copper mine at Murrin, near Mount Malcolm, development work is reported progressing. Another furnace for refining of copper matte will he added to the treatment plant.

BRAZIL.

The Ouro Preto Gold Co., at Ouro Preto, in Minas Geraes, on Septemher 21st reported the output for the month of August: Ore crushed 6219 tons, yielding 1943 ounces gold; value, £7760.

BRITISH COLUMBIA.

Boundary District.

The annual report of the Granby Con. M., S. & P. Co., with mines at Phœnix and smelter at Grand Forks, for fiscal year ended June 30, shows:

Expenses at mines and smelters	$1,136,000
Foreign ore bought	72,954
Foreign matte bought	766,000
Total	$1,974,954

The assets, cost of land, real estate, machinery, huildings, dwellings, equipment, etc., are placed at $13,845,000; copper in transit and cash on hand, $179,000; store supplies, $93,000. Production for the year aggregated 12,551,000 pounds copper, 277,574 ounces silver and 35,121 ounces gold. Receipts from real estate amounted to $38,511, making total receipts $2,271,252. The husiness for the year was hampered by the coal and coke situation, necessitating running the smelter only one-half its capacity. The plant has been increased hy two furnaces, making six in all, which they expect to operate full time from now on as against an average of two furnaces last year.

F. L. Sommer of New York, vice-president of the British Columbia C. Co., says they will enlarge their Greenwood plant by the addition of a couverter and four additional furnaces. The present equipment consists of two furnaces. The smelter will have a daily capacity of 2100 tons. The company owns the Mother Lode mines at Deadwood Camp and the smelter at Greenwood.

Ore shipments from Boundary district for the month of Septemher aggregated 61,388 tons, as compared with 69,568 tons in August. Shipments for the year to October 1 amounted to 459.127 tons.

Cassiar District.

J. B. Kinyon has hought the Christopher leases and water rights, covering 1900 acres of hench and creek leases, to-

gether with the water rights on McKee and El Dorado creeks, in Atlin section. Orders have been placed for 50,000 feet of lumber for the construction of a flume and 100 sluice boxes, to go in this fall. The boxes will be equipped throughout with steel riffles.

East Kootenay District.

The Gold River M. & P. Co. has been organized for placer mining and development by water power of electricity, power and light in the mines and towns of southeast Kostenay. The plant will be at Bull river falls, near Cranbrook, where it has 8000 inches of water, with a fall of 200 feet in 1¼ mile. The plans are to put in a dam above the falls and a flume that will carry the entire volume of water in the river, and to mine the bed of the river below the falls for placer gold. In connection with this an electrical generating station and power house will be built at the end of the flume. During the coming winter a sawmill will be set up and material cut for the flume, which will be 16 feet wide and 5 feet high. The company is made up of Iowa, South Dakota and Texas men.

Rossland District.

Ore shipments from Rossland district for month of September amounted to 39,651 tons, as compared with 36,010 tons for month of August. Shipments for the year to October 1 aggregated 292,423 tons.

Vancouver Island.

San Francisco men have taken over the sandstone and granite quarries on Newcastle island, near Nanaimo, and J. D. Dawes is superintendent. He says the company will start oporations this month, and shipments of building stone made.

Fire broke out in No. 4 mine at the Cumberland collieries on the 12th inst. The fire, which originated through spontaneous combustion of coal dust in section 11, is beyond control of tho force engaged in fighting it. All the miners have been taken out of the mine, and lines of hose laid to flood out the section.——All the mule drivers at the Dunsmuir colliery extension struck last week because one of them was discharged. It is expected a tie-up will result.

BRITISH GUIANA.

The custom house at Georgetown reports the following mineral exports from Jan. 1 to Sept. 8:

GOLD.

	Ozs.	Dwts.	Grs.	Value.
1903	58,484	4	15	$1,019,311 34
1902	66,479	11	3	1,159,775 38

DIAMONDS.

	Carats.	Value.
1903	6,274 5-16	$53,007 39
1902	8,684½	89,134 20

	1903.	1902.
Kaolin	....	900

CANADA.

Ontario.

On the "Barker belt," near Wabigoon, a group of claims covering 500 acres has been bought by tho Black Cat M. Co. of Cincinnati, Ohio, in which O. M. Bake, P. S. Briggs, H. H. Hughes et al, are interested. E. W. Gardiner is general manager. Besides the abovo holdings the company has also secured control of the Edna property, in the upper Manitou, which has heen developed to depth of 100 feet. The Black Cat Co. has also a group in the Lake of the Woods district, of which the Crown Point mine, adjoining the Mikado, is the priucipal.

CHILE.

The Copiapo M. Co., September 10th, reports production for the month of August at 1000 tons of copper ore, averaging 17% copper.

Iquique reports show the August production of the Santa Rosa mine: Gross value of metals extracted from company's proporties, $12,000; leasod properties, $3000.

GERMANY.

The exploitation of coal measures in the Rhenish-Westphalian basin has nearly trebled since 1895, the increase in output being from 4,000,000 tons annually to 11,000,000 tons. The more important companies are the Deutscher Kaiser, with 1,576,000 tous; the Gutehoffnungshutte, with 1,575,000 tons; the Krupp, with 1,514,000 tons; Bochum, 1,109,000 tons; Schalko, 898,000 tons; the Rhine Steel Works, 810,000 tons; and Diffordange, 742,000 tons, writes O. J. Hughes, U. S. Consul-General at Cohurg.

MEXICO.

According to official statistics the number of mines in Mexico producing smelting ores at present is reported at 1190, divided among the different States as follows:

Aguas Calientes	23
Lower California	26
Coahuila	32
Chiapas	1
Chihuahua	155
Durango	123
Guanajuato	112
Guerrero	13
Hidalgo	114
Jalisco	55
Mexico	28
Michoacan	37
Nuevo Leon	56
Oaxaca	58
Puebla	6
Queretaro	25
San Luis Potosi	50
Sinaloa	128
Tamaulipas	13
Tepic	12
Zacatecas	122
Total	1,190

The Treasury Department has issued a summary of the imports and exports during the fiscal year 1902-03, compared with values for 1901-02, from which the following figures are taken:

Imports—Invoice gold values:

	1902-03.	1901-02.
Mineral substances	$34,014,997	$21,223,548
Machinery and apparatus	10,337,060	8,308,186
Arms and explosives	1,796,092	1,401,605

Exports—Declared silver values:

Mineral Products.	1902-03.	1901-02.
Total gold and silver (coin and bars and other forms)	$91,763,481 31	$68,947,728 17
Copper	20,122,358 42	16,849,834 87
Lead	5,659,070 21	5,830,845 30
Other mineral products	1,181,786 05	546,771 25
Total mineral prod.	$118,726,676 89	$92,075,179 59

The Secretaria de Fomento, during second half of fiscal year ended June 30th last, issued 1885 mining titles, which covered approximately 75,690 acres. Addiug these figures to those of the first half gives 4132 titles for tho year 1902-03, covering an area of 153,490 acres. The number of titles issued during the fiscal year 1901-02 were 3607, and the area covered 151,600 acres.

Chihuahua.

The San Diego mine at Santa Barbara, owned by the Torreon Smelter Co., is being equipped with a steam hoist, two Corliss whims and other machinory. Seven shafts are being sunk on the main vein, and carbonate oro has been cut. It is expocted shipments will start next week. J. W. Pender of Chihuahua is superintendent.

Durango.

E. H. Stanley et al. of Detroit, Mich., have organized a company to operate a group of mines in Yerha Bueua district.

Guerrero.

Work is progressing at the Huitzuco group of quicksilver mines, 20 miles from Iguala station, on Cuernavaca division of Mexican Central railroad. The company controls an area of 568 pertenencias of 10,000 square meters each. Thirteen of the minos have been opened and three of them are producing. The main shaft is down 800 feet. The reduction works, 6 miles from the mine, consist of six stacks, 50 feet high, with the necessary condensers, etc. A tram line transports the ore.

Jalisco.

Douglas Lacey & Co. have organized the Mexican Exploration and Dev. Co. to exploit a group near Mazatlan, adjoining the Santo Domingo mines. T. H. Selby is superintendent. Threo prospecting shafts are under way.

Lower California.

The copper mines at El Boleo, owned by the Rothschilds of Paris, France, are reported to have produced during the first six months of 1903 5202 tons of copper, against 4861 tons in the same poriod of 1902.

Mexico.

The El Oro Mining & Railway Co. reports for the month ending August 31: The mill ran 31 days, crushed 9194 tons, producing from the new mill $120,354, and from the old cyanide plant $3096; total production, $123,450; working expenses and development costs, $62,630. The profit from the railway for the month was $8723. There has heen expended on permanent improvements, including expenditure on new mill, $21,542.

Michoacan.

The Negociacion Minera do Oro has been incorporated to exploit 200 pertenencias of mineral ground near Morolia. The ore carries hoth free milling and concentrating valuos. The mine is the Juape de Arriha. J. Amhrosius is president and general managor, and C. Kleinschmidt, engineer.

Nuevo Leon.

Smelter No. 2 at Monterey is sending $100,000 in silver bars monthly to the mint in Mexico City for coinage. Each bar averages 90 pounds, says the Mexican Investor.

Oaxaca.

Tho Mexican-American M. Co. of Sierra Juarez is preparing to put in a hydraulic plant on the Socorro river, near Sierra Juarez, says Modern Mexico.

The Conejo Colorado mine at Taviche, adjoining La Blanca, owned by St. Louis, Mo., men, have made an addition to the mill to double their output. The ore being treated has value of $40 per ton.

San Luis Potosi.

The Mexican M. & E. Co. will build a cable line, with a capacity of 1000 tons daily, from their Asuncion mine, in Monterey district, to the line of the National Railway, says Moderu Mexico.

Sonora.

Tho Douglas (Arizona) Dispatch says the Esmeralda mine, 14 miles east of Cos, has been sold to H. M. Patterson, J. Pearheart, and Kronkert & Beard, of El Paso, Tex., for $35,000. Manager Pearheart has started men on development work.

The Cerro Azul M. Co. has been incorporated at Nogales to develop and operate two gold properties, 30 miles from the international line. O. O. Saxhang is president, with F. P. Drew, vice-president, and W. Shuckmann, secretary and treasurer. The holdings of the company comprise twenty-two pertenencias in the foothills of the Cerro Azul mountains, 40 miles south of Nogales and 15 miles east from Imuris, on tho Sonora railroad. E. W. Jones is superintendent.

A. W. Tennent, manager of the Sonora River Placer M. Co., has bought a coppor property near San Antonio pass in Patagonia or San Antonio mountains, 4 miles southwest of Lochiel, says the Cananea Herald. He is sinking a vertical shaft and is putting in a steam hoist, engine, boiler, otc. Tennent reports work is progressing at the placer mines of the Sonora River Co., south of Cananea. Men are laying pipe and have 700 feet down. A pump has been put in at the river and water will he piped to the claims, 700 feet distant. Operations will begin on the claims next week.

A. Solano of Los Angeles, Cal., is reported to have bonded a group of gold and silver properties 40 miles from Magdalena for $75,000.

D. M. Heller, C. A. Overlock, et al., of Douglas, Ariz., have formed a company to exploit the Santa Rosa gold mine, 20 miles south of Nogales. Twenty men are at work sinking a douhle compartment shaft.

The Con. C. Co. at Cananea proposes to build an electric railroad line between Ronquillo and Cananea, a distance of 2½ miles. The power will he furnished by the plant just completed by the company, and having a capacity of 2000 H. P. It will run all the machinery at Cananea.

The Calumet & Yaqui River C. Co. has hought the mines and smelting plant of the Venice C. Co. at Soyopo. The Venice Co. holdings are near the mines of the Calumet and the plant includes two 50-ton furnaces.

Tamaulipas.

Tho Mexican Petroleum Co., operating at El Ehano, near Tampico, has completed twelve wells, says President Doheny, with a combined production of 20,000 harrels per month. The company is operating 10 kilometers (6.2 miles) of standard gauge railroad, using an oil-burning locomotive. They are shipping asphaltum.

Vera Cruz.

H. A. Carner of New York City, N. Y., and W. J. Crittenden of Mexico City report having located deposits of bitumen in the interior of Vera Cruz, which will bo developed by the Pan-American Co. of New York, of which Carner is president and manager.

PERU.

The Caylloma Silver Co., at Caylloma, reports its production for the month of August: Fine silver in export ores 28,000 ounces, and fine silver in hullion 14,000 ounces.

RUSSIA.

In the Caucasus mountains antimony ore is reported found, containing ½ ounce to 1½ ounce gold per ton, which contents cover mining expenses for the antimony. New copper fields are reported being opened up in the Caucasus, and assays show average of 9% copper and ¾ ounce gold.

SPAIN.

Statistics compiled hy the Revista Minera show the mineral exports from Spain during the first six months of 1903 included 68,340 tons of zinc ore, 1038 tons of spelter, 1451 tons of lead ore and 76,835 tons of pig lead.

TASMANIA.

The Mount Lyell M. & R. Co., at Mount Lyell, reports from Aug. 20 to Sept. 16, inclusive, 24,852 tons of ore treated, being 20,820 tons from the Mount Lyell mine and 4032 tons from tho North Lyell mine. In addition to the ahove, there were treated 2115 tons of metal-hearing fluxes. The converters produced during the same period 472 tons of blister copper, containing: Copper, 467 tons; silver, 42,785 ounces; gold, 1571 ounces. Reduction in hlister copper output principally owing to limitation placed on underground extraction at North Mount Lyell mine by present labor disturbance. The mine has been working only two shifts instead of three, and drawing partly from surface workings, which are of lower grade.

Catalogues Received.

Catalogue "D" of the Minneapolis Steel & Machinery Co., Minneapolis, Minn., is an exhaustive treatise on elevator and power transmission machinery.

Catalogue No. 8, from the Colorado Iron Works Co., Denver, Colo., describes and illustrates in vignette, and also sectional drawing, their new patented impact screen for sercening and sizing wet or dry ores from 4 to 80 mesh.

If the Christy Box Car Loader Co.'s machine is as good as their catalogue, it is an efficient device, for their descriptive matter therein is a fine showing of what thoy make. Their headquarters are 811 Equitable Building, Des Moines, Iowa.

"The Whole Story About Wood Pipe" is the title of an 84-page trado treatise from the National Wood Pipe Co., which is copyrighted. It gives good argument for the use of wood pipe, shows how it can be used, gives prices, testimonials, formulæ and technical tables, the whole being finely illustrated by half-tonos and line engravings. It can be had from the National Wood Pipe Co., Sixth & Mateo Streets, Los Angeles, Cal., or 301 Market Street, San Francisco, Cal.

"Steam Powor Plants of tho Pacific Coast" is an unusually fine trade treatise from Chas. C. Moore & Co., engineers, 63 First St., San Francisco, Cal., finely portraying many plants, huildings and engineering constructions on the Pacific coast, including office buildings, industrial works, railway construction, electrical installations, etc., in which the engineering firm of Chas. C. Moore & Co. furnished the power equipment. The little volume, which is a typographic gem, furnishes fine views of many prominent private and puhlic enterprises of recent construction, and apart from the commercial feature, it forms a good exponent of such Pacific coast development. The latter portion is devoted to illustrated description of machinery furnished and installed by Chas. C. Moore & Co.

Books Received.

"The Mineral Industry, Its Statistics, Technology and Trade, for 1903," has been received. This is the eleventh annual volume of this valuable publication, which has become familiar to all mining men. It treats of all mineral products, hoth metallic and non-metallic, and of the methods hy which these are mined and reduced to merchantable forms. It deals with many mining and metallurgical problems in a scientific and practical way, and these chapters give the volumes of the "Mineral Industry" a far greater value than any work compiled for statistical purposes only. The chapters on copper smelting, pyritic smelting and on electro-chomical metallurgy, each hy a specialist in his line, are particularly instructive and valuable. Price, $5. The Engineering and Mining Journal, New York and London.

Obituary.

J. W. HOLBROOK, a pioneer miner of Wadsworth, Nev., and Deputy United States Marshal, died at Wadsworth on the 4th inst., aftor an extended illness. Deceasod was a nativo of Maine, sixty-five years of age.

J. JURY, a pioneor miner of Eureka Co., Nev., died at Ruby Hill, September 30. He was injured by a cave-in in the Eureka Con. mine last January, this being the ultimate cause of his death, as other complications set in. He went to Eureka county from Cornwall, England, in 1876. He is survived by a wife and four sons.

DE F. H. ANDREWS, a pioneer mining man of Colorado and Idaho, died at Boise, Idaho, on the 3rd inst. of congestion of the lungs. Deceased was horn in Iowa, May, 1841; went to Colorado while a young man and engaged in mining and the real estate husiness, and was Mayor of the town of Bald Mountain, Colo., for several terms. He went to Boise, Idaho, in

1889, and at the time of death was interested in Thunder Mountain mines. He was a candidate for Governor at the last State election. He is survived by a wife and several children.

PERSONAL.

SUPERINTENDENT R. B. STANFORD has returned from the East to Columbia, Cal.

C. W. JENKS is in charge of the Queen Esther mines at Mojave, Cal., vice Lund, resigned.

CHAS. WIER has resigned the managership of the Yellow Aster M. & M. Co., at Randshurg, Cal.

J. S. MCBRIDE of North San Juan, Cal., interested in Nevada county mines, is in San Francisco, Cal.

G. K. FISCHER has resigned as manager of the smelter of the United States M. Co. at Bingham, Utah.

J. D. SPARGO succeeds C. A. Stevens as general superintendent Gold Roads M. Co., Acme, Arizona.

JOHN HUFF, of Victor, Colo., is manager of the Jackson G. M. Co., in Cripple Creek district, Colo.

W. SHARWOOD has returned to the Soulsby mine at Soulsbyville, Cal., from San Francisco, Cal.

J. A. JESTER is superintendent of the Southern Nevada M. Co. at Searchlight, Lincoln county, Nev.

G. A. CARTER is in San Francisco, Cal., to get a filter press and cyanide plant for the I X L mine, Sumpter, Or.

F. W. DANIELL is in Lordsburg, Grant county, N. M., from New York, to take charge of the Aberdeen M. Co.

J. R. GIFFORD of San Francisco, Cal., is now general manager of the Chihuahua M. Co., Choix, Sinaloa, Mexico.

A. S. ELMORE, of London, Eng., inventor of the Elmore oil process of ore concentration, is in Rossland, B. C.

W. L. COBB, E. M., of San Francisco, Cal., has gone to Kern county, Cal., to inspect mines 40 miles east of Caliente.

JOHN ROSS JR., superintendent of the Wildman-Mahoney M. Co. at Sutter Creek, Cal., is in San Francisco, Cal.

G. A. WARTS of Cripple Creek, Colo., is manager of the Stratton Cripple Creek M. & D. Co., vice W. G. Rice, deceased.

J. F. HALLORAN is assistant superintendent of the Portland mine, Independence, Colo., vice F. L. Smale, promoted.

J. E. STEVENSON, operating mines at Gavalana, Chihuahua, Mexico, has gone on a six weeks' visit to Utah and California.

R. G. HINKSON is superintendent of the Buena Vista smelter at Buena Vista, Chaffee Co., Colorado, vice B. F. Morley, deceased.

D. J. DUNCAN is assistant manager of the Hays Con. M., M. & L. Co. at Camp Hays, in the Pinto mountains, Sonora, Mexico.

HORACE F. BROWN has returned to San Francisco, Cal., from an examination of coal and iron mines on Cape Breton Island, Canada.

E. R. WHITMARSH of Colorado Springs, Colo., is manager of the Pharmacist Con. M. Co., operating in Cripple Creek district, Colo.

E. W. MORSE is manager of the Fortunate G. M. & M. Co., operating the New Haven group near Rollinsville, Gilpin county, Colo.

A. C. HARMON, manager of the Penn Chemical Works, operating copper mines at Campo Seco, Calaveras county, Cal., is in San Francisco, Cal.

C. A. BAILEY, president of the Central Con. M. Co., has returned to San Francisco, Cal., from a trip to their mines near Grass Valley, Cal.

J. T. MCCLANAHAN of Boonville, Mo., is president and manager of the Bertba G. M. & M. Co.. operationg in Idaho Springs district, Colorado.

J. D. DAWES is superintendent of the sandstoue and granite quarries on Newcastle Island, near Nanaimo, B. C., owned by San Francisco, Cal., men.

SUPERINTENDENT HOLBROOK AND MANAGER MCLAUGHLIN of the Horseshoe M. Co. of Deadwood, S. D., are in the East ou company husiness.

W. J. SUTHERLAND, owner of the Alaska Perseverance and Greek Boy minos, near Juneau, Alaska, has returned there from a trip to London, Eng.

J. E. BEVERIDGE has rosigned as superintendent of the Century M. Co.'s mines and mill in Park valley, Box Elder county, Utah, and is in Salt Lake City, Utah.

J. C. DRISCOLL, recently superintendent of the Silver Shield mine, Bingham, Utah, is superintendent of the La Reine mine, near Eureka, Juah county, Utah.

ROSS E. BROWNE, E. M., of San Francisco, Cal., accompanied hy his wife and son and J. D. and K. F. Hoffmann, left this woek for Johannesburg, South Africa.

STEPHEN THOMAS, who for years was foreman of the Mahoney mine at Sutter Creek, Cal., has gone to Nova Scotia as mine foreman of a gold mine near Halifax.

W. J. ADAMS, E. M., of San Francisco, Cal., is conducting a series of motallurgical experiments in the mining laboratory of the State University at Berkeley, Cal.

E. C. THURSTON, of San Francisco, Cal., has gone to mines near Mojave, San Bernardino county, Cal., to make mine inspections and metallurgical experiments.

J. A. JEFFERY of Nevada City, Cal., is superintendent of the South Yuha M. & Dev. Co., operating near Omega, Nevada county, Cal., vice C. W. Porterfield resigned.

C. T. DURRELL, former manager of the Whiskey Gulch & Spotted Horse mine, in Fergus county, Mont., is manager of the Chicago-Montana G. M. Co. at Lewistown, Mont.

F. M. KURRIE, for several years chief engineer of the Portland mine at Independence, Cripple Creek district, Colo., has been appointed assistant general manager of the company.

C. W. PORTERFIELD of Novada City, Cal., has resigned as superintondent of the South Yuba M. & Dev. Co., operating near Omega, Nevada county, Cal., to go to El Dorado county.

R. B. LAMB, metallurgist, has gone to Kern county, Cal., from San Francisco, Cal., to take charge of erection and operation of a stamp mill at tho Piute mine, 40 miles east of Caliente.

D. T. PARKER, metallurgist, and C. E. Jamison, chief chemist, at the Ohio & Colorado smelter, Salida, Colo., have opened an assay office and laboratory at 1721 Champa street, Denver, Colo.

HERBERT HAAS is now smelter superintendent for the Great Western Gold Co., Redding, Cal. He will start the erection of a 175-ton copper smelter, with sampling works, at the Afterthought property, near there.

W. G. PHIPPS has resigned the superintendency of the Jno. Royal mine, Columbia, Cal., to take charge of the Shady Run mine, Shady Run, Placer county, Cal. A. E. Baier is now mine foroman. The company will enlarge the mill and put in a new cyanide plant.

P. H. TYLER, a pioneer American miner in tho Philippines, left San Francisco, Cal., this week for the gold mining property of himself and associates in the province of Benguet, about 175 miles north of Manila, where he has a free milling gold property in successful operation. His mission in San Francisco was to secure suitable machinery, which he takes with him, this being stated by him to be the first consignment of such American mining machinery to the Philippines. Mr. Tyler says the possible mineral development of the islands is attractive, and that large numbers of Australian miners are taking advantage of such possibilities.

Commercial Paragraphs.

THE Mine & Smelter Supply Co. of Denver, Colo., have an order for fourteen Wilfley concentrating tables to be shipped to the Honerine mine, Stockton, Utah, for their new mill, now in the course of erection.

THE Mine & Smelter Supply Co., Denver, Colo., have an order for forty-three Wilfley concentrating tables from the Calumet & Hecla M. Co. of Michigan. The Calumet & Hecla Co. already had a numher of the Wilfley tables in their mills.

THE C. O. Bartlett & Snow Co., Cleveland, Ohio, report a number of orders received for dryers to dry concentrates; among others they have lately shipped one to the Wood & Swart Co., Denver, Colo.; one to the Payne Con. M. Co., Sandon, B. C., and to the Hanna M. & M. Co., Chicago, Ill.

G. W. MEYERS has returned to San Francisco, Cal., from a business trip through southern California mines and reports placing a number of orders for Chrome steel shoes, dies, etc. The Chrome Steel Works at Brooklyn, N. Y., has its new plant in operation, including a hydraulic press for making shoes and dies.

THE Brooklyn, N. Y., Engineers' Club held the first meeting of the season on the evening of Octoher 8th. Besides the usual formal husiness, a very interesting paper, entitlod, "A History of Pumps, Ancient and Modern," was read hy J. A. Drew of the Worthington Co. Mr. Drew sketched the development of pumping machines from the early Egyptian "Noria," resemhling the familiar well sweep, to the latest triple expansion, condensing, water works pumping engines, requiring little more than a pound of coal per horse power hour. The paper was illustrated by a large numher of lantern slides.

Latest Market Reports.

SAN FRANCISCO, Octoher 16, 1903.

METALS.

SILVER.—Per oz., Troy: London, 28⅛d (standard ounce, 925 fine); New York, bar silver, 60⅞c, refined (1000 fine): San Francisco, 60⅞c; Mexican dollars, 48@50c San Francisco, 46½c New York.

During the past week silver has gone above 60 cents for the first time in several years. The Bureau of Insular Affairs of the War Department has announced that it would make no further purchasos of silver for Philippine coins. It was intended to coin ahout $25,000,000 worth of silver, but word has come from Governor Taft that with the amount on hand and on the way, together with the legalized Spanish silver, there will he enough for the needs of the islands. There are now in the islands or on the way $17,900,000 in new silver coins, and ahout $1,000,000 more in this country ready for shipment. The Bureau of Insular Affairs denied that it purchased $1,000,000 worth of silver on the 15th inst., as reported, and that on the contrary it refused to purchase 400,000 ounces at 60.44. War Department officials predict that with the Philippines out of the market as purchaser of silver the price of that metal will decline.

COPPER.—New York: Standard, $13.25; Lake, 1 to 3 casks, $13.25; Electrolytic, 1 to 3 casks, $13.12½; Casting, 1 to 3 casks, $12.75; San Francisco: $15.00. Mill copper plates, $17.00; hars, 18@24c. London: £54 5s spot per ton.

Tho copper situation remains practically unchanged, though the price is a fraction lower than last week.

The following figures are of German consumption of foreign copper for the months of January-August, 1903, compared with the same period of 1902 and 1901:

	1903. Tons.	1902. Tons.	1901. Tons.
Imports	56,094	54,643	44,539
Exports	6,964	6,118	6,417
Consumption	49,130	48,525	38,122

LEAD.—New York, $4.50; Salt Lake City, $3.50; St. Louis, $4.00; San Francisco. $4.50, carload lots; 4⅛c 1000 to 4000 lbs.; pipe 6½, sheet 7. bar 5⅜c; pig, $4.75. London: £11 ₱ long ton.

SPELTER.—New York, $6.00; St. Louis, $5.00; London, £20 5s ₱ ton; San Francisco. ton lots, 6¼c; 100-lb. lots, 7c.

TIN.—New York, pig, $25.80 @ 25.90; San Francisco, ton lots, 28c; 500 lbs., 28½c; 200 lbs., 29½c; less, 30c; bar tin, ₱ lb., 30@32c. London, £115 5s.

PLATINUM. — San Francisco, crude, $18.00 ₱ oz.: New York, ingot, $19.00 ₱ Troy oz. Platinum ware, 75 @ 80c ₱ gram.

QUICKSILVER. — New York, $46.00@47.00, large lots; London, £8 7s 6d; San Francisco, local, $43@44 ₱ flask of 76½ lbs.; Denver, $49.50. Export, $42.50@43.00.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c: extra, 17½c; genuine, 35c; Eclipse, 37½c.

SOLDER. — Half-and-half, 100-lb. lots, 18.75c; San Francisco, Plumbers', 100-lb. lots, 15.50c.

ZINC.—Metallic, chemically pure, ₱ lb., 50c; dust, ₱ lb., 10c; sulphate, ₱ lb., .04c.

NICKEL.—New York, 50@60c ₱ lb.: ton lots, 40@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30@34c.

ANTIMONY. — New York, Cookson's, 7½c; Hallett's, 6¾c; San Francisco, 1000-lb. lots, 8c; 300@500-lbs., 8½c; 100-lb. lots, 10½c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, $16.85 @17.35; gray forge, $15.35; San Francisco, bar, 3c ₱ lb., 3½c in small quantities.

STEEL. — Bessemer billets, Pittsburg, $27.00@29.00: open hearth billets, $28.00 @30.00; San Francisco, bar, 7c to 12c ₱ lb.

LUMBER. — (Rotail): Pine, ordinary sizes, $24.00@25.00; extra sizes higher; redwood, $28.00@30.00; lath, 4 feet, $4.50 @5.00; pickets, $21.00; shingles, $2.50 for No. 1 and $2.25 for No. 2; shakes, $13.50 for split and $15.00 for sawed; rustic, $28.00 @35.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, $3.35; Cut, $3.55; 10d to 16d, Wire, $3.45; Cut, $3.35; 8d Wire, $3.50; Cut, $3.50; 6d and 7d, Wire, $3.60; Cut, $3.60; 4 and 5d, Wire, $3.70; Cut, $3.70; 3d, Wire, $3.85; Cut, $3.85; 2d, Wire, $4.10; Cut, $4.10. Special rates for carload lots.

LIME.—Santa Cruz, $2.35; Roche Harbor, $2.35 ₱ hhl.

CEMENT.—Imported, $2.50@2.75 ₱ hbl.; California carload lots, $2.25 f. o. b. at works; small lots, $2.50 ₱ hbl. in sacks, 4 sacks to hhl.

GENERAL SUPPLIES.

COAL. — San Francisco, coast, yard prices: Wellington, $8.00; Seattle, $6.50; Coos Bay, $5.50; Southfield, $8.00. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8.00; Cumberland, $13.00; Cannel, $8.50; Welsh Anthracite, $13.00; Rock Springs, $8.50, long ton; Colorado Anthracito, $14.00. Coke, $10.50 per ton in bulk, $13.00 in sacks; Sunnyside, $8.50, long ton.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c: less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c: less than one ton, 12c. No. 2, 35%, carload lots, 9½c; loss than one ton. 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black hlasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots. $2.00 por kog.

CAPS.—3x, $5.50 per 1000: 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 fect; double tape, $3.00; single tape, $2.65; Hemp, $2.10: Cement No. 2, $3.00: Cement No. I, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11c ₱ set; 14 oz., 40s., 10c.

OILS.—Linseed, boiled, bhl., 49c: cs., 54c; raw, bbl., 47c; cs., 52c; Lucol oil boiled, bbl., 44c; cs., 49c: raw, bbl., 42c; cs., 47c. Kerosene—Pearl, per gal., 21c; Astral, 21c; Star, 21c; Extra Star, 25c: Eocene, 24c; Elaine, 27c; Water White, in bulk, 14½c: Mineral Seal, iron bbls., 18½c; wooden bbls., 21c; cs., 24c; Mineral Sperm, cs., 26½c.; Deodorized Stove Gasoline, bulk, 17c; do., cs., 23½c; 86° Gasoline, bulk, 21c; do., cs., 27½c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19½c; Lard Oil, E. W. S., bbl., 85c; cs., 90c; Neats-foot Oil, pure, bbl., 75c; cs., 80c; Sperm, crude, 50@60c; Natural White, 70c; Bleached, do., 75c; Whale Oil, cs., 50@55c.

CHEMICALS. — Cyanide of potassium, 98%-99%, jobbing, 23@24c ₱ lb.; carloads, 23@23½c: in tins, 30c; soda ash, $2.00 ₱ 100 lbs.: hyposulphite of soda, 3@3½c por lb.; caustic soda, in drums, 3@3½c ₱ lb.; Cal. s. soda, bbls., $1.20@1.40 ₱ 100 lbs.; sks., $1.05; chlorate of potash, 12@13c; nitrate of potash, bhls., 10c; caustic potash, 10c in 40-lb. tins: roll sulphur, 2½@2¾c; powdered sulphur, 2@3c; flour sulphur, French, 3½@3¾c; alum, $2.00@2.25; California refined, 1¾@2c; sulphide of iron, 8c ₱ lb.; copper sulphate, 5½@5¾c; chloride of limo, spot, $2.50@2.75; sulphuric acid, in carboys, 66° B, 1¾@2c ₱ lb.; nitric acid, carboys, 8c ₱ lb.

BONE ASH.—Extra No. 1, 5@6c ₱ lb. No. 1, 4@5c.

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails, ½c ₱ lb. above keg price: in 1 and 5-lb tin cans, 100 lbs. per case, ½c. per lb. above keg pricc. Dry Lead—In hbls., 1 ton and over, 6c: do. in kegs, 6½c.

RED LEAD.—500 lbs. and over at one purchase, ₱ lb., 6½c: less than 500 lbs., 7c.

LITHARGE.—Pure, in 25-lb. bags, 8@9c ₱ lb.

BORAX.—Concentrated, 6@7c ₱ lb; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

MANCANESE.—Pure, ₱ lb., 60c.

SODIUM.—Metal, ₱ lb., $1.00.

BISMUTH.—Subuitrate, ₱ lb., $1.75.

CHROMIUM.—90% and over, ₱ lb., $1.00.

PHOSPHORUS.—American, ₱ lb., 75c.

SILVER.—Chloride, ₱ oz., 90c@$1.00: nitrate, 55c.

ALUMINUM.—No. 1., 99%, small lots, 37c ₱ lb.; 100 lbs., 35c: 1000 lbs, 34c: ton lots and over, 33c, Pittshurg. No. 2, 90%. small lots, 34c: ton lots and over, 31c, Pittsburg.

URANIUM.—Oxide, ₱ lb., $3.50.

(These prices are wholosalo, f. o. b. San Francisco, unless otherwise uoted.)

MINING AND SCIENTIFIC PRESS

Whole No. 2257.—VOLUME LXXXVII. Number 17. SAN FRANCISCO, CAL., SATURDAY, OCTOBER 24, 1903. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Two Noted Black Hills Mines.

Ten miles southeast from Deadwood on Elk creek, at the town of Roubaix, is located the Uncle Sam mine, now owned and operated by the Clover Leaf G. M. Co. This property is reached via the Black Hills & Fort Pierre railway, now owned by the Burlington route.

The mine was discovered in 1878 by two prospectors, who were out on a "grub stake." The ore was rich in free gold, and enough was pounded out in a hand mortar to pay for the construction of a mill of one stamp, operated by horse power. With this in operation the owners were soon able to buy a 15-stamp mill, which was also operated successfully for some time, when the property was sold to Deadwood men, who continued to work it until sold to the Diamond Match Co. of Michigan, who built a 60-stamp mill, spent a large amount of money, and after an unsuccessful career closed the mine down, being unable to handle the heavy flow of water with the pumping plant then at the mine. The present owners have the mine open to a depth of 700 feet, and levels open at 400, 500 and 600 feet, and are drifting on the 700-foot level to the vein. Below the 400-foot level the vein, which has been pitching at an angle of about 45°, has become almost vertical. On the 600-foot level they have drifted 200 feet, all in ore, that has averaged in the mill about $10 per ton. The ore is free milling. The extraction from amalgamation is from 90% to 93%, leaving so little value in the tailings that so far they have not found it profitable to attempt to treat the tailings, although they have made experiments on them. The mill contains sixty stamps, and are running thirty at present, and will gradually increase as development work warrants. They mine $4 ore at a profit. Coal costs $4 per ton delivered at the plant. They pay miners on machine drills $3.50 for ten hours. In exceedingly wet places, or in the shaft, they work three shifts. Top men get from $2.50 to $3; mill men, $3.50 and $4 per day of twelve hours; engineers on the hoist, $4 for eight hours. They are working from fifty to seventy men. S. W. Russell is vice-president and O. B. Amsden, superintendent. One of the accompanying illustrations is that of the Clover Leaf surface plant.

The Clover Leaf illustrates one of the peculiarities of vein formation in the schists of the Black Hills. Ordinarily ore bodies in schistose or slaty rocks conform approximately, at least, to the general trend of the rocks within which they occur; but in the case of the Clover Leaf the quartz ore body assumes a form likened to a saddle, with its apex striking N. 64° W. and pitching to the southeast at an angle of 40°. In horizontal section the ore body assumes the form of the letter U, the branches flaring outward slightly.



Clover Leaf Hoist and Mill, Rubiax, S. D.

The Hidden Fortune mine: This property comprises a group of mines on the divide between Deadwood Gulch and Gold Run and east of Poorman gulch. The nearest town is Central City. Some of the mines were opened in the early history of the country (1876–'78), the most noted being the Bingham and Cheyenne claims. Although there were large bodies of gold ore exposed in the workings, the property did not attract much attention until 1899, when the principal owner, Otto Grautz, in searching for wolframite, found abundance of free gold in the quartzite sheet capping one of the hills. In less than sixty days, it is reported, he shipped nearly $57,000 to Colorado smelters. Much of the gold occurred in ragged sheets, having been deposited in the jointing planes of the rock. The company has extensively developed the property and has built a 60-stamp mill (see accompanying illustration) about 4 miles from the mine, in Whitewood gulch, below Deadwood, where the low-grade ores will be treated by amalgamation and cyanidation. The Hidden Fortune property is one of the few where ore is mined from both the schists and the overlying sedimentary beds. The ore from the former is classed as free milling, the gold occurring native and with pyrite, but in the overlying Cambrian rocks the gold is usually associated with tellurium, and, not satisfactorily amenable to amalgamation, are treated by cyanidation and barrel chlorination.



Hidden Fortune Mill, Deadwood, S. D.



Hydraulic Elevator, Dillon, Colo. (See page 267.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market Street, San Francisco, Cal.
Telephone, Davis 771.

ANNUAL SUBSCRIPTION.

United States, Mexico and Canada $3 00
All Other Countries in the Postal Union 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

BRANCH OFFICES:

NEW YORK CITY, 720 Park Row Bldg. BOSTON, 27 School St.
CHICAGO, 1115 Monadnock Block. DENVER, 606 Mack Block.

J. F. HALLORAN ..... Publisher

SAN FRANCISCO, OCTOBER 24, 1903.

TABLE OF CONTENTS.

ILLUSTRATIONS: Page.

Clover Leaf Hoist and Mill, Rubiax, S. D. 264
Hidden Fortune Mill, Deadwood, S. D. 264
Hydraulic Elevator, Dillon, Colo. 264
Undercurrent in Oregon Placer Mine 267
Method of Drilling in Heading 268
Holes for Key Block and Curtains 268
Electric Exploder 268
All Ready to Blast Out Key Rock 268
Ready to Blast Curtain Walls 268
For Final Blast 268
In Position to Blast Curtain Walls and Sides 268
Connecting Up and Firing a Series of Holes in Open Quarry Work. 268
Arrangement Alaska Gold Mill 269
Section Through Center of Cyanide Building 269
Home Made Oil Filter 270
Convenient Mine Switch 270
Ore Treatment Chart of the Rand 272
Mining and Metallurgical Patents 274

EDITORIAL:

Two Noted Black Hills Mines 264
Possibilities of Modern Engineering 265
Shaft Construction and Inspection 265
The Alaska Boundary Fixed 265
The California Miners' Association 265
Thawing of Dynamite 265

MINING SUMMARY 275-276-277-278-279

LATEST MARKET REPORTS 280

MISCELLANEOUS:

Concentrates 266
A Number Scheme for Mines 267
Undercurrents for Saving Flour Gold and Platinum Sands 267
A Colorado Placer Mine 267
The Machine Drill in Mining 268
Milling on Douglas Island, Alaska 268
The Metallurgy of the Homestake Ore 269
To "Square a Circle" 269
Electricity in Gold Extraction 270
Home Made Oil Filter 270
A Convenient Mine Switch 270
Electrical Furnace Experiments 270
Cyanide Plant and Practice at Ymir Mine, British Columbia 271
Gold Reduction Plant on the Rand 271
Identity and Continuity of Veins 273
Geology of El Oro District, Mexico 273
Mining and Metallurgical Patents 274
Personal 279
Commercial Paragraphs 279
Obituary 279
Catalogues Received 279
New Patents 280
Notices of Recent Patents 280

Possibilities of Modern Engineering.

When Henry Meiggs built the first Peruvian railroad it was looked upon as one of the most daring feats of engineering ever accomplished or attempted. Seemingly insurmountable obstacles were overcome, and modern railroad engineers have since followed some of Meiggs' ideas in construction through mountainous regions, until to-day there are few engineering problems in mountain railway building which are not approached with confidence by the engineer. The proposal of the Pennsylvania Railroad, however, to tunnel from Jersey City under the Hudson river, the city of New York, the East river and a portion of Brooklyn, Long Island, is one of the modern attempts at engineering that is attracting the attention of engineers everywhere. Essentially a mining proposition, it involves much more than is usually contemplated in tunneling. It is a difficult and expensive undertaking to tunnel under a great river, a mile in width, through the most treacherous material known to engineers—silt, saturated with water, and far different from driving an excavation through a mountain, where the material is hard rock. In the latter case the cost can be arrived at with approximate accuracy, but in the driving of a tunnel through soft mud there are involved elements of uncertainty and of difficulty not found in other classes of tunneling. It is roughly estimated that the cost of this work will approach $50,000,000, and it may exceed that sum, but as the traffic of the railroad appears to demand it the construction of this sub-river tunnel has been commenced and is progressing. Similar attempts have been previously made, but after months of difficult work and unsuccessful effort the project has been abandoned. The present work, however, is well under way. A great amount of steel and concrete will be used in the construction, and different portions of it will be built according to the material through which it passes. One portion of the tunnel beneath the Hudson river will be what is known as a tube tunnel and will be practically without foundations. The river section will be constructed by the use of shields and under air pressure, the compressors being required to supply 300,000 cubic feet of free air per hour, at fifty pounds pressure per square inch.

Miners are often called upon to solve difficult problems in cutting through treacherous ground, quicksand, etc., but the magnitude of the Hudson river tunnel eclipses ordinary mining operations, where engineering problems usually have to be considered from the standpoint of economy, such as is not generally contemplated in railroad engineering.

There are many mining problems which remain untried which, though within the range of possibility to accomplish, are not attempted because the calculated result does not justify the expense, and it is only when a corporation with almost unlimited capital at its disposal, or a government, desires to achieve great feats of engineering that engineers have an opportunity to demonstrate what modern scientific methods, properly applied, can accomplish.

Shaft Construction and Inspection.

The necessity for careful daily shaft inspection by competent men is evidenced in the recent accident at the Red Jacket shaft of the Calumet & Hecla mine, near Houghton, Mich., where a few days since an ascending skip caught a projecting sliver on one of the guides, and stripped the guides from the timbers for a thousand feet, beside doing other material damage, which will require some time and considerable expense to repair. All great modern working shafts are heavily timbered, in American mines, and the greater number of them are lined up with great care and precision, in order that the cages or skips may move swiftly up and down without danger, and, as they usually do, without jar or violent vibration. Those who are only familiar with the running of elevators in tall buildings in cities, often comment upon the speed at which these elevators are run, but they seldom exceed 800 to 1000 feet per minute. Cages and skips in deep, vertical mine shafts usually run at not less than 1500 feet per minute and from that to 5000 feet or over. Men are generally moved at a somewhat slower speed, but at a rate far exceeding that of building elevators. In view of this, mine shafts require daily painstaking inspection to lessen the likelihood of disaster, such as happened at the Red Jacket shaft. When a skip is running at the high rate of speed indicated above, one unfamiliar with it can scarcely conceive the rapidity with which these vehicles pass from level to level or from the lower level to the surface without stop. In the case of the Red Jacket shaft, which is nearly 5000 feet deep, if a station were cut at each 100 feet, the station lights would flash by when under full speed at intervals of a little over a second until the surface was reached. It can readily be understood that any slight inequalities in the alignment of the shaft or the guides would render rapid running extremely uncomfortable, not to say dangerous. The fact that most of the great deep shafts in the United States are sunk through solid ground, and are heavily timbered, renders them comparatively safe; but where the ground passed through shifts, due to geological disturbances, or to swelling ground, fast running in safety is out of the question.

On the Rand in South Africa the great shafts are sunk either on the banket at various and often changing degrees of inclination, or are sunk vertically to reach the ore bed, but in most instances, owing to the high cost of timbers (American and Australian), these shafts are timbered with 6″x8″, 6″x9″ and 7″x10″ timbers, dimensions which usually, in America, would be considered too small to afford security, but the vertical shafts are sunk through quartzitic sandstone which exerts no pressure upon the timbers, the latter constituting merely a framework for the convenience of skip ways, ladders, pipes, etc. This practice having proved satisfactory in South Africa, where rapid running is the rule, it suggests that the managers of American mines might profit by the example of the Rand and sink shafts in hard ground, employing timbers of smaller dimensions than are customary here. A shaft timbered with 7″x10″ Oregon pine timbers would require only about one-half the timber (board measure) that would be necessary if 12″x12″ were used. Moreover, in America, it has become the custom to place sets 5 feet from center to center. On the Rand the distance is usually 6 feet, which represents a further possible saving of nearly 16% in amount of timbers used.

The geological conditions prevailing on the Rand greatly facilitate the construction of shafts along the lines adopted there, and it is positive that the same procedure cannot be followed everywhere, but there are many places where the system is applicable in the Western United States. There is one feature of South African shaft sinking, however, which would probably never become popular in America. On the Rand the timbers are seldom carried closer than 50 feet from the bottom of the shaft, and often the distance is much greater than this—100 to 150 feet. This is done in order that the wall plates, which are framed in a single piece and sometimes 30 feet in length, may be swung into place, and avoids the necessity of leaving out dividers from several sets above the bottom. It also reduces the danger of breaking or blowing out timbers when the blasts are fired. Sinking is accomplished by the use of buckets, provided with universal swivels to reduce the tendency of the bucket to spin around rapidly as they would otherwise do on a long lift. When the shaft has progressed a considerable distance below the last set of timbers sinking is discontinued and a number of sets put in as rapidly as workmen can place them.

In America miners are accustomed to having the timbers carried to within a few feet of the bottom of the shaft.

The Alaska Boundary Fixed.

The recent decision of the Alaska-Canadian Boundary Commission in favor of the United States appears to have greatly disturbed some Canadian politicians. The decision was made by a commission fairly representing both sides of the controversy, and was undoubtedly made absolutely upon the merits of the case, notwithstanding which there are those who openly attack the commission and its integrity, but as the decision is final the situation may as well be accepted with as good grace as possible on the part of those who feel that they have lost something which they actually never possessed. By the decision the United States secures all the waterways leading into the interior regions of Alaska excepting that known as the Portland canal, which was awarded to Canada. Portland canal runs in a northerly direction from the vicinity of Port Simpson, beginning at about north latitude 54° 30′. It fixes the boundary along the west side of Portland canal, from the head of which it swings off in a northwesterly direction, and passes far inside the heads of all the large inlets indenting that portion of the Alaskan coast, and conforming in a general way to the outline of the coast. All Americans who claimed property in the disputed territory are safe in their possessions, and as it is presumable that the long-disputed boundary line has been permanently fixed, it only remains for the proper officers of the Government to set the monuments.

THE annual convention of the California Miners' Association will be held in San Francisco, Cal., November 16, 17 and 18, 1903. The reading of a large number of technical papers, contributed by members of the Association, will form an interesting and valuable feature of the session. This is not a new departure in the sessions of the convention, but it is yearly becoming more popular, the Association evidently having entered a broader field of usefulness. Technical societies are springing into existence throughout the country, and their published transactions form a most valuable addition to scientific and technical literature, for generally the authors of these papers write from personal experience, and contribute information which would otherwise be slow in reaching the outside world.

ALREADY the press dispatches from the mining regions begin to tell of death and destruction due to thawing of dynamite by miners. This is rather early in the season for the annual crop of suicides caused by thawing powder to commence, but the ball has been started rolling.

CONCENTRATES.

ANTIMONY OXIDE is not readily attacked by hydrochloric acid.

✣✣✣✣

A HOLLOW CYLINDRICAL COLUMN of iron has greater strength than a solid one of the same weight and length.

✣✣✣✣

FUCHSITE AND MARIPOSITE are essentially the same mineral—a chromium mica. It is a mineral of variable composition, and of no commercial value.

✣✣✣✣

THE only remedy for car and skip wheels that have worn flat at one side is to have them turned "true" in a lathe. If too hard to be turned, buy new wheels.

✣✣✣✣

SILVER is a better conveyor of electricity than copper in the ratio of 1000 to 931. Aluminum, if given double the sectional area of copper, is as efficient a conductor of electricity as the latter.

✣✣✣✣

AIR COMPRESSOR VALVES, which become gummed and fail to work freely, may often be made to operate by oiling with kerosene instead of lubricating oil. It is not advisable to use much oil in the cylinders of the compressor.

✣✣✣✣

ROTARY grinding mills are favored in those districts where the gold is coated with iron oxide or some other substance, preventing its ready amalgamation. The rotary mill brightens the gold and renders it easy to amalgamate.

✣✣✣✣

HYDRAULIC GRAVEL ELEVATORS, when working under favorable conditions, will lift gravel about one-fifth the height of the pressure column. A pressure of 100 feet vertical will lift gravel about 20 feet; a 400-foot pressure will lift it 80 feet.

✣✣✣✣

WHERE rapid running is done in shafts, the shafts should be given daily inspection, and particular attention should be given the guides, to see that there is no likelihood of any projecting sliver, or end of a timber at a joint to catch the passing skip or cage.

✣✣✣✣

LEAKY straight-way valves may sometimes be repaired by unscrewing the cap and reversing the disc, which it will often be found has been cut by escaping water. The valve should be kept closed when not in use, and not permitted to run a small, trickling stream.

✣✣✣✣

THE amount of gold and silver in a cyanide solution may be determined by evaporating one assay ton (29.2 c. c.) of the solution to dryness on a lead tray, which is then rolled up, and cupeled on a hot cupel, weighing the resulting button, the head to be parted in the usual manner.

✣✣✣✣

IT is advisable to use round, cold-rolled steel for car and skip axles, as when worn they may be cut in two at the center by a hack saw and the worn ends welded, making practically a new axle. It costs much more to do this with square steel bars that have been turned round at the ends.

✣✣✣✣

TWENTY POUNDS cyanide of potassium is an unusually large amount to use per ton of ore. Experience has shown that unless a portion of the cyanide in a strong solution is decomposed by bases in the ore, a much weaker solution would be more satisfactory in dissolving gold, as well as more economical.

✣✣✣✣

THE signal to blast in the shaft is 3–2–1. The engineer responds by raising the bucket or skip about 2 feet and lowering again to the bottom, showing he is at his post and ready to hoist. The miners then ring three bells, spit the fuses, get on the bucket and give the final signal, one bell, and are hoisted without delay.

✣✣✣✣

THE more common minerals of strontium are the carbonate and sulphate. Traces of strontium are frequently found in limestones. Metallic strontium is obtained by electrolysis of the fused chloride. It is yellow in color and is harder than lead. Strontium salts are used in the manufacture of fireworks and color the flame a bright red.

✣✣✣✣

WHEN panning material which contains gold in such fine state of division that on exposure to the air it will float on the surface of the water, the gold may be settled by sprinkling water on it with the hand in showers. Gold will not float if kept constantly wet. The same applies to other particles of mineral which float upon the water.

✣✣✣✣

THE hoisting engineer should place side marks on the reel of his engine to determine the exact place to stop the skip or cage, as the indicator is too distant to make its reading exact. On the ordinary columnar or circular indicator one-sixteenth of an inch difference in the position of the pointer may mean a foot in the shaft. This can be corrected by the side marks.

✣✣✣✣

SO FAR as "Concentrates" knows, lagging is never placed beneath the sills of drift sets for the purpose of preventing swelling ground from raising up the floor of the drift. When this difficulty has to be met, it is customary to cut away the encroaching ground and remove it. In some instances if this is not done, the ground will continue to swell until the drift is completely closed.

✣✣✣✣

IT is impossible to give an estimate of cost of stoping an ore body where only the dimensions are known. The character of the ore and of the walls would probably determine the method of mining, and the cost would be influenced by the amount of timber required, by the price of labor, cost of power if machine drills were used and whether or not filling is practiced. These and other factors are important in determining the cost of stoping.

✣✣✣✣

WATER TANKS may be built of a double thickness of 1-inch boards. The weight on each square foot of the bottom of a tank in which the water is 5 feet deep is about 310 pounds. The pressure against the sides varies with the depth of the water from nothing at the surface to 310 pounds at the depth of 5 feet. Particular care must be given the foundations to see that, should the ground beneath the tank become wet, the tank will not settle.

✣✣✣✣

THE weight of bell wires can be taken up by the employment of leaf or spiral springs near the collar of the shaft. They should be adjustable so that, when the line is pulled, the man giving the signal shall have only friction to overcome and not be obliged to lift the weight of the line. If this is not done, there will always be unsatisfactory signal service. Nothing is of greater importance about a mine than a perfectly operating bell service.

✣✣✣✣

THE occurrence of calcite in a gold-bearing vein can not be regarded as an indication of either the richness or poverty of the vein. Some rich mines have calcite in abundance, and some poor ones have calcite. The occurrence of gold in calcite and in marble is not of infrequent occurrence. This is known to be the case in a number of mines in California, notably at the Alvord mine and at the Carbonate mine in San Bernardino county, and the Golden Rule mine in Tuolumne county.

✣✣✣✣

BRITTLE GOLD may be refined by passing chlorine gas through it for several minutes when in the molten state. This converts the base metals present (usually lead, bismuth or antimony) into volatile chlorides, which pass off in fumes. Should silver be present, chloride of silver will be formed, which will float on the surface of the gold. To avoid loss of silver, the crucible should be dipped, before using, in a solution of borax. Borax should also be introduced into the crucible with the gold.

✣✣✣✣

A HALF-INCH plough steel hoisting rope is calculated to have a breaking strain of 11.4 tons, and for this rope the working lode is 2.28 tons. A ¾-inch rope breaks at 34 tons, and should not carry a working load exceeding 6.8 tons. A plough steel rope 1¼-inch diameter will break at 67 tons tension. For it 13.4 tons is considered a safe load. The greatest strain on a hoisting rope comes when the load is suddenly started or stopped. In some instances the strain is estimated to exceed ten times the weight of the load.

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ROPE transmission of power can be arranged around corners, across canyons or rivers, either up hill or down. Warm coal tar and linseed oil form a good lubricant for transmission ropes. It can be slowly poured onto the rope while passing over a sheave. To grease hoisting ropes, a hopper shaped, "split" box is made, having a round hole of suitable size in the bottom. The two sections of the box are secured about the rope, and after packing a piece of gunny sack in the bottom of the box, about the rope, the rope-grease, coal oil, or other material to be applied to the rope, is poured into the hopper, and the engineer then permits the skip, bucket or cage to slowly descend, the man at the box working the "dope" into the rope as it passes downward.

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TIMBERS may be protected from blasting in shaft sinking by providing suitable fenders, made of either green or dry pine—the former preferred. The fenders should have holes bored through them to correspond to the hanging-bolt holes of the wall plates. When these are to be put in position a short bolt is run upward through the holes of the fender and through the holes not occupied by the hanging bolts in the plate, when a washer and nut are screwed on the upper end of the bolt, the lower end having a square head "upset" upon it, to lessen the likelihood of injury by blasting. This end is also provided with a washer. If dry pine be used for fenders, it is a good precaution to run transverse bolts through the fender to prevent splitting.

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AMALGAMATING PLATES in quartz mills are porous, or should be to do good work. Cyanide of potassium solution renders them hard and brittle, and destroys their porosity, making them unsuitable for amalgamation. For this reason, where crushing is done in cyanide solution, but little gold can be amalgamated, although the cyanide brightens the mercury. Copper plates in good condition absorb mercury, and with it more or less gold of microscopic fineness. Most gold ores contain gold invisible to the eye without the aid of magnifying power, and doubtless some of it is almost atomic in size. It is gold of this class that is absorbed by copper plates, and this applies with equal force to silver-plated copper plates. The amount of gold absorbed by plates depends upon the character of the ore. Mill plates, over which a large amount of gold-bearing pulp has passed, are often worth hundreds of dollars in excess of their cost, owing to gold absorbed by the plates.

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AT inclined shafts the skip can be made to dump automatically in the head frame by providing a horizontal track for the forward wheels of the skip. The bale should be secured near the bottom or beneath it, and, as the engineer continues to hoist after the forward wheels have run onto the horizontal track, the rear wheels are lifted clear of the track, and the skip dumps when it has reached an angle exceeding 35°. A back stop should be provided for the front wheels to prevent them from running too far forward. Engineers become so expert that they can dump a skip where such arrangements have been provided in about three seconds, the skip barely coming to a state of rest before it is again descending the shaft. Care must be exercised that the rear wheels do not strike the rails with much force.

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REPLYING to an inquiry from Mojave, Cal.: "Raising" is directly the opposite of shaft sinking. It means the making of an upward excavation, either in ore or in the barren rock outside of the ore deposit. If the "raise" were continued to the surface it would become a shaft. "Stoping" is the removal of ore from the vein or ore deposit by blasting or by other means, and is used in contradistinction to raising, drifting and shaft sinking. Stoping that is carried on upward from a level is called overhand stoping; that which is done downward beneath the level is called underhand stoping. The latter is seldom employed except in small rich veins, or in forcing the output of a mine where ore is scarce. The dip of a vein is at right angles to its strike (horizontal direction) and can be easily ascertained by placing a clinometer on one of the walls.

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A COMPANY or corporation can only take as one claim 160 acres of placer ground, but may take as many claims of 160 acres each as they desire to perform assessment work upon. On a company claim of 160 acres the annual assessment need not be done upon each twenty acres of the tract, but may be concentrated at one place, and $100 worth of work will hold the claim of 160 acres located by the company. In December, 1898, the General Commissioner of the Land Office issued the following decision: "Under the United States placer mining laws one person may make a single location containing twenty acres of placer mining land; two persons may make a single location, containing not more than forty acres in a compact body; three may locate sixty acres, etc., but no single location, whether made by eight persons or more, can exceed 160 acres. It has been decided that a single location of placer mining ground may embrace 20, 40, 60, 80, 100, 120, 140 or 160 acres in a compact body, according to the number of locations. If eight persons should make eight distinct and separate locations of twenty acres each, and seven of the locators should convey their claims to the other, it would require annual assessment work of the value of $800 to maintain the possessory right to all of the claims; but in the case of a single location, embracing 160 acres of placer mining land, the owner thereof, in order to maintain his possessory right thereto, would not be required to expend $100 worth of mining labor on each twenty acres thereof, but his possessory right to the entire 160 acres might be maintained by performing thereon $100 worth of actual mining work, designed in good faith for the improvement of the 160-acre location as a single mining claim."

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TO FIGURE the cost of any particular mining operation, or the expense of operating any particular department during a stated time, a system of bookkeeping is necessary, in which the expenses are segregated into individual accounts. In the cutting of a station at the shaft and the driving of a level an accurate account of everything used on that level should be kept, and charged in the books to that account. The number of pounds of powder, number of feet of fuse used, number of caps, number of candles (or other illuminant) required, amount of timber put in, cost of chute door and appliances, ventilating pipe, compressor pipe, rails and ties for track, timber in drifts, etc., timber in ore chutes built on level and other essentials in the construction of the same, cost of all labor, which may or may not be segregated, according as the system of bookkeeping is elaborate or not—all should be charged up. There must also be charged to this level its share of ventilating expense, compressed air (if it is used), blacksmithing and repair of machine drills, hose used, etc., also hoisting pro rata relative to other levels, and also superintendence. When the level is abandoned it should be credited with rails, pipes, timbers, etc., that may be removed and used elsewhere. It is only in this way that a detailed statement of costs can be obtained. In the milling department the same careful segregation of accounts must be carried out. It includes tons of ore delivered at mill (some managers charge tramming to mining expense account, and others to the mill, but if it constitutes a large item of expense it should be made a separate charge), cost of power, lubrication, light, water, repairs, quicksilver, chemicals, fuel, shoes and dies, belting (or transmission ropes), insurance, and miscellaneous supplies, besides labor, which may or may not be segregated. The principal thing is to first properly segregate the various charges to their proper accounts. This having been done, the system becomes simple and of service for comparison.

A Number Scheme for Mines.

Written for the MINING AND SCIENTIFIC PRESS by MATT W. ALDERSON.

In the opening of a new mine, where one sinks on the vein, a level will probably be run at 100 feet and, when stoping commences, chutes will be put in for convenience of handling the ore. These chutes are generally numbered, that time may be saved in referring to their location. Later the shaft is continued to lower depths and the numbers given the chutes are frequently a continuation of those used above. As the levels above are extended and new chutes put in these also are numbered, and the writer has been in a mine where chute No. 18 was on a level several hundred feet below the surface and chute No. 36 on the 100-foot level, with numbers of smaller denomination.

Such a system, or lack of system, becomes in time confusing. One needs a system susceptible of expansion with the development of the mine in whatever direction that work may lead. It is customary in most mines to establish levels at every 100 feet. This is a good plan and, even where a survey may show a level is at 483 feet instead of at 500, it is the part of wisdom to call it the 500-foot level. The idea of numbering the levels in this way is certainly excellent. It is simple, expressive, and allows for expansion to whatever depth the shaft may be driven.

In development work, where one drives on the vein aud pay is continuous, chutes are frequently placed 20 feet apart, that having been found by experience to be a very convenient distance. In making a raise between two such chutes the ore will run easily to one chute or the other if the dip of the vein is sufficient; and, where it is not, 10 feet is about as far as the miner can shovel the ore to advantage to reach the runway.

Commencing, therefore, on the 100-foot level, I would number the first chute 102, the second 104, the third 106, etc. This system has the double advantage of telling the level on which the chute is located and its distance from the shaft. Thus the first figure is always the number of the level and the two figures following are a key to the distance from the station on that level. By adding a cipher to them we have the approximate distance from the starting point. Thus 136 means on the 100 foot level and 360 feet from the station.

In numbering in this way only the even numbers are used for chutes, the odd being applied to the raises or stopes, the raise above the chute receiving the number immediately preceding that given the chute.

In the course of development the vein is apt to be opened both ways from the shaft, crosscuts will be run, and parallel veins developed. How then? The simplest way is to give each vein a letter and to consider each veiu as an individual vein from the station or a base line corresponding thereto. Thus a chute on the first vein may be numbered 122A as we find ourselves going in one directiou from the shaft. Going in the other direction, the letter B may be used after the number. All the letters in the alphabet may be set aside for numbering different veins except the letters I and X. It is preferable not to use I, because it may be confounded at times with the figure 1. The letter X should be used for crosscuts.

In the development of a mine the level may come to where the vein forks. Suppose this is at 346B. The chutes on the hanging wall side should be continued and lettered B. Do not refer to one as the hauging wall vein and the other as the foot wall vein, but give each a letter, and do not commence the numbers on the foot wall vein with 302, but with the distance from the station, regardless of the fact that the vein is not continuous to that point.

Where a crosscut is run some distance from the shaft, from one vein to another, the numbering on the new vein should not commence from the crosscut, but from the base line, as, even if there is no knowu ore in the direction of the shaft, it may be found there some day, in which case the numbers are available. Again, if numbers commenced from the crosscut, they would not correspond with the numbering of other parts of the mine. In the same way it is well on a property developed by a tunnel to commence the numbering from the surface or station on the lowest level, then on the upper levels to use that as a base line, instead of making the numbering of each level start from the surface and be independent of those on the levels below.

This system provides for 980 feet along a vein. Thus 598B means the chute 980 feet from the station on the 500-foot level of the B vein. The next chute should be numbered 500BB, and, as each succeeding 1000 feet are run, another letter is added, after the first three or four letters the additional letters being preferably expressed by a dash and number, thus: 528—5B. Thus a number followed by one letter means that the chute referred to is within the first 1000 feet from the station; followed by additional letters, it is within the 1000 feet area corresponding to the number of letters.

In most veins the ore occurs in irregular shaped bodies, with intervening spaces barren of ore or with ore too low grade to pay to work. Wherever it may be deemed advisable to make a raise the number is ready for that particular place. Then, if development shows that the pay ore extends back over the level where no pay was supposed to exist, and a raise is made up through barren ground to the ore, the numbers for that raise and the chute below are available.

Sometimes veins are so wide for a considerable distance that more thau one row of ore chutes may be deemed advisable to handle the ore easily. Suppose this to be on the D vein. Let the row of chutes on the hanging wall side be lettered D and the rows towards the foot the letters following.

Crosscuts are numbered the same as the chutes. Thus, suppose we have a crosscut on the 400-foot level, 240 feet from the station, between the B and C veins. It would be numbered 424BCX.

In this day of improved business methods everyoue who has the handling of a number of men appreciates the value of system, and of one having as little machinery as possible. In the system above outlined every figure and every letter used means something; there is nothing superfluous and the figures of one level always correspond with those above and below. The system is adapted to the needs of the smallest or the largest mine, providing for twelve parallel veins, both directions from the base line, as many veins as are likely to be developed from one working shaft, and for development horizontally along any or all of said veins for any distance it may be deemed advisable to drive.

Undercurrents for Saving Flour Gold and Platinum Sands.

Written for the MINING AND SCIENTIFIC PRESS by DENNIS H. STOVALL.

Sincc the discovery that the old channel placer diggings of northern California and southern Oregon contained much fine or flour gold, aud the more recent discovery that they also contained platinum concentrates and sands in considerable abuudance, much attention has been paid by the miners to the matter of methods for saving these values. A system of undercurrents attached to the sluice boxes has been found by many to be the best method for saving flour gold and black sand. The best system that the writer has found in his rounds of the southern Oregon placers is that in use at the Royal Group hydraulic mines of Galice district. Manager J. R. Harvey of these placers has given much of his time to this work alone, with the result of having a system of undercurrents that practically saves all of the flour gold and platinum concentrates.

The accompanying photograph shows a part of an undercurrent as attached to the sluice box. The sluice box itself is supplied with a full complement of riffles, there being first a long bedrock race cut across the diggings which catches all of the nuggets and coarse gold; then the sluice boxes are reached with, first, a system of standard steel riffles, followed by block riffles, all of which can be easily lifted and rinsed, leaving a smooth floor to clean from at clean-up. The undercurrents set near the end of the sluice boxes. About one-half of the flow of water is drawn down through a ½-inch grizzly in the bottom of the sluice. The dropping of this water through the grizzly creates a suction and carries down with it all of the black sand and flour gold that would have otherwise went on over the dump with the waste water and boulders. The water drawn off is first spread out over a broad riffle table, as shown on the left in the photo. This table is about 10 feet wide and 13 feet in length. Here the coarser particles and much of the flour gold settles. This flour gold and the platinum sand acts very much like coffee grounds when stirred—they will not settle so long as they are disturbed. For this reason they are easily drawn off, and the problem then resolves itself into the question of how to settle them.



Undercurrent in Oregon Placer Mine.

After the sands pass over this first undercurrent they are carried further and dropped into a hopper and run through a steel screen with ¾-inch openings. Everything larger than ¾ inch in diameter passes over this screen and is lost, but these are usually only small pebbles, as the gold particles of that size are caught long before, and the platinum particles are all smaller in size. Everything that runs through this screen is spread out over a riffle of cocoa matting. This riffle table is arranged in divisions so that each strip of matting can be lifted up and cleaned when covered with sands, the water being turned on the other divisions.

The sands that are caught on the cocoa matting riffles are worth from $140 to $170 a ton, the values being about equally divided betweeu platinum and gold. The sands that are found on the "old channel belt" of southern Oregon and northern California, recently described by the writer in the MINING AND SCIENTIFIC PRESS, are not what are commonly known as "black sands." They are a black sand in one sense, but they are more than that—they not only carry platinum and gold in the free state, but in combination also. They are largely refractory and contain all of the metals of the platinum group.

W. F. Smith, a representative of the Welsbach company of Philadelphia, has been experimenting and working in the placer diggings of the old channel placer belt of northern California and southern Oregon for over two years past. He has found that platinum conceutrates and flour gold occur in quantity all the way from Happy Camp, Cal., to Rogue river, southern Oregon. His company put in undercurrents in the Waldo placer mines of southern Josephine county last year and saved several tons of platinum sands. The company, or a department of it, knowu as the Waratah Minerals Co., is uow installing a plant at the Royal Group mines on Galice. This plant will be equipped with a mill and concentrating tables for treating the sands after they are taken from the uudercurrents.

The manager of the Royal Group mines estimates that his undercurrents pay the running expense of his mine, leaving the gold a clear "pick up." They do not interfere with the regular process of gold mining. The same results could be obtained at a number of placer mines in northern California and southern Oregon, where undercurrents are not now in use.

Platinum concentrates have much the appearance of coarse gun powder. They are not black, but are a dark steel gray. Their metallic luster is easily discerned with a close examination.

A Colorado Placer Mine.*

One of the up-to-date placer mining plants in Colorado is that of the Oro Grande Placer M. Co. at the junction of Blue, Snake and Ten-Mile rivers, near Dillon, in Summit county.

The water rights consist of 5000 inches from Snake river and the same amount from Straight creek. The Snake river ditch is 9½ miles long and carries 2500 inches. The Straight creek ditch is 1½ mile long and carries 1000 inches. The water is brought from the pressure box through 8000 feet of 54-inch riveted steel pipe and 1000 feet of 24-inch pipe to two elevators, and through 1000 feet of 16-inch pipe to one elevator. The fall is 520 feet to bedrock. The working pressure is 220 pounds. Two of the elevators, which are on bedrock, lift 99 and 100 feet respectively. When the sump is finally made in bedrock the lift will be 105 feet for both elevators, which is said to be uext to the highest lift in the world. The elevator discharge pipes are 16 inches in diameter to the elevators, and the supply pipe to the elevators is 15 inches in diameter, using 12-inch throat and 5-inch jet in both. The depth to bedrock is 79 feet from the surface of the ground.

The pit (see illustration) is 350 fect in length and 250 feet wide. The flumes are 100 feet loug, fitted with 3½-inch angle-iron riffles over cocoanut matting. The larger percentage of the gold is caught in the first 40 fect, includiug that which will pass 120-mesh. The floor of the flume is 19 feet above the surface of the ground. The tailings go into Blue river, and the high water in the spring, thus far, has carried off a large amount of same. The

*See illustration on front page.

large rocks in the pit are removed by means of a gravity tram, automatic dumping, operated from 110 feet steel-girder derrick. It is the intention of the company to install a specially designed steam shovel for removing rocks. T. D. Harris is manager of the company and F. R. Blount of New York is president.

The Machine Drill in Mining.

The employment of machine rock drills in mining operations is becoming more general everywhere. Formerly machine drills were only introduced at a mine after the value of the mine had been actually proven by hand work, but it is recognized that the cost of prospecting and development may be lessened materially by the use of rock drills to as great an extent as in the operation of the mine after a large amount of exploratory work has been done. Not only is the cost per foot lessened by the use of machine drills, but time is saved in performing any work, whether drifting, stoping, sinking or raising.



Fig. 3.—Electric Exploder.



Fig. 1.—Method of Drilling in Heading.



Fig. 2.—Holes for Key Block and Curtains.

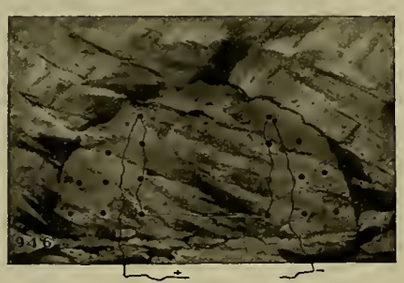


Fig. 4.—All Ready to Blast Out Key Rock.

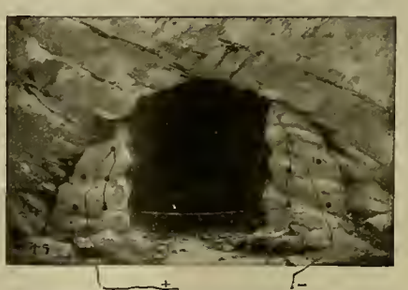


Fig. 5.—Ready to Blast Curtain Walls (Only).



Fig. 6.—For Final Blast.

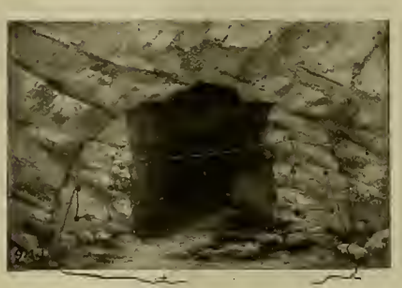


Fig. 7.—In Position to Blast Curtain Walls and Sides.

Time saved is capital saved, and the greater the amount of money invested the more important is the element of time.

It is a good plan to provide a small compressor and drill plant for prospecting and development work, the plant to be increased later if the mine justifies such additional expense.

It were useless to make any comparisons between mining operations in widely separated regions, and such comparison is almost as unreliable in the same district, but it is generally safe to say that in a hard rock country any considerable amount of mining work done by hand could have been more quickly and cheaply done had a machine drilling plant been provided, and the work done by experienced men. It is not essential that the rock work should be under ground to make machine drills advisable. Quarries can use them to great advantage, and it is a question if there is not as high a percentage of saving in the use of machines in outside work as under ground.

In the employment of machine drills, in order to derive the greatest benefit and thereby make the greatest saving of time—which means money—it is essential that the miner running the drill be carefully instructed in its use if he has not already had that experience. He must also be a good judge of "ground," and understand placing the drill holes to advantage. However, this last qualification is not so essential as a knowledge of the machine, and how to handle it, for this latter is always important, while in most instances the drill holes are put in systematically without reference to the slips and seams, grain or rift of rock, which are so important in hand mining. Generally it may be assumed that a miner who is experienced in hand drill mining will place his machine holes to better advantage than a first-class machinist who, thoroughly understanding the machine drill, knows little of rock blasting. The illustrations in this article are furnished by the courtesy of the Ingersoll-Sergeant Drill Co. of New York.

Fig. 1 shows a column bar with two machines mounted thereon. It also shows the manner of pointing the holes as viewed from the side. Fig. 2 shows the position of the holes as viewed in plan. The center is known as "the cut" or "key block," and the side holes are driven in what are sometimes called the curtains. Holes driven straight into a face of hard rock never prove satisfactory, and can be broken by the strongest nitro powder only after being repeatedly fired. Pointing the holes as shown in Fig. 2, the center holes should be shot first and the side holes either immediately after or after cleaning up the rock broken by the first holes—usually the former.

This is accomplished by one of two means. Either the several fuses are cut of such length that the holes will be exploded in the desired order, the hole



Fig. 8.—Connecting up and Firing a Series of Holes in Open Quarry Work.

with the shortest fuse going first, followed by th others in the order of their respective length of fuse, or by means of the electric blasting outfit. All miners are familiar with the first method, which is identical, whether for hand or machines drill holes. The electric battery exploder is coming into more extended use. The cartridges used are those of any nitro powder company, in every respect similar to those used in hand or machine drill work, the difference being in the cap or exploder. This is prepared for the express purpose of firing blasts by electricity, and is illustrated in Fig 3. The exploder consists of a shell of copper, A, partially filled with fulminate of mercury, B, which is sealed in the tube by sulphur cement, F. Through this plug, and projecting into the fulminate, are the ends of the two exploding wires, C, across the ends of which is soldered a short, thin platinum wire, E. This is placed in a hole punched in the nitro powder cartridge and the farther ends of the wires connected with the "push" blasting machine. This machine is contained in a strong wooden box. It consists of a powerful electro-magnetic generator operated by a rack.

When the holes have been drilled and loaded with the powder, including the cartridge containing the electric exploder, the holes are tamped, the wires connected with each other throughout the series and the leading wires are taken back and connected with the battery. When all is in readiness the man who is to fire the holes, being at a safe distance, grasps the handles of the battery and pulls them slowly to their full height. He then pushes down, at first slowly, but with accelerating speed until the rack strikes the bottom of the box, when, if all things have been properly arranged, the holes will be fired.

Fig. 4 illustrates a tunnel heading ready to blast, with the electric wires connected to those holes (the cut) which it is desired should go first. Fig 5 shows the curtain holes ready to blast, and Fig 6 shows the heading after Fig. 5 has been fired, and is wired for blasting the side holes. Fig 7 illustrates both curtain and side holes wired ready for firing, and Fig. 8 illustrates the manner of wiring up a series of holes in a rock quarry where it is desired to displace a large mass of rock and to break it along a given line.

In shaft sinking generally, and in drifting when it is necessary to carry the timbering close to the face, it is not advisable to fire all of the holes simultaneously, as it may damage the timbers by the heavy discharge of flying rock, and also by the effect of the concussion.

Machine drills are made to meet every requirement of modern mining, and range from 2-inch pistons up to 5½ inches. In stopes, cut in moderately hard ground, the smaller machines are found to answer admirably.

Milling on Douglas Island, Alaska.*

Written by R. A. Kinzie.

The ores on Douglas Island are peculiarly adapted to the methods of extraction in use. The gold is contained in altered syenite in the form of free gold and in the sulphides, the principal gold-bearing minerals being pyrite, arsenopyrite, molybdenite and calcite. The ore on the surface has been subject to little oxidizing action, and that on the lowest level is more free-milling than that in the surface pits. It has been found that 48.04% of the gold is caught on the plates by amalgamation and the balance is contained in the sulphurets and tailings.

The crushers are placed in the head frames of the various mines and are of the gyratory type. When the ore is hoisted out of the mine it is spilled by self-dumping skips on a grizzly formed by 1-inch by 10-foot pieces of iron, bolted together by 1-inch iron bars and placed 2 inches apart by disc-shaped pieces of cast iron. The over-size from the grizzlies goes to the crushers and the under-size passes through into the ore bins beneath the crushers.

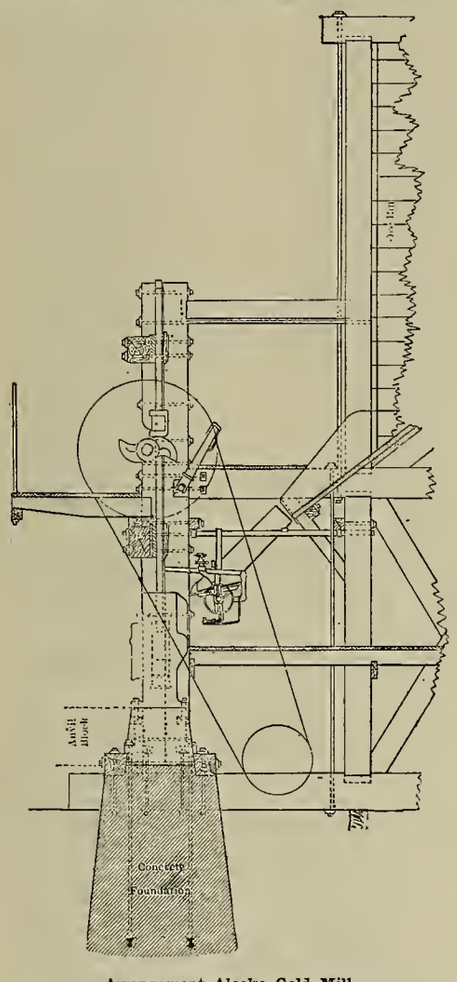
Too much stress can not be laid upon the effect of efficient crushing as related to the duty and output of a stamp mill. This is particularly true on the island, where the crushing capacity is in excess of the demand and where there is abundant water power, which costs practically nothing. During the past year the duty of the mills has been increased over one ton per stamp in twenty-four hours, and, without doubt, 50% of this increase has been caused by setting the crushers to break the rock 20% smaller. An efficient crushing plant for mines similar to the Treadwell would consist of four Gates crushers, arranged in pairs, one above the other, the upper to be of such a size that they would receive rocks 18x36 inches, and the lower to turn out a product not larger than 1½ inch in diameter. The rock, when hoisted, would be dumped on grizzlies with 5-inch spacing between bars, the over-size going to the upper crushers, the under-size falling on a second grizzly with bars set 1½ inch apart—over-size going to the lower pair of crushers and under-size passing into the storage bins. The product from the upper pair of coarse crushers to be spilled on a grizzly with bars 1½ inch apart, the over-size going to the lower crusher and the under-size and crushed product from the lower crushers falling into the bin. If the above method were used it would do away with a great deal of the "bulldozing" in the mines, making appreciable reduction in cost of mining.

There are three different methods in use for conveying ore from the crusher bins to the mill ore bins. At the Treadwell small locomotives are used, draw-

*Abstract Trans. Amer. Inst. Min. Engrs.

ing trains of six cars, each car holding 2½ tons. At the Mexican, where the crusher and mill are practically under one roof, the 2½-ton cars are pushed by hand; while at the Ready Bullion the ore is handled by a gravity tram operating a train of four 2½-ton cars, the cars being returned by means of a small winding engine at the crusher bin. The tracks from the crusher ore bin are continued along the top of the mill ore bins, so that the ore can be dumped directly from the cars into the bins.

In the 300 and 240 Treadwell stamp mills the stamps are arranged back to back, and the bottoms of the bins are made in the shape of an inverted V, so that the ore will be equally divided and fed uniformly to the stamps on either side. In the other mills, where the stamps are arranged in a single row, the bottom of the ore bins, from a point 8 feet below the



Arrangement Alaska Gold Mill.

track, is given a slope of 45° to the open ore chutes at the level of the cam floor. The bins are double-boarded, and on the side next the stamps are lined with ¼-inch steel plate to protect them from the scouring action of the rock. From the bins the ore is taken out by openings at the level of the cam floor and conveyed by chutes to the hoppers of the Challenge feeders. The 300-Treadwell, Ready Bullion and 700-Foot mills are provided with suspended Challenge feeders. Both types are central feeders, the bumper rod being placed next to the central stamp, guided in the usual way.

There are three kinds of mortars in use on the island. The 300-Treadwell, Ready Bullion and 700-Foot mills use Fraser & Chalmers' No. 67–A type; the Mexican uses the Fraser & Chalmers' No. 67, while the 240-Treadwell mill uses a special mortar. End and side liners are used in all the mills, aud false bottoms are used, except in the 240 Treadwell mill, where the die rests on the bottom of the mortar. The false bottoms and liners are cast at the company's foundry. The false bottoms consist of a piece of cast iron 3 inches thick and of the width and shape of the flange portiou of the die. Their object is to protect the bottom of the mortar from excessive wear.

The stamps in the 300–Treadwell, Ready Bullion, Mexican and 700–Foot mills weigh 1020 pounds, while those in the 240–Treadwell weigh, when new, 850 pounds. The stems, tappets, boss-heads and shoes are joined in the usual manner. A shoe lasts three months and crushes 489 tons of ore, which means that 0.27 pound of iron is consumed per ton of rock crushed. The dies are cast at the company's foundry and last ou an average 4.49 months, crushing 732 tons and consuming 0.16 pound of iron per ton crushed.

There is no part of a mill so essential to its efficiency as a good mortar foundation. There are two kinds used on Douglas Island. The Ready Bullion, 700–Foot and the 300-stamp mill at the Treadwell have concrete foundations, capped by cast iron anvil blocks, while the Mexican and the Treadwell 240-stamp mills have the ordinary wood foundation.

On account of the peculiar climatic conditions at Douglas Island, the life of a wooden foundation of the best Oregon or Douglas fir has been about six years. It then commences to rot, causing the mortar bolts to loosen, which results in an uneven wearing of the top surface of the block. The life of the mortar block can be prolonged from six months to a year by planing down the top and leveling it by placing strips of rubber belting between the mortar block and the mortar, in case the decay has been confined to the surface, while the interior of the block remains sound. The blocks are built in the usual way, with four pieces of Oregon pine, 1 foot 28 inches by 26 inches, bolted together by iron bolts. The holes for the auchor bolts are drilled into the mortar block from above, at distances apart corresponding to those on the flange of the mortar. At a distauce of 4 feet below the top, holes are cut to receive the nuts and washers that secure the lower end of the bolts. It is evident that when the decay of the wood penetrates to, say, a depth of 4 inches, there is no longer a secure fastening for the mortar and the mortar block becomes useless. If a 2-inch iron rod be passed through the ends of opposite mortar bolts and through the block, the life of the foundation will be prolonged from two to four years. The best wooden block is oue built up of 2-inch plank, bolted and nailed together, and the mortar bolts fastened as above.

Fig. 1 shows the character of foundation used in the newer mills. Soon after the mills were started it was noticed that the edges of the concrete next to the mortar showed signs of crumbling. The mortars were then raised and a sheet of ¼-inch rubber belt inserted between the mortar and the anvil block. This lesseued the crumbling, but did not stop it, and during the third year full one-quarter of the mortar blocks in the mill had their anchor bolts broken off at the point of contact of the concrete and the anvil block. In nearly every instance, on removing the anvil block, it was found that when the foundation was installed, instead of surfacing up the concrete to the correct level, it was allowed to set; then cement was poured in between the anvil block and the already hardened concrete to raise the foundation to its proper height and level. This caused a plane of weakness and consequeut crumbling, resultiug in the breaking. The above condition might be remedied in the first instance by properly finishing the concrete and making it 8 inches wider on either side thau the bottom of the anvil block, as shown in Fig. 1. With the above exceptions, the concrete foundation with the anvil block has answered the purpose for which it was designed, and, with a few minor changes, it is preferable to the wooden foundation, under the conditions existing on Douglas Island.

(TO BE CONTINUED.)

The Metallurgy of the Homestake Ore.*

NUMBER III.—CONCLUDED.

Written by C. W. MERRILL, B. S.

The cupel slag and the cupel bottom are put through the blast furnace, the lead content of the slag reduces to lead, which absorbs the values, and is drawn from the lead well in the usual manner. This lead is returned to the cupel at the next clean-up, the litharge from the cupellation goes to the next precipitate, aud the blast furnace slag is worth less than $5 per ton.

The total cost of this refining amounts to less than ¾ of 1%; so that the Homestake Co. realizes $20.52 per ounce for its cyanide gold, less the usual U. S. Assay Office charges on dore bullion, and the expressage to New York. These charges amount to between 10 and 11 cents; and the net realization per ounce of fine gold precipitated is thus $20.42 in New York exchange. A parting plant is now contemplated, which will make a further saving in this connection and enable the company to turn out fine gold and fine silver.

TONNAGE, PERCENTAGE AND COSTS.—Tonnage: The maximum monthly tonnage of this plant—which is ascertained by placing cubic-foot boxes in many parts of various vats, determining the dry weights per cubic foot of sand and averaging a large number of such determinations—was attained in October, 1902, when 40,236 tons, or 1298 tons per day, were treated. This gives to the Homestake Co. the largest sand treatment cyanide plant in the world; the next largest being, to the best of my knowledge, that of Simmer & Jack in South Africa.

Percentage: As a comparison of the various assay determinations and valuations with the bullion produced is always of interest, the following figures for the last half of the year 1902 are given:

Extraction.—The extraction, as shown by the difference between charge and residue assay multiplied by the tonnage, was $292,579.

Precipitation.—The precipitation, as shown by the difference between assays of unprecipitated and precipitated solutions multiplied by the solution tonnage, was $301,233.

Gold in Precipitates.—The amount of gold in precipitates, that is, the assay value of the precipitate sampled upon removal from the presses, was $302,-895; the gold value of bullion shipped, $307,635, and the silver value, $2874.

The average percentage recovered in bullion by the treatment for these six months is 74.7%.

This is not as high a percentage of bullion as should be recovered from a porous or oxidized ore, or one in which the values are along cleavage planes; but, in view of the facts that such a high percentage is recovered by amalgamatiou, that the values are very finely disseminated in the Homestake ore, and that the tailiugs are very low-grade, we feel, and all our tests so far have verified our conclusions, that it is the ecouomic percentage, yielding the maximum net profit.

Mauy tests and experimental runs of the plant, looking toward a greater net yield, have been made, covering longer treatment, stronger and weaker solutions, extra oxidation with sodium and barium dioxide, and other similar reagents, varying alkalinities and alkaline reagents, etc. The question of separate treatment of concentrates and coarse sands has also been investigated, all with negative results. The conclusion of the writer iu regard to this latter point is that, even if a higher net yield could be realized by separate treatment, which is contrary to the results of all our tests, a much greater proportion of the fines (passing 200-mesh screen) would have to be thrown off aud wasted, entailing a serious net loss.

Costs: As to operating costs at the Lead cyanide plant, the followiug are the averages per ton for the year 1902, during which the average value of the material treated was $1.65 per ton:

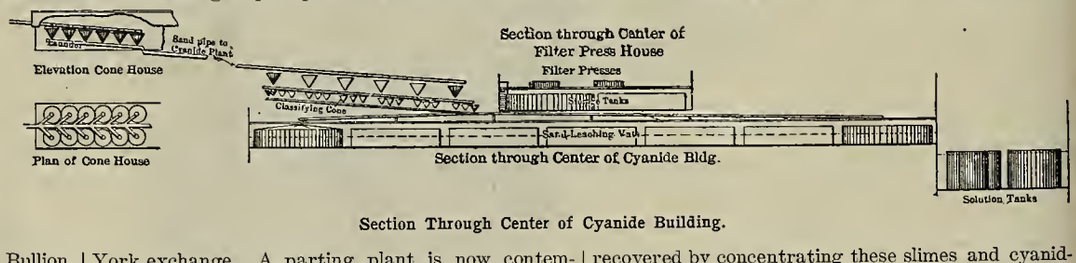
Classification—Labor and Supplies		$ .017
Treatment—		
Cyanide	$ .152	
Labor	.030	
Lime	.022	
Supplies	.005	
	$ .209	.209
Precipitation—Labor and supplies		.026
Power—Labor and supplies		.051
Water		.026
Assaying—Labor and supplies		.013
Refining—Labor and supplies		.006
Miscellaneous		.005
Total		$ .353

As compared with the above, the lowest costs I have seen authoritatively stated for other plants are as follows:

City & Suburban, South Africa	$ .55
Geldenbuis Estate, South Africa	.605
Geldenhuis Deep, South Africa	.62
Robinson, South Africa	.62
Worcester, South Africa	.72

The African costs refer, of course, to operations before the late war between England and the South African Republic; but they are the only figures available to me, and I do not think they have been reduced materially siuce.

As regards the Homestake slimes, which are not at present being treated, their assay value ranges from $0.80 to $1.10 per ton, which is very much lower than that of any slimes now being cyanided elsewhere, and which does not offer much inducement to undertake their hydrometallurgical treatment as a whole. It is the writer's judgment, however, that a material profit, greater than that attainable by any method of treating the whole bulk of slimes, may be recovered by concentrating these slimes and cyaniding the concentrates so obtained; and experiments on a workiug scale will shortly be undertaken along these lines.



Section Through Center of Cyanide Building.

*Read at Am. Min. Congress, Lead City, S. D., and to be read at Oct. meeting Am. Inst. Min. Eng., New York City.

To "square a circle" is to construct geometrically a square equal in area to a circle of given diameter, or to state in terms of its radius the exact area of a circle, a problem shown by modern research not to admit of a vigorous solution, says the Standard Dictionary.

Electricity in Gold Extraction.

The gold with which we are most concerned is that which occurs in metallic form in quartz and quartziferous rocks, accompanied only by the usual impurities, such as pyrites, mispickel, etc., says the Electrical Review, and alloyed with small quantities of silver, platinum, rhodium, etc. Copper and lead ores in which it is present are best left for discussion when dealing with these metals.

The Classification of Gold Ores.—The gold ores can be conveniently divided into two classes: (a) "free milling" and "alluvial" ores, and (b) "refractory" ores. These two classes sometimes overlap, as, for instance, when it becomes necessary to treat an ore by an amalgamation process and the tailings from this process by a subsequent chlorination or cyaniding process. The washing and amalgamation of free milling and alluvial ores are both simple and inexpensive matters, and in all probability the only difficulty that electricity can ever be made to overcome has already been successfully met by the Molloy process, in which the mercury is used as a cathode in dilute sodium sulphate. By this means a "film of hydrogen" is formed on the mercury, or, perhaps, it is more correct to say that a small quantity of sodium is deposited into the mercury and any oxidation of its surface consequently prevented, so that the prevention of "sickening" is successfully accomplished, the surface remaining bright and more easily catching up and retaining the fine gold. If the price of sodium metal falls sufficiently, it is possible that the more direct means of keeping the mercury bright by simply adding sodium to it will again be resorted to.

Processing Refractory Ores.—The case is somewhat different with regard to refractory ores or tailings which have refused to give up a large proportion of their gold to the amalgamation plates. In the ordinary way two courses are open for the treatment of such materials—they must be chlorinated or cyanided. If they are chlorinated, a somewhat complicated plant is required and the chlorine has itself to be made, which is a fairly expensive matter in districts where it is usually carried on. The ore is then leached and the resulting dilute solution of gold reduced by charcoal, sulphurous acid or ferrous sulphate, methods in themselves efficient and satisfactory, but somewhat cumbersome.

The Work of the Electrician.—A fair amount of attention has been given by the electrician to this part of the problem, but as a rule it has seemed as though the position of affairs had not been fully understood. As already pointed out, a really free milling ore is better left to the devices of the gold miner, and the electrician need only turn his attention to the refractory ores. In many electrolytic processes the ore is stirred up in a vat with a solution of common salt. Carbon anodes are continually agitated in this mud and serve to liberate chlorine, which immediately acts upon the gold and dissolves it. The cathode is of mercury and is intended to catch all gold reduced into it from the chloride of gold solution in the vat. There is reason to believe that all gold which is naturally sufficiently finely divided, together with any float gold, is largely chlorinated and voltaically reduced. The bulk of mud being treated by such a method is, however, very large. There may be, for instance, several tons of mud being continuously stirred and electrolyzed for a long period of time in a complicated and expensive apparatus, involving large wear and tear and unavoidable loss of mercury. For this reason this method has not attained to much commercial importance.

The Cyanide Process.—The other way of dealing with a refractory ore is by the cyanide method. Here is an almost perfect process in which electricity, although not essential, may be employed to make it more perfect. The main disadvantages in the cyanide process are the excessive time required for the cyanide to dissolve the gold, the poisonous nature and the high cost of the cyanide. The excessive length of time required for the dissolving is to some extent accounted for by the fact that air is required in the reaction, oxygen or some other oxidizing agent, in fact, seems to be necessary, and on a small scale it is possible to hasten the reaction by the use of some such oxidizing agent as bromine, but in practice it does not appear practicable. A very weak solution, indeed, is theoretically needed to dissolve the gold from an average ore, say 0.005% or less, but in practice it is found necessary to use 0.05% cyanide to dissolve the gold. Even this is too weak to enable the zinc afterward to precipitate the gold from the solution, so that it is found necessary to use five or even ten times as much cyanide for this reason. On the Rand, in South Africa, a solution of about 0.3% cyanide is generally used.

Electrical Reduction.—Attention has been directed to the electrical reduction of gold and regeneration of the solution with some degree of success, the solution being made to pass slowly between the electrodes, the gold being plated onto the cathode in the ordinary way. Out of the several processes devised for this purpose one of the most successful has been that of Siemens & Halske. In this process iron anodes and lead cathodes are used. When the cathodes are sufficiently coated with gold they are expelled for the precious metal. One of the advantages of electrical processes over the ordinary methods is that they enable a much weaker solution of potassium cyanide to be used than is necessary for the spontaneous precipitation of the gold by metallic zinc, and the strength of the solution may then be influenced only by that necessary for dissolving the gold from the ore, thus saving a considerable loss in cyanide. The electrical method of precipitation is gaining headway in South Africa and in New Zealand. According to A. von Gernet, the cost of electrical precipitation for a plant on the Rand, treating 500 tons of gold ore per day, is as follows:

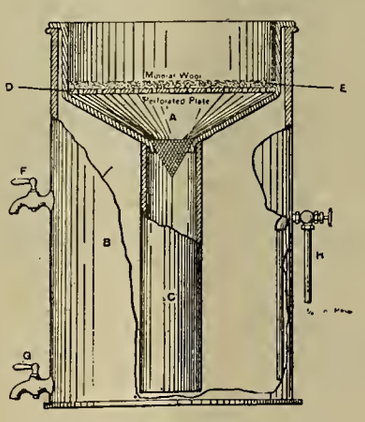
	Pence per Ton of Ore Treated.
Cyanide	3.4
Filling	10.0
Fuel, power and lime	4.5
Labor, native and white	6.9
Lead and iron	1.8
Charge due to extra cost of plant	0.5
Stores and general	3.2
Total	30.3

According to another authority, as much as 99% of the total gold in the solution can be separated on the cathodes, and a strength of 0.5% cyanide (provided that there is no cyanicide in the ore) is sufficient to dissolve the gold at a reasonable rate. The current density generally stated to be most desirable is from 0.03 to 0.06 ampere per square foot of cathode surface and the voltage from four to six volts. The time required to deposit the whole of the gold held in solution seems to vary considerably, according to the efficiency of the circulation of the liquid, but Cowper-Coles, by his process, claims to have deposited from a 0.01% solution of potassium cyanide, containing 2.5 pennyweights of gold per ton, 95% of the total in ten hours, the rate of flow of liquid being fifteen gallons per 100 hours for every cubic foot of cell or 3 square feet of cathode surface.

Electricity in the Cyanide Process.—Many suggestions have been made for aiding the dissolution of the gold in the cyanide by electrical means, but the fundamental principle upon which they are based is weak. It is an obvious impossibility to bring any reasonable proportion of the fine gold into contact with an anode, however it may be constructed, and the mere passing of the current through the mud, and thus using the small gold particles as "intermediate" or "secondary" electrodes, can not be expected to help matters at all, since, the particles being so small, the current would prefer to go round them to passing through them, and thus would be of no service. Even if a small proportion did go through these particles of gold, the efficiency of the process would be almost nil.

Home-Made Oil Filter.

In small plants where the owners do not think they can afford the luxury of an oil filter, a very satisfactory filter can be made from the following directions: The accompanying drawing represents an oil filter which the writer made for use in a plant which needed one. The tank was of galvanized iron, 14



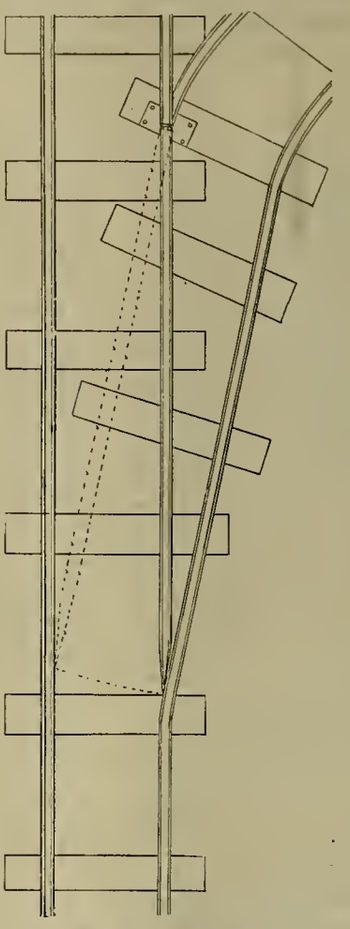
Home-Made Oil Filter.

inches in diameter by 30 inches long. A is a shallow tank made to fit inside of tank B, with a slanting bottom into which the tube C is soldered, the latter being 1¼x19½ inches. D is a perforated tin plate, and E is a layer of felt of the same size as the plate Cock F is placed 14½ inches above the bottom of the tank and is to draw the oil, and cock G is to drain the tank when necessary.

In action the oil is poured into the receiving tank A, where it drains through the felt and screen, and flows down the inside of the tube C. Passing out from the bottom of the tube the oil ascends drop by drop to the surface of the water surrounding tube C. The water level is kept constant by means of the overflow pipe H, which is 13 inches long inside the tank and is tapped into the latter at a point 14 inches from the bottom. The valve of this pipe is open at all times to allow the escape of excess water. A gauge glass is in addition, but can be dispensed with.

A Convenient Mine Switch.

One of the greatest sources of annoyance and loss of time in mines is poorly constructed tracks and switches. The latter, particularly if not made with care, frequently cause the derailment of cars, which are usually loaded, with the constant stopping of traffic and loss of time in replacing the car on the track. Switches may be built with "frogs" in the same manner as railroads, but these are expensive and not essential for the light traffic of most mines. Switches should be so built that they will not become clogged with rocks or other mine debris. The accom-



Convenient Mine Switch.

panying sketch shows a good form of mine switch—the single, movable rail. The rail must be shifted by the trammer or some other person, but this can be readily done with the foot. There are no frogs to become clogged, and a switch of this description is easily kept clean. The movable pointed rail is held in place by a pin driven through a hole provided by the blacksmith at the upper end of the rail, at which place it rests on an iron plate, as shown. The pin passes through the iron plate and to a depth of not less than 3 inches into the tie. It should be so made that, if desired, the switch tongue may be lifted out and any obstruction removed from beneath it. A tie should also be so placed that the point of the switch shall rest upon it at either side of the track. This is not properly illustrated in the sketch.

Electrical Furnace Experiments.

An interesting experiment is described by M. Ch. Fery in a recent issue of Le Genie Civil. The experiment, which was made to test the accuracy of an optical pyrometer of his devising, consisted in the fractional distillation of brass in an electric furnace. This furnace took 600 amperes at 80 volts, and with it 11 pounds of copper could be boiled off in six minutes. On charging it with brass containing 37% of zinc, the temperature rose in half a minute to the boiling point of zinc, which was found to be about 1100° C. This temperature remained nearly constant for one minute, which sufficed to get rid of all the zinc, and in two minutes more the boiling point of copper was reached, which was found to be 2100° C. The copper left in the furnace at the end of the experiment contained barely a trace of zinc and was very nearly pure, though a little carbon was mixed with it in the form of graphite.

The pyrometer used in these experiments is of a very interesting type. It has the advantage that no portion of it is exposed to a really high temperature, its indications being dependent on the fact that the total radiation emitted by a "theoretically black" body varies as the fourth power of the absolute temperature. The interior of any furnace into which there is but a small opening acts as a theoretically

black body. M. Fery's method of measnring the temperature, however, is to receive the radiation, from a small opening into such a furnace, on a thermopile so shielded that the amount of radiation received is independent, within limits of the distance of the couple from the opening. This thermopile is connected to a D'Arsonval galvanometer, and the temperature is estimated from the observed deflection in the nsual way. In cases in which it is impossible to have an opening direct into the furnace, M. Fery builds a small muffle into the wall of the furnace and obtains his temperature readings by pointing his instrument at the interior of this muffle.

Cyanide Plant and Practice at Ymir Mine, British Columbia.*

NO. II.—CONCLUDED.

Written by EDWIN C. HOLDEN.

Where there is enough head room to give distributor arms 3-inch grade per foot, arms of 1 inch diameter, or even smaller, could be nsed without danger of clogging. This would be an improvement upon the nsual form, which has 1.5 inch arms at 1.5 inch grade; for it would approach the ideal conditions requiring a maximum number of arms fed from a full hopper.

Continuous, uniform charging is essential to make a good charge; hence, so far as possible, stamp mill hang-ups were made between charges. When, however, an emergency hang-up was made with a charge incomplete, a gentle hydraulic current was started under the filter in the vat; the water feed to the distributor was increased; and, when charging was recommenced, the settlers were run with a strong hydraulic current for a few minutes, allowing only the coarse sands to settle. Despite every precaution, however, a slime layer will mark in the charge every mill hang-up of over ten minutes' duration.

The overflows from the vats and the separators were combined before they reached the overflow sampler, so that I cannot give separate figures on the vat and box separations. The longest distributor arms occasionally make a wave strong enough to throw over a little of the finer sands into the overflow launder, so that of the combined overflow 1.1% was caught on a 100-mesh screen. Much of this coarse residue, however, was wood fiber from the mine and flumes.

The classification of values in charges and overflows was marked, the average assays and screen tests for the year being:

	Au. Oz. Per Ton.	Ag. Oz. Per Ton.	Through 100-Mesh. Per Cent.
Vanner tails	0.0838	1.008	64.86
Charges	0.0931	0.637	50.70
Overflows	0.0621	1.878	98.90

The high silver in the overflow is due to its association with galena in the slimes.

The system of classification, it must be admitted, was crude; and if the plant were pushed to its full capacity, close hydraulic classification, yielding a clean, quick percolating charge, would be necessary; but, as run at this time, the system was very satisfactory, for it settled and treated a total of 70.1% of vanner tailings. When we were treating oxidized ore, charges could not be successfully treated that carried over 45% of fines.

With all the stamps dropping, a vat was filled in from twenty-eight to thirty-two hours; but during the last quarter of 1902 it required from forty-eight to sixty hours. The experimental work called for five days' treatment; but, with the reduced crushing, we increased the proportion of slimes settled, and treated charges as long as our capacity allowed—the average time of treatment being 10.5 days. A normal charge was 185 tons, dry weight.

The acid tests seem, in the case of the Ymir tailings, to be worthless as an indicator for the use of lime. The ordinary tests for latent acidity called for over one pound of lime per ton. Phenolphthalein indicated more. We used 200 pounds to the charge for a while, until the zinc boxes grew so foul that dried precipitates assayed under 1200 ounces of total fine bullion per ton. The methyl-orange indicator was more satisfactory. It called for less than 0.5 pound of lime per ton. But the final practice, which gave the best results, was to use less than 0.1 pound per ton, and apply it in 5-pound lots, the last lot going on with the final dose of strong solution. The cyanide consumption was thus reduced over 10%; and the zinc-box crude precipitates rose in grade to over 5300 ounces per ton. In treatment, the final filtrates became very cloudy when they titrated between 0.1% and 0.05% KCN; and the small addition of lime, just before starting weak treatment, tended to keep the slimes coagulated and the filtrates clearer.

Vacuum percolation was soon discarded, as it gave a very dirty filtrate and packed the charges, so that the final rate of percolation was slower, even with the vacuum, than it would have been if unassisted throughout.

The routine of treatment was as follows:

After leveling and adding dry lime, two 5-ton doses of weak solution (between 0.1% and 0.05% KCN) are successively given. When these have disappeared they are followed by four or five 10-ton doses of strong solution (0.2%) at 5-hour intervals. There is no trace of cyanide in the filtrate for six hours after the first application of weak solution, and there are no values until after fifteen hours. After forty or fifty tons of strong treatment, the charge is drained six hours, when the filtrate has almost ceased, and titrates 0.04% to 0.07% KCN. Twenty tons of strong solution are now run in under the filter. It requires from six to eight hours to run this in without channeling the charge, and when it is all in, if drainage has been sufficient, there will not be more than 5 inches of solution on top of the charge. After soaking from three to six hours the charge is drained and a 10-ton top treatment follows. Top and bottom treatments thus alternate until 160 tons of strong solution have been applied. Then follows weak treatment, applied on top in 5-ton doses as rapidly as it disappears, to a total of forty or fifty tons. This is followed by wash solution (0.05% to trace KCN), forty tons; and this, by water as required, to preserve the balance of solutions or secure low end filtrates. No solution is run to waste other than which is lost as moisture in the residues.

The adoption of bottom treatment had a marked effect. During the first six months' operating, when only top treatment was used, the gold extraction gradually fell off from 70% to less than 50%; and assays from the bottom of the charges were discouraging. When the connections for bottom treatment were made in October the gold extraction rose at once from 48% in September to 75% for October; and the average actual gold recovery for the last quarter of the year was 80.23%, while the actual silver recovery also rose from 25% to 41%.

The total time of treatment was from 9.5 to 11.5 days. The average rate of percolation was 1 inch per hour, although 64% and 71% gold extraction were obtained from charges having only 0.5 inch and 0.6 inch rates. The highest rate during this period was 1.5 inch per hour. This slow percolation means high cyanide consumption and long treatment; but it also means larger slimes tonnage treated. It does not require a large increase in daily tonnage to pay for extra vats and a little more cyanide.

Residues are discharged through two 10-inch plug flanges placed 4 feet from the sides of the vats. A 2.5-inch hose with 2-inch nozzle is used under 115 pounds pressure, the hose being held in a swivel clamp at the edge of the vat. The bottom 6 inches is cleaned out at reduced pressure. One man will sluice out a charge and clean the filter in from 3.5 to 4 hours.

The filter is three thicknesses of 16-ounce burlap, having the usual false bottom and rope grounting, and anchored to the vat bottom to counteract its buoyancy.

Precipitation is effected by zinc shavings in eight 10-compartment steel boxes, and it is perfect with the weakest solution when run at the rate of one ton of solution per twenty-four hours per cubic foot of shavings. The shavings in the wash solution box are lead dipped. Whenever there were values in the effluent, running at the normal rate, they were found to be due to precipitate mechanically carried over after dressing boxes, and it was found best not to disturb a box after it had been running more than a week, but to add shavings on top as required.

The clean-up method, while it just about competed with refiners' rates, was not satisfactory. The precipitate was dried, fluxed and smelted direct, without either acid or roasting treatment, and without refining, which produced a bullion of 720 total fineness. The treatment loss was 1% of the gold and 0.5% of the silver. The clean-up cost, including freight and treatment of the resulting high-grade zinc slag, was 17 cents per pound of dried slimes. This does not include charges for bullion treatment.

Operating costs per ton in detail for the last quarter, when 7150 tons were treated, were as follows:

COST OF TREATMENT PER TON.

Cyanide, at $0.22 per pound	$0.200
Zinc, at $0.09 per pound	0.020
Lime, at $0.009 per pound	0.001
Fuel, at $2.50 per cord	0.019
Clean-up supplies	0.029
Repairs	0.014
Miscellaneous	0.003
Labor (wages at $3.50 and $4.50 per day)	0.234
Total	$0.520

Assay office costs were not alloeated; but the cyanide plant proportion should approximate $0.025 per ton. These results were obtained when treating but seventy-eight tons per day. This cost can be reduced to 38.6 cents when the plant is treating its full-rated capacity of 200 tons per day; and the introduction of reverberatory and enpel furnaces for clean-up would still further reduce it.

The plant is equipped with steam heating and electric lighting plants, and has an auxiliary water power system capable of developing to 300 H. P. The pumps and lighting dynamo are run by Pelton water motors under 320 feet head; and the only cost of power is the trifling item of maintenance of flumes.

The total cost of the works, including the power plant, was $57,951.63. Omitting the costs of the main mill building, boarding houses, power plant and heating system, and thus reducing the estimate to the basis of an open air plant, the cost was $33,782, including the clearing, excavating and masonry, previously referred to, which amounted to $6321.34.

*Trans. Am. Inst. Min. Eng. (Condensed).

Gold Reduction Plant on the Rand.*

The broken ore is raised from the mines through vertical and incline shafts, or a combination of both, nsually in skips, which are now built to carry three tons per load. Cages to transport the mine trucks from below to the crusher station are still used in some few instances, but this practice is now disappearing. On incline headgears the skips run up from below on rails and two pairs of flanged wheels, and on reaching the top of the headgear the lower pair, which have a very broad flange, engage with an onter pair of rails, which cause the tail end of the skip to be raised above the level of its mouth, and the contents are shot into an ore bin; in vertical headgears the self-dumping action is on the same principle; the skip is inverted by engaging with runners, which divert its mouth over the ore bin while the tail continues its way up the vertical guides.

The rock as sent up from the mines often consists of a considerable percentage of waste sandstone, and to eliminate this as early as possible it is "sorted" as it leaves the bin into which it was dumped from the skip.

Sorting is done by three methods. The rock passes down over grizzlies, which eliminate the unsortable "fines" on to the sorting floor, where it is treated as follows:

1. On floors, on which the rock is spread out, sprayed with water, the waste is picked out and thrown into bins, whence it is conveyed to the dumps, and the pay rock is thrown into the crushers, which are on a level with the floor.

2. The rock having passed over the grizzlies is led on to the slow moving belt, and at the same time is sprayed with water. The sorters (natives in charge of a white man) are ranged alongside of the belt, and each piece of rock has thus to pass the scrutiny of many eyes before it reaches the end of the belt and is shot off into the bin beneath. The waste is thrown off as before and trammed to the waste dump.

3. The system mostly in vogue on the fields is the sorting table. This machine has undergone many changes of construction since its first adoption at the City and Suburban mine, and the present design has reached a high state of efficiency. The rock passes through a revolving screen and is at the same time sprayed with water. It thence runs on to the table, which is here revolving in a reverse direction to the hands of a watch. The sorters are ranged round both within and without the circle of rock; they pick out the waste and throw it into conveniently placed shoots. The pay rock is automatically scraped off at the far side of the table and runs down into the jaws of the crushers on the floor below.

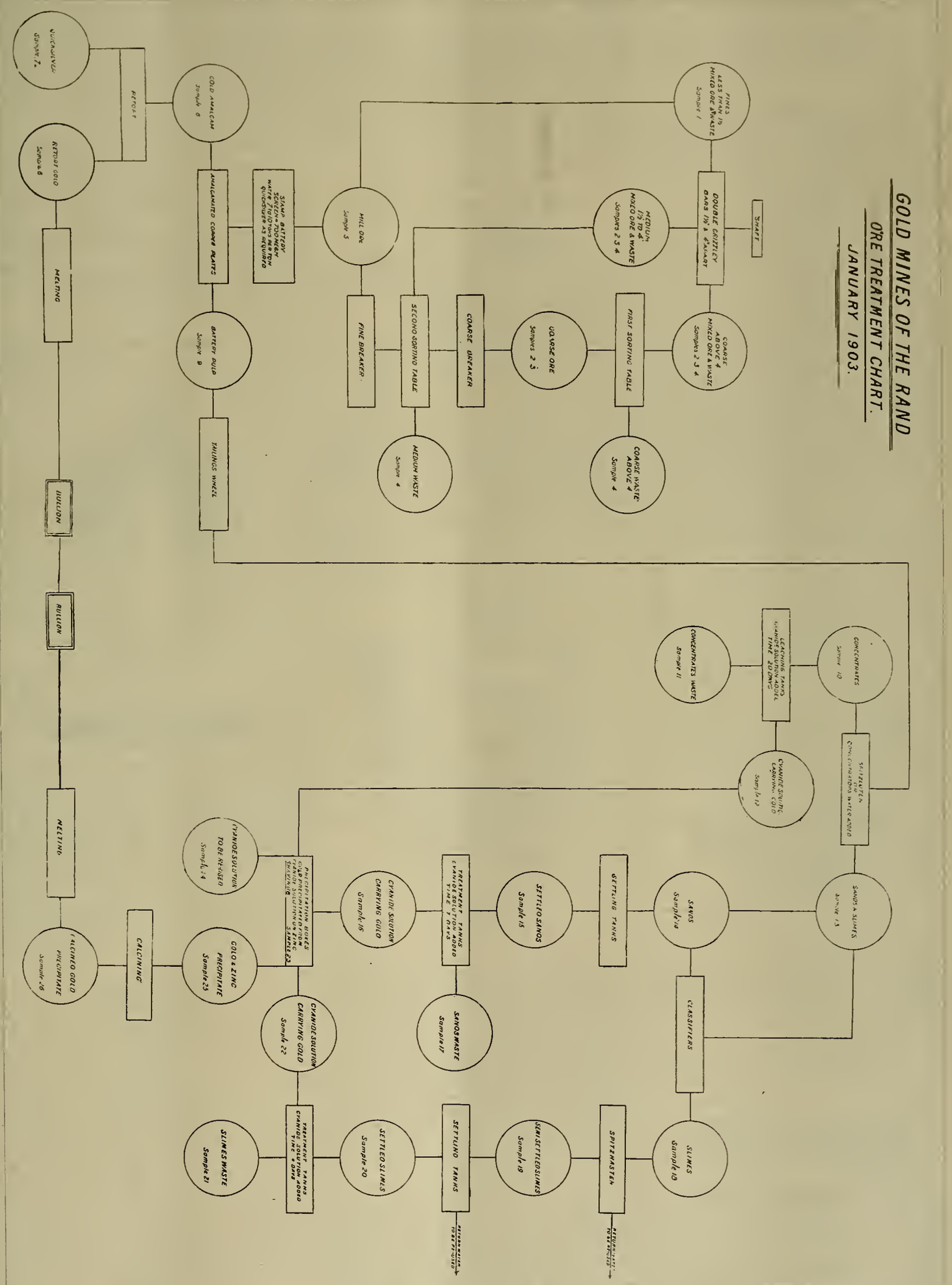
The crushers are usually of the gyratory type and the rock is delivered from them into the bin, which already contains the fines, broken to a size sufficiently small for treatment in the stamp mill. According to the requirements of the particular works, the crushing and sorting station is either built into the headgear or forms a separate house.

From the crusher station the ore is hauled to the mill bins, usually by mechanical means, though in some cases mules are still employed to draw the trucks. Where the mill is situated some distance away, either steam or electric traction or endless rope haulage is employed. For short distances reciprocating haulage is used. A heavy skip is drawn up into the mill from the bottom of the crusher station and empties itself automatically into the required mill bin. At the bottom of the mill ore bin are shoots, from which the rock is fed piece by piece into the mortar boxes, the flow being regulated by automatic feeders.

The rock is broken by the stamps in the mortar boxes to a consistency of fine sand and slimes, and is water-borne through the screens over the copper amalgamating plates. The size of mesh of the screens is varied according to the requirements of the rock and with regard to the economical running of the cyanide and slimes works.

The majority of the free gold is caught by the amalgam on the plates, and the particles held in the sands; the pyritic portion and the fine gold in the slimes are carried over the plates and fall from the launder into the sump at the base of the tailings wheel. Tailings wheels are usually made of wood with steel shafts, and are constructed with either single or double bucket lifts. The water-borne tailings are raised by this means above the level of the cyanide works, which are so designed that no further elevation of the material is required throughout the rest of the treatment. In the launder leading from the top of the tailings wheel is fixed an automatic sampler, which takes at regular intervals a sample of the material being delivered to the cyanide works. From the launder the tailings pass through a series of three or more hydraulic classifiers called spitzlutten. These are boxes so constructed that the heavier sands and concentrates are drawn off at the bottom and are led off into vats for special treatment, while the lighter sands and the slimes flow over and continue their course towards the general treatment vats. The concentrates obtained are either treated with cyanide solution in special vats, or are handed

*Abstract from the annual report of the Transvaal Chamber of Mines.


GOLD MINES OF THE RAND
ORE TREATMENT CHART.
JANUARY 1903.
SHAFT
DOUBLE GRIZZLY BARS 1½" & 4" APART
FINES LESS THAN 1½ MIXED ORE & WASTE Sample 1
MEDIUM 1½" TO 4" MIXED ORE & WASTE Samples 2 3 4
COARSE ABOVE 4 MIXED ORE & WASTE Samples 2 3 4
MILL ORE Sample 3
FIRST SORTING TABLE
UG VEIN ORE Samples 2 3
COARSE WASTE ABOVE 4 Sample 4
COARSE BREAKER
SECOND SORTING TABLE
FINE BREAKER
MEDIUM WASTE Sample 4
STAMP BATTERY SLIGHT AMALGAMATION WATER FED TO BOXES QUICKSILVER AS REQUIRED
AMALGAMATED COPPER PLATES
COLD AMALGAM Sample 6
RETORT
RETORT GOLD Sample 6
SUCCHLEVED Sample 7
BATTERY PULP Sample 9
TAILINGS WHEEL
CONCENTRATES Sample 10
CONCENTRATES WASTE Sample 11
LEACHING TANKS CYANIDE SOLUTION TIME 20 DAYS
CYANIDE SOLUTION CARRYING GOLD Sample 12
SLIMES & SANDS Sample 13
SANDS Sample 14
SETTLING TANKS
SETTLED SANDS Sample 15
TREATMENT TANKS CYANIDE SOLUTION ADDED TIME 3 DAYS
SANDS WASTE Sample 17
CLASSIFIERS
SLIMES Sample 18
SPITZMASTEN
SEMI-SETTLED SLIMES Sample 19
SETTLING TANKS
SETTLED SLIMES Sample 20
TREATMENT TANKS CYANIDE SOLUTION ADDED TIME 4 DAYS
SLIMES WASTE Sample 21
CYANIDE SOLUTION CARRYING GOLD Sample 22
PRECIPITATION BOXES GOLD PRECIPITATION BY ZINC SHAVINGS Sample 23
GOLD & ZINC PRECIPITATE Sample 25
CYANIDE SOLUTION CARRYING GOLD Sample 16
CYANIDE SOLUTION TO BE RE-USED Sample 24
CALCINING
MELTING
FILLING GOLD PRECIPITATE Sample 26
MELTING
BULLION
BULLION

over to chlorination works for extraction of their gold contents. At the foot of the spitzlutten is fixed another automatic sampler, and the sands and the slimes thence pass through the spitzkasten. This is an hydraulic classifier so constructed that by a definite pressure of water being introduced at the bottom of the box the slimes are borne upward and over the edge of the box, while the sands are drawn off through the bottom and are led away to the percolating vats. In some cases no extraneous water is required for this action.

Percolating vats or tanks are now built of steel, are round in shape, and are arranged in pairs one above the other, to admit of easier manipulation in the double treatment. The sands from the spitzkasten are run into the top vat through a flexible hose, and the superfluous water carrying some of the remaining slimes is taken off through a side discharge, the height of which is regulated by slats of wood as the level of the sand rises in the vat.

When the vat is filled with material the first cyanide solution is pumped on and is allowed to percolate through the mass. It is drawn off through the filter bed at the bottom of the vat and flows away to the extractor house. The discharge doors in the bottom of the tank are then opened and the sands are shovelled through into the lower vat, where more cyanide solution is pumped on and drawn off below. The mass of the sands is then washed with water to extract the remaining solution, and the valueless residues are discharged through doors in the bottom of the vat into trucks and hauled away to the tailings dump.

The designs of these percolating vats have undergone and are still subjected to many changes. The earliest forms were square wooden tanks, which were afterwards changed to round vats, built of wooden staves and mounted on masonry foundations. The sands from the mill were settled in a tailings dam, loaded into trucks, drawn up and dumped into the vat. They were then subjected to single treatment, and were shovelled back into the trucks and taken away to the dump. With direct treatment came the necessity for larger vats, and several plants were erected consisting of rectangular concrete tanks; these have now been superseded by steel vats.

The water-borne slimes, after leaving the spitzkasten, are charged with a certain amount of lime by means of an ingenious automatic arrangement. They are then led into a further series of spitzkasten, and the action of the added lime is such that the slimes settle in the spitzkasten and are drawn off at the bottom, while the superfluous clear water flows off at the top and is returned to the reservoir. The slimes, which have now a gelatinous consistency, are run into the slimes vats, where they are allowed to settle and concentrate, the bulk of the water being eliminated by decantation. They are then agitated with cyanide solution. This is done either by stirrers in the vats, or by passing the liquid mass through centrifugal pumps and returning it to the vat. The latter treatment is more in vogue at the present time. The mass is allowed to settle, the solution is decanted off, and the residue washed with water to remove the remaining solution. The residue is then discharged through the bottom of the vat into the slimes dam by aid of centrifugal pumps.

The gold-bearing cyanide solutions from various tailings treatments are pumped into solution vats and thence are led into the extractor house. To avoid unnecessary treatment and undue loss of cyanide, the washes of one treatment are converted into the weak solutions of another, and so on. They are thus built up in strength and gold-bearing contents for the more economical extraction of their gold contents. The extractor house contains the extractor boxes, the pumps for transferring the solutions and agitating the slimes, and in some cases for returning the clarified water to the mill. In it also are the acid vats for dissolving the zinc and the smelting furnaces for the final stage of the process. The gold-bearing cyanide solution flows in through the pipes at the head of the boxes, and flows out denuded of its gold contents at the foot, whence it is pumped to the solution vats to be used over again.

There are various methods of treatment within the boxes, of which the following are the main points. The various compartments are in every case partitioned off so that the solution to be treated is introduced into the bottom of the first compartment, flows over the top, and is introduced into the bottom of the next, and so on:

1. The boxes contain perforated trays which are filled with fine shavings of zinc, pressed well down and forming a spongy mass. The gold is deposited on the zinc and falls through the bottom of the tray in the black slime.

2. The compartments are filled with strips of lead, which hang closely suspended in rows. An electric current is passed through the solution, the lead foil being used as the cathode and iron plates for the anode. The gold is deposited in a black slime on the lead foil.

3. The zinc shavings as described in (1) are first dipped in a solution of acetate of lead, thereby giving them a fine coating of lead. A zinc-lead couple is thus formed and more energetic action is induced. The gold is deposited on the shavings as in (1).

4. The solution passed through the boxes prepared as in (3) is rendered more susceptible of parting with its gold contents by the continual addition at the head of a box of a sufficient quantity of free cyanide solution to bring the strength up to the desired standard. The gold is deposited on the shavings as in (1).

The latest method in vogue on many of the principal mines on the Rand is the use of very weak solutions in the extraction of the gold from the tailings, and the adoption of the extractor box treatment (No. 4) for the precipitation of the gold.

The greatest measure of success is obtained by studying the output of each mine separately and by finding out the particular treatment and method of extraction that is most suitable to these particular conditions.

The accompanying drawing shows the arrangement of a modern mill on the Witwatersrand.

Identity and Continuity of Veins.

NUMBER III.—CONCLUDED.

The court found, however, that "the continuation of the east dipping fissures has not been satisfactorily established at any point where the two veins come together;" also, that the above theory is not in conflict with the claim of continuity of the Pennsylvania vein through the complications.

By a circuitous route the vein was followed continuously downward on a westerly dip from the apex to the lowest level without the intervention of any complication. Both to the north and to the south of the Horseshoe winze the vein was so traced from the 700-foot level to the bottom level—i. e., from a level above the Horseshoe complication to a level below it. The court considers that the bearings of these facts were not overcome by evidence of complications elsewhere, and says: "To my mind, the most conclusive fact establishing the continuity of the Pennsylvania vein is this fact, that the vein can be followed as a dominant, persistent vein from the surface through continuous stopes down to the lower workings of the mine."

In the northwesterly portion of the mine there is a marked divergence of the strike of the vein in depth from the course of the apex. The Grass Valley Co. urged this as an objection to the claim of identity and continuity. But the court says: "This fact would be of some importance if the vein was an ideal one, maintaining a uniform strike and dip throughout its entire course. But it is not an ideal vein, and there are very few such to be found. . . . This twisting or turning of the vein is accounted for . . . by the folding of the rock under pressure and contraction. . . . This objection to the Pennsylvania vein is, in my judgment, without any force. . . ."

Finally: "It follows from these considerations that I am of the opinion that the Pennsylvania Co. has established its right to all the ore bodies and sections of the mine in dispute."

The distinction between the character of complications existing in the Pennsylvania case and the occurrence of faulting and normal displacements previously illustrated is manifest. The difficulties of determining identity increase as complexities are multiplied, and necessarily each case must be determined upon a consideration of the peculiar facts therein developed.

Speaking of the difficulties surrounding this class of cases, Judge Hawley has pertinently said:

"In all controversies concerning the identity of ore bodies found on different levels at various depths beneath the surface there is always room for a wide divergence of opinion among men of equal credit and experience as miners. The absolute truth is often difficult to ascertain, except in cases where connections are made between the different bodies of ore found on different levels. . . . A wide latitude is always permissible for the purpose of ascertaining the reasoning upon which the conclusions of witnesses are based, as well as their general knowledge of the ground, their experience and observations, and their qualifications as practical miners or experts derived from years of experience in the particular district where the ore bodies in question are found."

The several cases heretofore cited, together with the opinions of noted jurists, are but a few of the numerous contentions coming before the courts for adjudication. No phase of the mining law is so prolific of litigation as that permitting the extralateral right. The fact that in most mining districts the vein system is complicated—the veins striking in various directions, often crossing each other—together with varying dip, tends to make a complex question of it, which is not simplified by the vagaries and the irregularities of the veins themselves.

In the earlier years of mining in the West force was often employed in an effort to hold disputed territory underground, nor has this tendency wholly disappeared yet in some districts. In some recent instances noxious gases and irritating dust have been employed to drive opponents from mine workings, but usually the decision is left to the courts, where all such contentions must eventually go, if not compromised by the parties to the conflict. The United States is the only country where the extralateral right is permitted, it having having been abolished in all English colonies where it had been introduced. British Columbia is an instance of this kind, where, under the "extralateral right" law, within a short time enough litigation resulted to last for many years.

The mining law was framed years ago, when mining geology was not as well understood as at the present day, and it evidently assumed a condition that does not often obtain. It conceived a possible series of parallel veins, with uniform dip. Under such conditions no conflict could occur. The numerous changes in the law from time to time indicate an increasing knowledge of geological facts, but no amount of law can meet the great variety of geological vein phenomena.

Geology of El Oro District, Mexico.

Written for the MINING AND SCIENTIFIC PRESS.

The movement of capital from the United States to Mexico has grown of late years. It is to be expected that in the number of investors eager to secure shares in the mineral resources of Mexico there will be found the erring element which follows extraordinary mining activity in all countries. At the same time the unscrupulous element whose motive is always to lead the erring to disaster is to be looked for at the very front of the movement.

In the past five years more capital has been invested in the mines of Mexico than in the previous twenty years. Most of this capital will be rewarded with profits, particularly capital invested in properties outside the leading mining centers. In the new camps which have come into existence in the past five years many investors may fare badly.

El Oro, one of the noted camps of Mexico, about 75 miles west of the city of Mexico, first came into prominence when the Somera mine was purchased by the El Oro Mining & Railway Co. of London. This was about five years ago. Shortly after the Somera became the property of the English company August Sahlberg, who had been superintendent of the Somera, but had severed his connection with it in order to devote his energies to the development of the Esperanza, an adjoining mine, which he had bought, discovered the San Rafael vein in the latter. The opening of the Descubridora vein on the El Oro mine, and of the Dos Estrellas vein on the mine of that name, increased activity in the camp greatly. Mills and cyanide plants were erected without loss of time, and the production of bullion was doubled in the course of three years. The Somera, El Oro, Dos Estrellas and Esperanza mines were proven to be among the most valuable gold and silver mines of the world.

The most prominent feature of the topography at El Oro is the hill called Somera. In this upheaval, which attains an altitude of 13,200 feet above the level of the sea, centers the greatest geological and mineralogical interest of the belt. Within this hill, and the group of mountains to which it belongs, is situated the system of veins comprised in the El Oro, Esperanza, Somera and Estrella mines. The mountains themselves, in the form of separate ranges, descend to the north until they finally terminate abruptly in the low-lying lands of Tepetongo and Bravo. It has been determined that the country comprised by Somera hill, and the apparently dependent mountain mass to the northeast, is formed of argillaceous slates, overlaid by a capping of volcanic rocks, the capping being thickest to the northeast of the hill and thinnest to the southeast, disappearing almost entirely on the eastern slope of the hill, in the vicinity of the Dos Estrellas and Jesus del Monte mines. In the camp of Tlalpujahua the slate is exposed. The plane of contact between the slates and volcanic rocks is inclined from southwest to northeast. The points at which the principal explorations have been made to ascertain these facts are the claims Ojo de Agua, Progresso and Estrella No. 1. The first work on the shaft on the San Patricio claim has been in gray slates, stratified with seams of quartz. There are three classes of volcanic rock recognized in the formation at El Oro. The first of these is hornblende-andesite; the second rhyolite, and the third a dark-grey andesitic porphyry, which occurs in dikes. In some of the mines the second class of volcanic rocks have the form of a porous amygdaloid, the amygdules being sometimes filled with chalcedony. The slates are always of the same class, the only difference being noted is that produced by the action of heat and atmospheric agencies. Development work shows that there exists a system of parallel veins extending eastward from Somera hill, and that these veins occupy fissures, the thickness of which varies in a most remarkable way between a few inches and 20, 30 and even 40 feet. The general trend of the veins, with the exception of the Tlalpujahua section, where it is north and south, is 32° southeast to northeast, with a dip to the east. The veins are composed of quartz containing gold and silver. They occur entirely in the slate, those in the eastern end of the belt having a capping of volcanic rocks whose thickness varies from 250 to 500 feet. Never do the apices of veins rise above the slate. Many faultings have occurred in them, but none are extensive. Yet, when some mining engineers assert that it is a rule that "the veins of greatest width have the greatest length," the question of a mistake being made by them becomes evi-

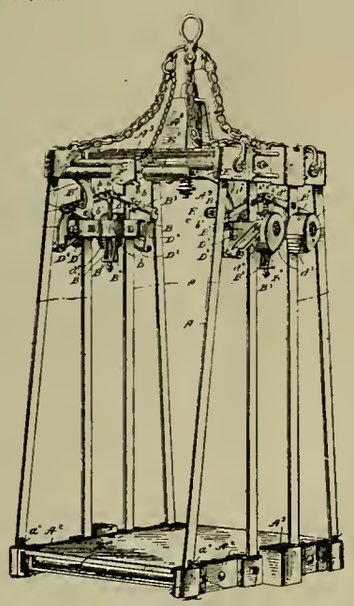
dent, since it is well known that in the widest veins there have been many breaks, with slate intervening between the sections of the vein in such a way as to discourage the operators in attempts to relocate the veins. Notwithstanding this, however, the prospects of the leading mines appear to be bright until the 600-foot level is reached—that is to say, a depth of from 200 to 300 feet below the apices of the veins. At that level the values of the ore, which begin to diminish rapidly at the 500-foot level, are too low to pay the present expenses of extraction. There is, therefore, only from 200 to 300 feet of stoping in the mines. As the veins are from 18 to 50 feet wide, and carry gold and silver to the extent of from $25 to $50 per ton throughout their entire extent, which is great, it is easy to be seen that they have a long life before them, even with vastly increased milling facilities taken into consideration.

Mining and Metallurgical Patents.

PATENTS ISSUED OCTOBER 13, 1903.

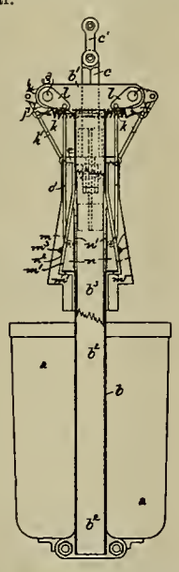
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

MINER'S SAFETY CAGE.—No. 740,872; F. C. Kerst, Springfield, Ill.



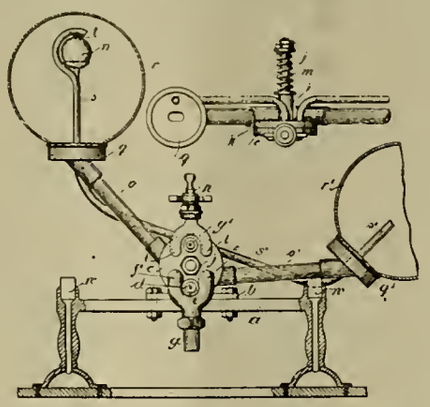
In safety cage, combination of main frame, vertically slidable lifting rod, transverse plates secured to main frame, collared bolts passing through plates, levers turning on collars of bolts provided with hubs, dogs surrounding hubs of levers and turning on bolts, springs acting against dogs, connecting device connected with lifting rod, intermediate levers connecting first named levers with connecting device, and springs operating intermediate levers.

SAFETY GEAR FOR MINE SKIPS, CAGES, ETC.—No. 740,942; W. B. Stevenson, Witwatersrand Gold Fields, Transvaal.



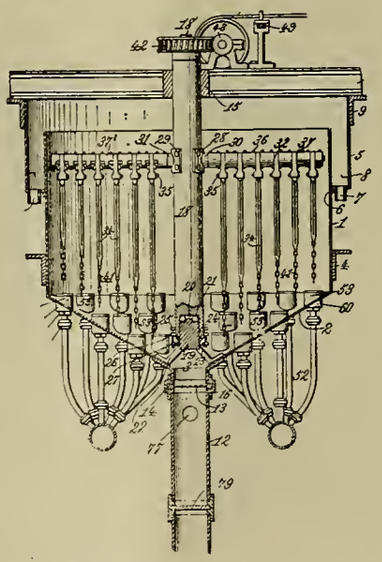
In safety gear of nature indicated combination with skip or cage and supporting frame of containing and guiding straps having longitudinal slots formed therein fitted to frame and forming angular recesses at each side of guides or runners, dog wedges or catches arranged in angular recesses and each provided with vertical serrated or toothed gripping surface parallel with guides or runners, studs or projections on backs or inclined surfaces of dog wedges or catches projecting into slots in straps to retain catches in position and to compel gripping surfaces thereof to move parallel with guides or runners, and means for raising wedges or catches in containing and guiding straps should skip or cage become unsuspended.

VALVE FOR HYDRAULIC AIR COMPRESSOR.—No. 741,172; J. C. Schneider, Hamburg, Germany.



Combination of valve, consisting of two disks, facing each other, one of which is mounted to turn on axis and other fixed, air and water inlets in fixed disk, two hollow arms extending in opposite directions from movable disk and communicating with ports therein, reservoirs carried at ends of arms, air pipes leading from upper ends of reservoirs to ports in movable disks, and floats in reservoirs for closing air pipes.

APPARATUS FOR EXTRACTING PRECIOUS METALS.—No. 741,189; H. H. Thompson, Churchville, N. Y.

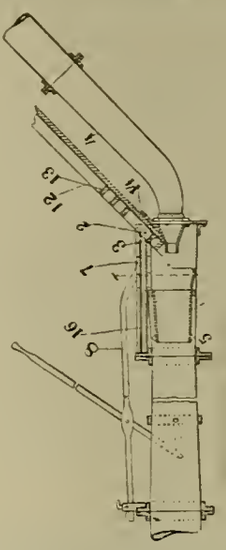


Apparatus for extracting precious metals, comprising receptacle provided with conical bottom, having outlet and upper portion surrounded by overflow compartment, having outlet; series of bodily movable and loosely mounted diamond-shaped agitating arms, gradually decreasing in length and adapted to be retained in operative position when rotated in one direction and to assume inoperative position when moved in opposite direction, rotatable means for suspending arms within receptacle, series of nozzles disposed throughout and connected to conical bottom and communicating with interior of receptacle, means for supplying cyanide solution, compressed air and water to each of nozzles, either separately or in any preferred combination, operating means for rotatable suspension means, and means for changing direction of movement of operating means.

TREATMENT OF SULPHIDE ORES.—No. 740,701; A. M. G. Sebillot, Paris, France.

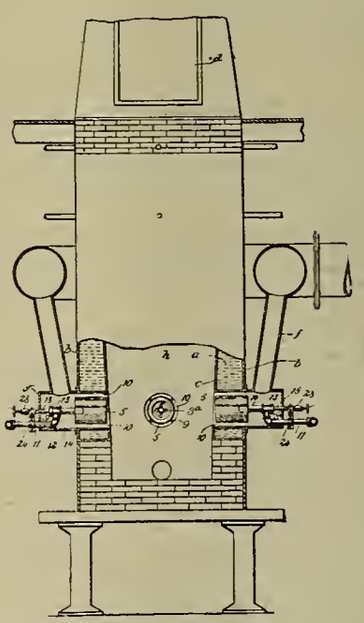
Process for treating ores containing sulphur consisting of sulphating ore in closed vessel by action of sulphuric acid upon metallic sulphides at temperature above its boiling point and simultaneously recovering sulphuric acid used, calcining sulphated ore at temperature of 700° Centigrade to dissociate sulphate of iron to prevent dissolving of too great quantity of sulphate of iron in lixiviating liquors, and lixiviating calcined ore.

HYDRAULIC ELEVATOR.—No. 741,291; J. H. Adams, Alameda, Cal.



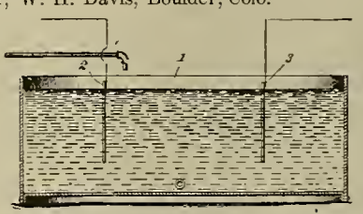
Hydraulic elevator, consisting in combination of upraise pipe, receiver, bottom plate for latter having lift water inlet, and projecting top flange, nozzle secured to inside of plate coincidentally with inlet, water conducting pipe, receiver having opening at side, exterior, longitudinally slidable gate for opening and means in conjunction with gate for regulating size of opening from point above, sluice section having bottom section projecting through opening into juxtaposition with nozzle, and supported upon top flange of bottom plate, and air relief mechanism for freeing lift water when gate is closed.

MEANS FOR UTILIZING OIL OR GAS IN ORE REDUCING FURNACES.—No. 741,504; W. Kemp, Tucson, Ariz.



Ore reducing furnace having tuyere opening and combustion chamber situated in tuyere opening and communicating with working chamber of furnace and with wind box, burner extending into combustion chamber, and means for supplying fuel to burner.

PROCESS OF TREATING CYANIDE SOLUTIONS.—No. 741,231; W. H. Davis, Boulder, Colo.



Process for treating cyanide solutions during, or subsequently to, their contact with ore, consisting in introducing into solution alkaline hydrate, and then subjecting mixture to action of alternating electric current, thereby raising osmotic pressure, to dissociate double salts in solution, causing precipitation of hydrates of base metals, and to combine freed cyanogen with alkaline hydrates, to cause simultaneous regeneration of cyanide in solution and clarifying of latter.

Mining Summary.

SPECIALLY COMPILED AND REPORTED FOR THE MINING AND SCIENTIFIC PRESS.

ALASKA.

At Silver Bow basin, noar Juneau, the Alaska-Perseverance M. Co. has surveyed a site for a 200-stamp mill, says the Juneau Dispatch.

Nome reports say that the work of extracting gold from the Nome beaches still continues. During the season of four years ago this was very profitable, and many miners refused to make known the large amounts of gold which they secured from the beach with rockers. Twenty-five plants were operated this season between Nome cemetery and Penny river and fifteen more on the eastern outskirts of Nome. The plant usually consists of a gasoline engine, a hose and sluice boxes. It is estimated that each took out an average of $2500, giving an output for this season of $100,000. Four years ago the beach was estimated to have yielded $900,000.

ARIZONA.

Cochise County.

B. F. Graham of Bisbee has bought the R. L. Benton interests in the Bisbee Queen mine, near Bisbee, and also in the Lucky Tiger mine in Sonora, Mexico, south of Bisbee.

The Lake Superior & Pittsburg mine south of Bisbee, in Warren district, reports producing ore in both No. 2 and No. 3 shafts. From No. 2 ore has been shipped that netted $3000 por car.

Graham County.

The annual report of the Arizona C. Co. at Clifton shows in the smelting department 50,283 tons of oro and 1,647,787 pounds of copper from the leaching plant were smelted, resulting in gross yield of 15,412,544 pounds of copper. This does not include 2505 pounds of copper produced in form of sulphate. In the concentration plant 210,717 tons of ore were treated, yielding 28,226 tons of concentrates—a product of 1 ton of mineral to 7.46 tons ore. The concentrating ore was partly sulphide ores from the Humboldt and the Yavapai and partly oxidized ores from Metcalf. The leaching plant treated 41,358 tons of tailings, producing 1,661,939 pounds of copper and 5.01 tons of copper sulphate. The acid plant turned out 1920 tons of sulphuric acid. The profits earned during the year from the mines at Clifton amounted to $717,500, while the company's railway net receipts were $120,000. Many improvements have been made at the mines and at the reduction works during the year. Development work has been increased in the Fairplay mine and also at the Coronado.

C. E. Stevens, superintendent of the Stevens mines at Metcalf, reports the company's steam plant in operation and sinking in the winze is progressing. The gasoline plant proved unsatisfactory and steam was substituted.

Mohave County.

J. Carroll reports developing his claim, 1 mile west of the Juno mine, near Chloride, and has a small vein of high grade silvor ore in the contact. The tunnel is in 200 feet.

Near Chlorido the Altata mine and three adjoining claims have been sold to J. F. McBride of Chicago, Ill., for $15,000. McBride will put in a gasoline hoist of 1000 feet capacity, and developments will be started next month and continue in the 250-foot shaft. The Rainbow mine has been bonded by A. M. MacDuffee.

A 50-ton cyanide plant is boing put in at the Great West mine, near Kingman.

Yavapai County.

There are 500 men reported at work in Bigbug district.

Yuma County.

S. B. Moore reports work boing increased in the mines around Quartzsite. O. A. Pease will build a 200-ton mill on his property at Chollos.

ARKANSAS.

Marion County.

A concentrating mill is being built at the Ponca City mines.——A concentrating mill is going up on the Susquehanna mine, near Dodd City.——At Zinc and at the Beulah mine core drills are being used to prospect the ground instead of the churn drill.

The Arkansas Dev. Co. of Yellville has been organized to do prospecting with core drills and development work on property of non-residents. They propose to put in six core drills. J. M. and I. W. Clokey and R. J. Williams of Decatur, Ill.; H. Wells of Yellville, Ark.; and R. W. Hess of St. Louis, Mo., are directors.

Newton County.

The Speers M. Co., composed of Little Rock capitalists, has bought 200 acres in Newton county for $25,000. The company already has a large quantity of ore on the dump and a concentrating mill is being built.

CALIFORNIA.

Amador County.

G. S. Andrews, ownor of the Grand Prize mine, near Pioneer, says he will install a larger hoist and make other improvements to more rapidly develop the mine.

At the Fremont mino, between Amador City and Drytown, quartz crushing began last week in the 20-stamp mill, says Manager A. Goodall.

Calaveras County.

The Continental mine, near West Point, is dropping its two stamps.

The work of developing the South Bank mine, near Sheep Ranch, is progressing, says Manager W. H. Clary, and a hoist is being put up on the main shaft.

The mill of the Mountain King M. Co., on the Rose Rock mine, near Murphys, started up last week, but as the water supply is limited regular crushing is not expected until the rainy season begins, says the Calaveras Chronicle.

El Dorado County.

(Special Correspondence).—The Crystal mine, north of the Vandalia mine, near Shingle Springs, is in full operation, drifting on the vein. Some high-grade ore is in sight. They have ten stamps, with amalgamation, concentration, and the tailings are cyanided.

The Peyton Chemical Co. has bought the E. E., this claim being the north extension of the Noon Day copper mine, operated by this company, says Superintendent Morrison. Improvements, including head frame, ore bins, etc., are being put in. The work so far in sinking the shaft shows copper sulphides, with little wasto. Three 8-mule teams are hauling ore to the railroad, about fifteen tons per day being shipped. This property is about 5 miles south of El Dorado.

The Union mine, 3½ miles south of El Dorado, is running with a few men, under Manager Harpending, the owner.

The Larkin mine, southeast of Diamond, is closed temporarily.——Larkin Bros. are running a crosscut on the Oro Flamme to cut the vein at depth. They have retimbered the shaft.

It is reported the Church mine, 3 miles south of El Dorado, will resume operations. Several mines are waiting for the American Electric Power Co. to furnish them with power. The work on this plant is progressing.——Snow Bros. have over one-half of their 2 miles of pipe line laid. They are preparing to take water from the Coon Hollow reservoir, near Placerville, to work gravel near Diamond.

Placerville, Oct. 20.

(Special Correspondence).—A shoot of ore has been opened up by a tunnel on the Charles ledge, owned by E. R. Moroy. The find was made at south end of the claim and directly opposite tho shoot of ore on the Mount Pleasant. The tunnel has followed a well-defined ledge for 139 feet with average width of 10 inches, and is 60 feet helow surface. They are sinking a winze in the tunnel, the ledge being there 12 inches wide and showing free gold and sulphurets. There is another vein of ore 10 feet west from this ledge which is expected to unite with it at depth.

Grizzly Flat, Oct. 21.

The mill at the Del Monte mine, on the American river, 4 miles below Coloma, was put in operation last week. The mill is a 2-stamp triple-discharge, weight of stamps 1000 pounds, and has a table concentrator. Power is furnished hy 12 H. P. gasoline engine. B. McBeath is superintendent.

The Ohio Quartz mine, adjoining the Mt. Pleasant mine, near Grizzly Flat, has boen sold to W. Brown of Oleta.

At El Dorado the Harpending mine is in full operation on a non-union and eight hour schedule, says the Mountain Democrat.

The mill has been completed at the Del Monte mine, near Lotus. It is a 2-stamp triple discharge battery, and will be operated by a 12 H. P. gasoline engine.

The Minnehaha G. M. Co. has been incorporated at San Francisco to operate a group of mines near El Dorado. S. W. Payne, J. Osborne, R. Payne, R. E. and C. S. Payne aro directors.

Superintendent F. Mott has men at work at the Rosencrans mine, below Georgetown, and has started siuking a double-compartment shaft. He is building a cyanide plant.

Fresno County.

In west section at Coalinga, J. H. Elmore of Greeu Bay, Wis., has leased a forty acre tract and will put up a rig and begin drilling. J. L. Roberts of Monterey is superintendent.

Kern County.

The Kern River Oil Co. has two additional rigs up and drilling will begin next week.

B. Ostick has purchased the Porter one-third interest in the Rainbow and Tipton claims, near Randsburg, giving him a two-thirds interest in the group.

The Associated Oil Co., which for several months has been drilling on the California Standard lease at McKittrick, and where six wells are down, is moving its outfits on to the Monte Cristo lease, south of McKittrick. The Associated Oil Co. will sink ten wells on the Monte Cristo. The new wells will be confined to the land adjacent to the hills, as so far all the best wells that have been drilled in that territory are those nearest the range of hills, says the Californian. The Pacific Crude Oil Co., on adjacent territory to the Monte Cristo lease, has brought in its third well.

Mono County.

Superintendent Turner of the Standard Con. M. Co., at Bodie, says he is making tests with view of working the sands and slimes of their mill tailings separate.

Nevada County.

C. A. Bailey of San Francisco, president of the Central Con. M, Co., oporating on Little Greenhorn creek, near Grass Valley, says they will build a 10-stamp mill on their group this fall. By the time it is finished it is expected to havo ore enough uncovered to keep the mill running. In addition to the Duval vein, which they are developing, they expect to cut the Greenhorn vein, which is located in the footwall.

The company owniug the Yuba mine, near Mayhert, is working on a 2500-foot gravity tramway, which will carry oro from the Mayflower to Yuba's mill, says Superintendent J. L. Bryson.

The North Bloomfield M. Co., at North Bloomfield, has men at work refacing Bowman's dam, which is expected to be finished by November 15. The company also has men running a tunnel a distance of several hundred feet. When completed it will be used as a passageway for the water which will be run from the dam to the mine, doing away with danger of flumes being swopt away by the winter freshets.

The German quartz mine, on the South Yuba river between Washington and Mayhert, after being idle for several years, will resume next month, with M. D. Cooley as superintendent.

The Quartz Quarry G. M. Co., operating the Junction mine near North San Juan, is negotiating for the 40-stamp mill on the Gold Bank mine at Forbestown, which will be moved to the Junction mine tunnel portal. They will run the machinery by electricity from the Bay Counties Colgate power houso. The Junction voin is 60 feet thick, on contact betwcen granite and slate, and milling tests have shown the general run of the ore averages $3 a tou, says Superintendent H. Huckins.

The compressors bought by the Empire M. Co. of Grass Valley with the Allison Ranch plant will not be moved, but will be operated in thoir present position to supply power to the machinery at the Omaha mine. It is the intention of the company to run a pipe line from tho Allison Ranch mine to the Omaha mine.

El Oro M. Co. has been incorporated at San Francisco, to operate near Nevada City. Directors are C. W. Hopkins, W. Henderson and R. E. Starr of Oakland, A. F. Stevens of Alameda and J. T. Houx of San Francisco.

The Sixteen-to-One mine at Washington will have a mill, says Manager Eagan.

The Empire M. Co. of Grass Valley has bought the machinery of the Allison Ranch mine, near Grass Valley. G. W. Starr, manager of the Empire, says the machinery will be removed to the Omaha mine, which is boing operated by the Empire Co. The mill is of 20 stamps.

Manager Hay has men at work developing the Hay mino at Randolph Flat.

Placer County.

A strike is reported in the Crosby mine, between the Three Stars mine and Lincoln, 7 miles northwest of Auburn. After cleaning out the old works the shaft was sunk from tho 300-foot level 140 feet. Drifts were started east and wost and struck the ledge on tho west side. It showed 14 inches in width. The ore averages $25 per ton, says Superintendent F. Crosby. The mine is incorporated as the Crosby G. M. & M. Co., and is owned hy Lincoln men.

Increased operations are under way at the Bartou mine at Westvillo, and fifteen more men will be put on next week.——The Gaylord mine, near Auburn, has been started up for the winter season and fifty men will be put at work next week.——It is reported the Red Point mine will be shut down. The tunnel has reached the 4-mile point, says the Placer Republican.

Sacramento County.

The Sutter M. Co. has been organized by Sacramento men, and is now sinking a shaft on the Murray place, on which the original Blue Ravine mine was located, near Folsom, says the Bee. The ground has been prospected by drill.

P. C. Cohn of Folsom will reopen the Prosperity mine, near Folsom. A pump and other machinery has been set up and the workings are being unwatered.——The new plant of the Gray Wing M. Co., which is located several hundred feet west of the old works, is about completed.——On the lower end of the Broder ranch, a mile from its present plant, the Blue Ravine M. Co. will put up works and open up the ground. It will be necessary to have two plants to work the ground the company has.

The Hupp & Roberts Co. will sink a new shaft on the Perazzo ranch, near Folsom, 800 feet east of its previous workings.——The Folsom Dev. Co. has its drills at work prospecting the ground it has bonded. It is said the company will build four dredges in addition to the two in course of construction.

San Diego County.

Superintendent R. K. Humphrey of the California King G. M. Co., at Picacho, reports the mines and plants in steady operation. A double drum gasoline hoist is being put up on the Apache claim, 1000 feet from the old mine. A double compartment shaft has been sunk on it. Aside from the ore body opened up in the Apache, ore has been blocked out in the Dulcinoa. Diamond drills, run by gasoline, are exploiting the body lower down.

Machinery for the Encinitas C. Co.'s concentrating plant at Encinitas is on the ground and being set up. The crusher will handle seventy-five tons of ore per day.

Shasta County.

The Texas Con. mine, near Keswick, was sold on the 17th inst., under forcclosure of mortgage, to Paul & Garlick of San Francisco for $20,000.

In the Old Diggings district, near Redding, the Keystone group of mines has heen sold to W. W. Old of Redding for San Francisco men. The new owners will bogin running a tunnel between 500 and 1000 feet in length to tap the body of ore showing at surface, and as soon as the mine is opened up a 100-ton smelting plant will be built.

The Quartz Hill mine, near Redding, is shipping quartzose gold ore to the Keswick smelter. The mine has been reopened under Superintendent W. O'Donnell, who has eleven miners at work. The shipments are being made for test purposes, and, if satisfactory, development work will be increased. The ore will be transported to Keswick, a distance of 5 miles, on cable tramway, to have capacity of 100 tons a day, says the Free Press. The Quartz Hill mine is about 4 miles north of Redding, on the east side of the Sacramento river.

Sierra County.

J. W. Morrell, manager of the Alleghany Drift M. Co., at Alleghany, says they are preparing for winter operations, and he expects to have water in the ditches next week.

Siskiyou County.

Work is resuming at the Spengler mine at mouth of Humbug creek, near Hawkinsville, in getting ready for winter. This mine is worked with steam derricks, ground sluicing and hydraulicking.——The Stallcup Bros. and Standford are reported taking out pay in their river claim below Hornbrook, on the Klamath rivor, in bedrock gravel.

Tuolumno County.

(Special Correspondence).—The Kodak mine, on the north fork of the Tuolumne river, near Carters, is under bond to L. F. Walker of San Francisco; he has men at work grading the millsite for a 10-stamp mill. He expects to have it in operation this winter.

Carters, October 20.

The Hampton mine, near the Rawhide extension, near Tuttletown, is being worked by E. J. Rule and the Hampton Bros. They are drifting on vein No. 1, which shows free gold and galena.

The bond on the Vine Spring mine, near Columbia, has been extended by the owners to the Yankee Hill M. Co. Five stamps will be added to the 2-stamp mill and a cyanide plant put in.

Sheriff Adams last week deeded to the Big Casino G. M. Co., of Seattle, Wash., under a judgment against the Mack Con. G. Co., all interest of the latter in the Wooten quartz mine, 10-stamp mill and improvements; also the Contention quartz mine at Big Oak Flat. The Big Casino G. M. Co. has bought the Priest interest in the Wooten mine, at Big Oak Flat, adjoining the Mack mine; also water rights.

The tramway has been finished between the Grizzly and Garfield mines, near Car-

ters, and rock from the latter is being crushed in the Grizzly mill.

L. A. Bowen and F. J. Pedro have a bond for a deed to the Reed one-half interest in the Mary Ann quartz mine, on the Stanislaus river, above Pine Log, near Columbia, and near the Hyapoo mine.

Trinity County.

The Layman mine at Hayfork is being developed under Superintendent J. B. Layman. When the recent bond expired the face of the lowest tunnel was a distance of 30 feet from the ledge. Layman is running a crosscut.

R. A. Skinner, owner of the Yellowstone group of mines on East Fork, near Weaverville, has resumed development work. ——E. F. May, secretary of the Trinity Dredging & Hydraulic G. M. Co., near Weaverville, says the company purposes installing a dredger.

COLORADO.

Clear Creek County.

Six belt concentrators, besides tables, have been added by Manager Crow to the equipments in the Con. Alpine mill, near Idaho Springs. The mill will be in operation this week, adding about seventy-five tons daily to the milling capacity of Idaho Springs district. Machinery is being put in at the Coronation tunnel on Trail creek, including a six drill compressor and boiler.

An addition has been completed at the Jackson concentrator, near Idaho Springs, and two more buddles placed therein. They will be used to work over the pulp from the tables that now goes into the creek. The Jackson mill is owned by J. G. Roberts. He has water power plants, with power to double his present milling capacity.

T. May & Co. are getting out ore from the Frostburg lode, near Silver Plume. Besides having a body of milling grade ore there is a small streak of gray copper through it that runs high in silver.

W. H. Crawford of Nashville, Tenn., vice-president of the Southern M., M. & Dev. Co., says operations will be resumed on the group consisting of the Evening Star and Poor Man's Relief group of claims on McClellan mountain, near Silver Plume. It is intended to drive a tunnel to cut these lodes at depth.

Custer County.

O. W. Murphy of Colorado Springs, who has a two-year lease on the Silver Bar mine, has arranged for the use of the Rocky Mountain Reduction plant, also in Custer county. He is building a shafthouse and putting in a steam hoist, and will increase development work.

Fremont County.

Two oil wells were opened last week near Florence. The United Oil Co. brought in well No. 322, 5 miles south of Florence, at a depth of 1500 feet, which will produce fifty barrels of oil per day, but the company may decide to drill the well to a depth of 2500 feet. The other oil well was opened by the Frazer Oil Co.

Gilpin County.

The Golden Rod M. & M. Co., in which Chicago men are interested, is operating in Silver Creek section, west of Central City. A shaft building has been built at its Pet, or main shaft workings, and has put in a hoisting plant. The shaft on the Pet is down 50 feet and will be sunk to a depth of 200 feet. Ore has been taken out of this shaft giving returns of $37 per ton. The company is putting in a two-drill air compressor. A new road has been built from Silver creek to the Pet shaft. J. Lillig is president and manager.

The Avon M. Co. is shipping an average of three cars per day from the San Juan mine on Quartz hill, near Central City, via the Gilpin Tramway Co. to the company stamp mill in Nevada gulch. The ores are coming from the third, fourth and sixth levels. W. C. Denison is manager.

The Missouri-Colorado M. & M. Co. has a lease and bond on the Snowden group, near the head of Silver creek, near Central City, and has put men to work. The company is stoping in the upper tunnel and is shipping test lots of ore. They will work it in conjunction with their Old Ann property, to the north. The Old Ann shaft is down 425 feet. W. C. Hollister is manager.

Sinking operations have begun at the Kemp Calhoun mine, near the head of Leavenworth gulch, near Central City, and are being carried on with three eight-hour shifts. The shaft is 350 feet deep. The property is being operated by Manhire Bros. under lease and bond, and they are shipping smelting ores.——McFarlane & Co. of Black Hawk are putting in new mortars at the Polar Star and Meade mills, on North Clear creek, and are building a flume 480 feet in length, 3 feet wide and 2 feet deep, to the Polar Star mill.

Gunnison County.

The Gothic M., M. & Coal Co. at Canton, Ill., operating in the Gothic section, has remodeled its mill and put in a combination treatment plant. The original plant was for treatment of silver and lead ores by leaching and smelting, but now consists of a milling and concentrating section and smelters for the further treatment of the mill products. The ore, middlings and slimes are each handled separately. The company has on a lower level than the mill and concentrating plant a fifty-ton copper matting furnace and a fifty-ton lead smelter. Ores which contain lead and copper together, or all three metals, will be first milled and the several compounds of those metals separated. They will then be in the form of fine concentrates which will be briquetted and then smelted. F. L. Clements of Canton, Ill., is manager and superintendent, and D. H. Lawrence is smelter superintendent.

Lake County.

Manager Linderman, of the Louise M. Co., operating in English gulch, near Leadville, says development is going ahead and showing considerable low-grade ore. The company will build a mill at its mine.

At Leadville the work of rebuilding the Elgin smelter will be started next month by the Ohio & Colorado Smelting Co., which owns the Salida smelter, says Manager Goodwin. They will build two more lead furnaces at the Salida smelter.

It is reported the Garhutt mine on the gold belt, near Leadville, will again be developed. It is owned by W. S. Checsman of Denver.

In addition to outputting 8000 tons a month the Ibex M. Co. at Leadville is doing considerable development and prospecting in new territory. A station has been cut in No. 4 shaft at the level where the shaft connects with the Yak tunnel. A drift has been started 100 feet above the tunnel and a body of ore opened. It is not the intention to transport the ore through the tunnel, but it enables the development at greater depth.

The Iron-Silver M. Co. is starting work on the Tuscan mine, which belongs to the company, and which has been idle for some time. The Tuscan shaft was sunk to the sulphide contact, and bodies of low-grade sulphide ore opened.

Manager G. F. Campion says he has put fifty men on the Caribou mine at Leadville, and will resume shipping a heavy tonnage of silver-lead ore to the Salida smelter. The Carihou was sending 100 tons a day to the Salida plant when they shut down a few weeks ago.

W. F. Deaner, manager of the La Plata mine, near Leadville, which has been sold to Illinois men, is repairing the surface plant and will lease the ground in blocks to miners.

Mineral County.

The Rovenue Tunnel Co., W. Skinner superintendent, has resumed operations on the Rovenue tunnel on Mammoth mountain, near Creede, and will continue driving for another thousand feet. The breast of the tunnel is in 1310 feet from the mouth.——C. W. Roe started up his concentrating mill last week to treat the zinc ore in the Happy Thought dump that he is working under lease.——K. Barriclaw and J. L. Peters have a lease on the Krutzer Sonata mine, near Croede, and will begin development work next week.

President G. Davis of the Humphreys mill, near Creede, says they have given orders to shut down the mill for the winter. The cold weather has so decreased the water supply that they have insufficient power, and the steam power plant will not be ready for use until Nov. 1. Superintendent Lees meanwhile will mine only ore that can be shipped to the smelter.

The ore output of Creede district for the year is as follows:

Month.	Tons.
January	5,383
February	5,788
March	7,072
April	5,715
May	5,645
June	5,711
July	5,636
August	6,396
September	6,891
October (to Oct. 10)	2,018

A five-year lease on the Mike Le Fever claims on McKenzie mountain, near Creede, consisting of the Paris and Diamond King lodes, between the Corsair and Krutzer Sonata mines, has been given to R. Lucette, C. McGillivray, J. Graden, A. Bunch, G. Martin, W. Cosgrove, F. Hughes and C. Welle. They intend driving a crosscut tunnel near the foot of the mountain to cut the vein at depth of 500 feet from the apex where it has been developed by shallow shafts. In these shafts samples from the vein run 100 ounces in silver per ton. The tunnel will have to be driven 300 feet to cut the vein, says the Creede Candle.

Ouray County.

I. M. Jordan of Cincinnati, Ohio, part owner of the Shulesburg group of claims, at the mouth of Poughkeepsie gulch, near Ouray, says they will reopen the group and increase development. Low-grade ore is on the dump awaiting starting of the Home pyritic smelter.

J. H. Tumbach of St. Louis, Mo., reports consolidation of properties near Ouray, comprising 300 acres. The ground known as the Blow Out gulch properties is owned by the Ouray Con. M. Co., the new organization, and includes fifteen claims and a millsite held by location, five claims and a millsite patented, and contracts for six additional claims. They contracted to buy the 10-stamp mill in operation on the ground. The company will put in machinery and drive the tunnel through its entire acreage, a distance of 5200 feet. The greatest depth that will be attained by the bore will be 3000 feet. About 1000 feet of tunneling has been done on the principal group of claims. The directors of the company are: H. Ziegenheim, P. J. Doerr, J. H. Tumbach, J. Hayward, T. W. Emerson, J. W. Jones, T. Osborne, F. S. Mallory and F. J. Hulaniski. J. Hayward is manager.

Park County.

(Special Correspondence). — About 12 miles from Fairplay, at 12,300 feet above sea level, and near the summit of Mt. Sheridan in Horseshoe mining district, is the Last Chance mine, owned and operated by the Cerussite M. & M. Co., B. S. Schlessinger, manager. The mill has a capacity of fifty tons per day and is 2½ miles below the mine, on a branch of the C. & S. Railway. The ore is hauled from the mine to the mill by wagons. The ground in the mine is frozen to a depth of 450 feet. In one of the stopes they have what is known as the "ice palace." The frozen condition of the rock enables them to mine without timbering. The stope is from 40 to 60 feet wide, and in places 200 feet in width without any timbering. At present they are mining forty tons of ore per day, and employing twenty-five men. The ore carries lead and silver and some gold.

Fairplay, October 17.

Saguache County.

The Steel Canon M., M. & I. Co., which is operating at Villa Grove, near the Orient mines of the Colorado Fuel & Iron Co., report having opened up a large body of low-grade silver-copper ore. A 60 H. P. boiler, compressor and air drills will be put in. Arrangements are completed for building a 100-ton smelter.

San Juan County.

A tailing plant will be put in at the Gold King mill, near Silverton, says the Standard. Grading the ground adjoining the mill has been done, and plans have been made for a building 75x160 feet to cover thirty-six slimes tables.

San Miguel County.

At the Black Bear mine in Ingram basin, near Telluride, development work is progressing. A reduction plant will be built.

The Silver Bell mine, near Opbir, is turning out 200 tons of ore per day. Regular shipments of bullion are made to the mint and from two to three cars of concentrates are shipped daily to the smelter. The company has 150 men on the payroll. ——The Carriheau-Montezuma mill, near Ophir, is also running steadily and thirty stamps are dropping. This company granted its millmen an eight-hour day at the same time that the new scale of hours and wages was adopted by the Silver Bell, and never suspended work a day. All the product of the mill is sent to smelters for treatment, the ore being refractory, and some ore is also shipped. The principal development work at the mine is opening an air shaft from the second level to the surface, which will add to the ventilation of the underground workings. The company is employing fifty men, but this number will be increased.

Summit County.

Near Breckenridge work on the Monte Cristo group is reported progressing. A mill will be built. The aerial tramway is being put in place.

The Masontown M. & M. Co., operating the Victoria mine at Frisco, having bought the Smith stamp mill north of Breckenridge, is tearing it down and moving it to its property on the Ten-Mile range, says Superintendent Wortman of Climax.

A former producer in the Consolidated Ten-Mile district has been bought by the Felicia Grace M. Co., which has been incorporated to develop it. The property consists of several fractions (ten acres in all) at Robinson. The Rio Grande Railway has built side tracks to the main shaft building and shipments have begun. The directors are: C. C. Worrall, D. Keneven, E. T. Buller, E. C. Straub of Denver, and M. Brockstedt of Leadville.

Teller County.

Superintendent King of the Sioux Falls & Cripple Creek M. & Dev. Co., which holds a lease on the Fort Wilcox and Fluorine claims on Copper mountain, near Cripple Creek, says they will start operating the cyanide plant next week. The mill will have capacity of treating 100 tons of ore per day. There is on the surface ore that can be successfully handled by cyanide process which will yield values of $5 per ton in gold.

Manager H. E. Woods reports a strike on the Gold Coin mine at Victor. In the tenth level a 16-foot vein of ore, carrying values of two ounces gold per ton, has been cut and has been traced for a distance of 125 feet. The tenth level is 1039 feet below the surface and development work has reached depth of 1250 feet. Woods says there has been a marked decrease in the water levels since the drainage tunnel was driven.

Lessee H. M. Gilbert of the Milwaukee Leasing Co., operating on the Le Clair claim, near Cripple Creek, is putting in additional machinery. It is the intention of Gilbert to take up the bond which he holds. The pay streak is 1 inch in width, of a deep fluorite, carrying sylvanite. The vein is broken down for 4 feet and the entire stuff is shipped, giving returns of two ounces gold per ton, says Gilbert. He has a 6-drill compressor, a hoist 8x10 feet and an 80 H. P. boiler. The shaft is down 335 feet and two drifts have been extended both north and south.

President and manager N. Franklin of the Eagle Sampler at Cripple Creek says he has seventeen men at work and is running through 150 tons of rock per day. The T. & P. and the Rio Grande samplers, as well as the Black sampler, are working a regular force and are treating nearly up to the standard. The gross amount of tons being treated and shipped out directly, exclusive of the Portland mine, is 500 tons per day, says the Cripple Creek Times.

IDAHO.

Bingham County.

The Carihoo G. & C. M. Co., Ltd., has been incorporated, with the principal place of business at Idaho Falls, with F. A. Putnam, C. Miller, W. A. & E. M. Holden and A. W. Holden as directors.

Blaine County.

Superintendent J. Peterson of the Navarino & Comet group of mines, on Deer creek, near Hailey, says he has eighteen men at work and several buildings have been put up. Two six-horse teams are getting in wood, timbers and lagging for the winter. This done, the teams will be put to hauling ore from the mines to the site on Deer creek where a mill will be built in the spring.

Boise County.

The Banner mines, 20-stamp mill, two hoists, sawmill, pumps, lathe and other machinery have been bought by V. Thorne for the London company owning a group of mines in Gamhrinus district. The Crown Point hoist will be moved this fall to the company's Gamhrinus group. It has capacity for sinking 1200 feet. The Crown Point mine was worked to a depth of 600 feet and the Banner to a depth of 590 feet.

K. Keller, who has a bond on the Elkhorn mine, near Idaho City, will put in a boiler and pump and unwater the shaft sunk in the lower tunnel.

J. E. Richardson says he has men developing a group on Charcoal gulch, 2½ miles west of Neal and ½ mile from where Charcoal empties into the Boise river. The vein is 5 feet wide, with a granite hanging wall, and assays $40 in gold, with a little silver. He will start a tunnel to get a depth of 500 feet on the vein. He proposes to build a reduction plant.

Canyon County.

W. C. Austin of Boise and W. V. Garrett of Spokane, Wash., report buying the opal mines on the Snake river for Eastern parties. They will employ twenty to thirty men at the mine, including lapidaries. The opals are found in andesite, being in calcareous seams and in geodes, says the Idaho Capital News. They will break out the rock by using lime instead of powder. A hole is drilled in the rock and filled with lime, water is then poured in and a wooden plug tightly driven in the mouth of the hole. The swelling of the lime breaks the rock gradually, so that the opals are not injured. The locations consist of six full claims near the river, 20 miles southwest of Nampa.

Elmore County.

Near Atlanta, G. Butler, H. Crab, H. Tesky et al. are developing a group of locations on the head of Black Warrior creek, 4 miles from the Walker and Birdwell discoveries. The ledges show free gold.

Idaho County.

C. L. Hathaway of Warren reports that he has 5000 acres of placer ground 12 miles west of Warren, and has put in machinery, buildings, etc. A ditch 6 feet wide on the bottom, which will carry 6000 miners' inches of water, is being cut. The ground averages 25 cents per cubic yard and is 25 feet deep.

C. Hildebrandt, in Rapid River district, northwest of Warren, reports, in driving tunnel, he cut a shoot carrying values in tellurides.

Owyhee County.

The Florida Mountain mill at Dewey, near Silver City, was started up last week by electric power, says the Avalanche. The property is owned by the Trade Dollar Con. M. & M. Co., which has reconstructed the Florida mill and is concentrating its operations at Dewey by closing the Blaine and the Black Jack mills and delivering all the ore at Dewey through the Florida tunnel. One important change in the mill was made by placing the concentrators ahead of the pans and amalgamators, and putting in a machine shop on the floor where the vanners formerly stood. Current is obtained from the electric power plant at Swan Falls on Snake river, 27 miles distant. There are 120 lights in the mill, besides those in the tramway leading from the ore bins at the end of the tuunel tramway.

Shoshone County.

Operations have been resumed at the Springfield mine, in Stevens Peak section, near Mullan, after being closed down for several months. Sinking has begun on the ledge in the lower tunnel. If the ore holds its value at the latter depth a lower tunnel will be started, which will give a depth of 1500 feet on the ledge by driving 2000 feet. The group includes seven claims, 7 miles south of Mullan. The ore carries copper values in chalcopyrite. O. B. Livingston is president.

MICHIGAN.

Houghton County.

Mine Inspector Hall's report for the year shows 13,629 men employed in the Houghton county mines. For the year ended September 30th there were thirty-three deaths from accident, of which thirty-one were underground and two on the surface. In addition there were eight non-fatal accidents. Fatalities were distributed as follows: Arcadian 1, Atlantic 1, Baltic 1, Calumet & Hecla 10, Centennial 1, Champion 1, Franklin 3, Isle Royale 2, Kearsarge 4, Osceola none, Quincy 5, Trimountain 3, Wolverine 1, Wyandotte 1 and Winona 1.

The Wolverine mine, near Calumet, is arranging to put in a third boiler at No. 4 shaft, with the third automatic stoker and economizer through which the gases from all three boilers will be discharged. This additional equipment is made owing to increased depth of workings.

Work on the Centennial mine shaft house on the Kearsarge amygdaloid, near Calumet, is progressing.

The Red Jacket shaft of the Calumet & Hecla, near Calumet, is out of commission again. Operations were resumed last week after the trouble caused by a previous accident, and on the night shift an up-bound cage caught a sliver on one of the gauges and tore out the timbers for a distance of 1000 feet, says the News, while another cage struck the "keeps." The remains of the five-deck working cage struck in the former accident are still in the hottom of the compartment. The shaft will not be in full working order till about Nov. 15.

The Mayflower mine, near Calumet, is drifting on the amygdaloid lode from depth of 580 feet in the shaft. This lode is east of that on which the Old Colony is working and the latter is itself east of the Kearsarge. Occasional bunches of copper are found, but thus far the lode bas shown no commercial value. The Old Colony crosscut is approaching the point where the drill showed copper and is being driven at right angles to the formation from depth of 550 feet.

No. 1 shaft of the Elm River mine, near Winona, is 400 feet deep. The shaft is in the foot wall and no crosscuts will be driven to examine the lode until depth of 1000 feet has been reached.

Keweenaw County.

Sinking will be resumed at the northerly pit on the Miskwabik mine, near Allouez. Compressor, hoist and air drills are being set up. At a depth of 100 feet a drift will be run to show up the lode and will he south of the permanent shaft a distance of 300 feet, from which a raise will he carried to connect with openings from above. The permanent shaft has passed through the overhurden and is now in the ledge with copper showing.

Ontonagan County.

Six rock crushers for the Michigan mine at Rockland are heing set up in A and B shaft houses. Rock shipments from the Michigan will begin by Nov. 10.

MISSOURI

Jasper County.

The Imp M. Co., composed of Veatch, Chrisman, Smith & Bennett, of Webh City, have struck a lead prospect 4 miles north of Joplin, on the Smith & Stickney ground, says the News-Herald. They have three drifts opened up and have put iu hand jigs and commenced washing. The first fifty tuhs washed cleaned up 1500 pounds of lead. The lead was struck 10 feet from the shaft in a drift which they were running to catch a run of jack which had raised from the 75-foot level.

The Octo mine on the Wolcott-Baird lease has heen sold to J. Laidlow of Toronto, Canada. The property consists of three lots and a steam hoisting plant. The mine was developed six months ago and since that time has cleared $41,000, says the Jopliu News-Herald.

Drill hole No. 13 on the Shoman lease on tbe Harvey farm, across Spring river from Joplin, is reported to have struck ore at 75 feet and the drill has sunk into 14 feet of mineral.

A strike is reported on tbe Johnson land, 6 miles west of Webb City. Jack was found at 22 feet and the mineral has continued to 75 feet, with the drill still in mineral. The memhers of the company owning the lease are R. Stickney, J. Logan, G. W. Ash, P. Hannum, C. Bishop and R. Glenn of Carthage.

A prospecting drill is at work on the Neighbor's field, west of Carl Junction. ——The Mammoth Lead Co. has its machinery in working order and is developing.——L. Anderson, W. Downs et al. have a hoist and tramway built at their shaft in Lehigh and have hegun work.

At the Seven Devils mine, near the Lincoln mine, near Joplin, on hand jigs they are producing from twenty to thirty tons of ore per week. They are driving drifts and developing the ground.

Newton County.

The Scotland mines, between Granby and Joplin, are being reopened by Webb City and Eastern men. These mines were abandoned several years ago on account of water, says the Granby Miner.

MONTANA.

Jefferson County.

Laughliu & Ham, owners of the Midnight and Morning claims, in Cataract district, near Basin, report having struck a hody of high-grade sulphide ore, carrying gold, silver and copper. They have run a crosscut tunnel 500 feet and struck the lead at depth of 250 feet. Several shipments of surface ore have heen made, averaging $40 per ton. These claims are 6000 feet north of the Crystal and Bullion mines.

The Ajax M. Co., near Basin, is putting up a 10-stamp mill at the bead of Big Swamp creek, in Big Hole Basin.

The Minnesota mine, near Wickes, has resumed operations, under bond to O. M. Holmes. He will sink a new shaft and a tunnel will he driven at the foot of the mountain.

Madison County.

F. B. Feetham of Grand Forks, N. D., manager of the Hungry Hollow mines, near Virginia City, says development will be increased. A road has been built. It is proposed to sink a vertical sbaft to depth of 200 feet and then crosscut to the lead. Should the vein at tbat depth prove as good values as near the surface, a mill will be built.

The Bonanza mine, near Rochester, has been leased and bonded to the San Domingo M. Co. of New York for $50,000, says the Basin Progress.

T. H. Teal reports the Shafter mine and mill, near Dillon, will be closed down next week for the winter.——At the Kearsarge mine buildings are going up, and excavation for the 60-stamp mill is finished. The foundations for the batteries and engines are heing huilt. In addition to plates and concentrators, will bave a cyanide plant with 500-ton steel tanks, says tbe Madisonian. The company has 150 men on its payroll, and additions are constantly heing made. Development work in the mines is progressing.

R. C. Knox, manager of the Revenue M. Co.'s gold-bearing interests at Norris, says they will build a cyanide plant of 100 tons daily capacity, the plant to be located at the mines and water piped to it from the well 2½ miles distant. Meanwhile the high-grade ores which are shipped to the smelter are providing means with which to develop the mines. The last lot marketed assayed 8.9 ounces gold and 6.1 ounces silver, says Knox.

Ravalli County.

A gold strike is reported on Owl creek near Hamilton, and Manager Cross of a New York company has located thirty-eight claims. They say the ledge is several hundred feet wide.

Silver Bow County.

F. A. Heinze says he is working every man available in the Minnie Healey and Rarus mines at Butte, and will increase his reduction facilities. His concentrator at Basin will be enlarged, and he is building a flume to furnish water for the concentrator, which will be 4½ miles long; 100 men are on this work. On the ground at the Belmont mine he has material for hoisting plant and ore bin, and is cutting a station at the 600-foot level of the mine. As soon as this is done the shaft will be suuk to the 800-foot level. He has a lease and bond on the Gem mine, north of the Speculator and Bell mines.

NEVADA.

Eureka County.

(Special Correspondence).—The Ruby Hill Tunnel Co. will drift from maiu tunnel 100 feet south.——Tremont & Laird, working the Cloud mine, near the Silver Connor mine, have taken out a shipment of silver-lead ore.——A. Laird, working the Alexandria, has shipments ready.

In the Keystone development work is progressing and the company has 600 tons of copper-lead ore ready for shipment. With tbe proceeds from this lot of ore Superintendent Porter proposes to build a small furnace for treating the ore on the ground.

The mines at Hamilton are paying $7 per ton for hauling their ores to Eureka—an increase of 50 cents per ton.

E. E. Phillips of the Lincoln M. Co. has men at work and will start shipping next month.——The Diamond mine has taken out 150 tons of ore for shipment the past ten days. The ore is a "yellow" carbonate that runs $8 gold, 10% to 15% lead and several ounces in silver. The maiu tunnel on the Diamond has beeu run 2300 feet in the limestone without the quartzite hanging wall. Men are crosscutting on a drift northwest, which will opon new ground.

The Atlantic & Pacific Co., adjoining the Diamond, is running a tunnel south in ground carrying gold values.——The Banner mine, west of the Diamond, has a 3-foot ledge of low-grade gold-silver ore on the shale and limestone contact. Assays run $6 gold.——The California and "76" are reported to have silver-lead ore carrying manganese which may be concentrated. —— The Bullwhacker mine, a former producer of Eureka district, is being opened up and developed by leasers.

Eureka, Oct. 21.

The Rocco-Homestake-Nevada M. Co., at Hamilton, has bought the hoisting plant, including boiler, engine, reels, etc., at the Seligman mine, on the west side of White Pine mountain, and has men dismantling it for hauling to the mine, where it will be put up on a vertical working shaft the company has started 400 feet north of the present incline. This new shaft will be sunk to depth of 1000 feet.

Lincoln County.

The mill of the Southern Nevada M. Co. at Searchlight was put in operation last week and is running two shifts. Superintendent Day, of the Searchlight M. & M. Co. says he will resume the sinking in the main shaft.——The Quartette M. Co. has its mill running steadily sixteen hours a day and work is being done on the three lower levels of the mine, says The Searchlight.

Storey County.

The small steam hoist is in place at the Forman shaft, near Gold Hill, and work on tbe gallows frame is in progress. Men bave been put on the 500-foot level to remove the obstruction at that point that prevents a free circulation of air in the Sutro tunnel south lateral hranch. Repairing the shaft timbering down to the tunnel level will follow.

Washoe County.

The Springfield-Nevada M.Co., at Olinghouse, reports opening up a foot of $50 ore in the face of the drift heing extended north. A sufficient amount of tbis is heing taken out to keep one of the Huntingtons on an eight hour per day run. The stopes are being square set and carried along with the drift. Over 100 feet of stoping ground has heen onened up in the old tunnel, showing an average of about 3 feet of ore, with values $9 per ton. They are preparing to bring in a supply of water to their 50-ton mill.

NEW MEXICO.

Bernalillo County.

The smelter of the New Mexico S. & R. Co. is expected to be iu operation by Jan. 1st. Additional machinery will he put in. The smelter will have capacity of 150 tons daily. The property of the company is 25 miles north of Albuquerque, N. M. A. G. Frank, of Denver, Colo., is president.

Grant County.

Work on the Granite Gap mines, near Lordshurg, is progressing under S. C. Pratt.——F. Wyman will reopen the Wyman mine, which is said to be on the same ledge as the Volcauo and Bachelor, near Lordsburg.

The St. Louis Gold Gulch M. Co. has been incorporated hy Silver City men, with T. W. Carter, H. E. Dillon, M. W. Porterfield, H. M. Powell and C. Gatzweiller as directors. They have hought two gold mining claims at Gold Gulch—the Lucky Bill and Dutch Uncle—which have a mill on them. These two claims are on either side of the Owl claim and on the same lead. Work will be started this week.

The Con. M. Co. has heen organized to work a group of gold mines at Gold Hill, with W. H. & A. M. O'Beirne, P. Lawrence and J. Sterling as officers, the last-named heing manager. The main office of the company is at Huron, S. D. The company will work the Sterling mines at Gold Hill, which consist of the North Star, Reliance, Divide, Olive, Gem and Apache. They expect to put up a 5-stamp mill and will work the ore by the cyanide process.

Superintendent G. A. Easton, of the St. Louis Gold Gulch M. Co., at Gold Gulch, says they will have a concentrating plant to handle their low grade ores.

At Gold Gulch, the Owl M. Co. is putting down three shafts on the Owl claim and has put in a steam pump in one of them.——Work has been suspended temporarily on the Carbonate claim, which joins the Owl, on account of water in the shaft, hut the company will put in a pump, after which it will resume sinking.

San Miguel County.

The concentrator of the Faywood Lead Co. at San Jose is in steady operation and shipments are being made to the smelter at El Paso. Improvements have been made to the mill this month. A fan was put in last week to clear the mill of the lead dust.

Socorro County.

G. A. Freeman, manager of the Kat and Kittens mine, near Mogollon, says he is arranging to huild a mill on the property.

OREGON.

Baker County.

Men have heen put on development work on the Golden Eagle mine, near Greenhorn.

Two more claims have been added to the holdings of the Cracker Summit Co. on Cracker creek, near Sumpter. They lie north of the group and hring the company's total up to seventeen claims. They are well timhered, as well as showing mineral bearing veins. The raise from the lower tunnel is heing driven to open the intervening ore, while arrangemeuts are being made for development work on south end of group.

E. S. Topping, A. D. Whittier et al. of Sumpter have bought 160 acres of Placer ground in Dead Mule Gulch section, which they will develop. Near these placers they found an iron-bearing vein between porphyry and syenite, and also a 2½-foot seam of coal between sandstone.

Manager Bellman of the California mine, near Sumpter, says he is building a reverberatory furnace. The California mill and mine were closed down temporarily last week pending leveling up and adjustment of the aerial tramway.

Superintendent A. Hillier of the Golden Rule mine, near Sumpter, says the mine has been shut down until spring, when development work will -be resumed on a larger scale.

O. C. Wright, president and manager of the Blue Bird mine, near Sumpter, says he has started construction of the mill. It will he a 100-ton concentration plant, with rolls.

Grant County.

Manager McGuigan of the Alamo mine, at Alamo, says he expects to have his mill machinery in position at the plant next week. With this plant in operation will make the second 10-stamp mill in Alamo district, the Quebec heing first.

W. Wade, superintendent of the Scandia tunnel, near Granite, says the crosscut is in 2450 feet, with 800 feet farther to drive before cutting the main lead. Several small veins have been cut, which will be drifted on later. The main ledge shows a width of from 8 to 14 feet on the surface. The crosscut will give a depth of 1200 feet.

Manager Carson of the Milwaukee placers, near Granite, reports he will complete hy Nov. 15 his working test of the placers that has heen in progress throughout the summer. Piping into the elevator has heen going steadily for several weeks, and they have a cut 150 feet in length, 24 feet deep and 50 feet wide at the top. A few feet of gravel was left on the bedrock, which remains to he run through the hoxes before the bedrock can be cleaned. Last week they hroke into a bed of gravel under a hank of clay, which appears to be the deposit from an old channel of Granite

creek, being 20 feet below the present level of the creek. The holdings of the Milwaukee Placer Co. take in 3 miles of Granite creek and comprise mainly patented ground; also a sufficient amount of water for working.

SOUTH DAKOTA.

Custer County.

The Black Hills Porcelain Clay & Marble Co. has resumed operations on its lithographic stone deposits west of Custer, says Superintendent Nasen.

Lawrence County.

There are the following mills in operation in the Black Hills mining sections, treating ores by cyanide process:

Plant.	Daily Tonnage.
Homestake No. 1 (tailings) at Lead	1,300
Homestake No. 2 (tailings) at Lead	800
Horseshoe, near Terry	500
Golden Reward, at Deadwood	250
Penobscot, Garden City	150
Spearfish, near Lead	300
Deadwood-Standard, near Lead	125
Wasp No. 2, Lead	120
Lexington Hill, Deadwood	100
Columbus, Central City	80
Jupiter, Deadwood	80
Imperial, Deadwood	200
Total	4,005

The following cyanide plants are either in course of construction or will be under way by January 1st, says the Mining Record:

Plant.	Tonnage.
Reliance	300
Lundberg, Dorr & Wilson, Lead	75
Golden Crest, Deadwood	60
Columbus, Central City	1,000
Hidden Fortune, Deadwood	300
Victoria, Lead	300
Phœnix	250
Branch Mint	250
Addition to Deadwood-Standard	125
Dakota, Deadwood	120
Malm, Morris & Leach	100
Total	2,880

The output of the district for the month of September was the largest for the year, due to the following: The Horseshoe 500-ton mill was put in operation; the Penobscot increased its output of smelting ore; first cleanup was made from the Lexington Hill; the National smeltor at Rapid City, Pennington county, was blown in; capacity of the Spearfish was increased to 300 tons a day; the Horseshoe began shipping ore from the Ben Hur mine to the smolter; the Imperial mill was started after a shutdown of sixty days; the Cloverleaf mill treated higher grade ore and increased tounago.

T. J. Steele of Deadwood has taken over control of the Dakota M. & M. Co., owning a group of claims in Bald Mountain district, and will increase development work. Their mill, which is in Deadwood, will he removed to the mine and enlarged. Its present capacity is 125 tons daily. The main shaft will bo sunk to the quartzite to develop a supply of water, as well as for ore.

Pennington County.

J. Cochran, owner of the Cochran mine (the Alta-Lodi), near Rochford, reports development work progressing, and he is drifting east and west from the bottom of the shaft, showing ore on both sides. The Huntington mill at the mine will be started in the spring.

TEXAS.

Beaumont reports say estimates of the amount of oil in storage in the Beaumont (Jefferson county), Sour Lake (Hardin county) and Saratoga (Hardin county) fields show 13,500,000 barrels in these and intervening sections.

UTAH.

Beaver County.

The report of the manager of the Horn Silver mine, at Frisco, shows for the current year to Sept. 1 the management has marketed 2993 tons of ore and 1500 tons of concentrates, while in September there was delivered at the smelters 1000 tons of ore, with two lots of concentrates. The Horn Silver M. Co. is down to depth of 1650 feet, and while connection at that depth has not been made with the main ore-bearing bodies, it has been found during the year that there is ore and profitable work in the stopes from the surface down to the 700-foot level. While the silver and lead ores continue to predominate, copper-bearing rock has also been taken out, says Manager P. T. Farnsworth.

Juab County.

G. M. Galsford has a lease on the property of the Boston & Tintic M. Co., near Eureka.

Salt Lake County.

The Dewey mill in Bingham canyon, near Bingham, has been added to the holdings of the Columbia M. Co. and remodeled and enlarged. It will handle the second-class ores, says Manager Tibbets. The plant was originally designed to reduce the low-grade argentiferous-lead ores of the camp. At present the Columbia is using the Rogers' concentrator, reducing twenty tons daily.

Summit County.

The annual report of President and Manager C. L. Rood, of the Naildriver M. Co., operating at Park City, shows buildings put up and machinery placed, including a direct hoisting engine, 18x60, with boilers 54x16. The shaft is down 525 feet, and a crosscut run from the shaft 60 feet towards connection with the Green tunnel, having 60 feet farther to go. Work is being done with machine drills. It is proposed to continue sinking the shaft and then crosscut and drift on the vein. In grading for the shaft ore was found near the surface.

WASHINGTON.

Ferry County.

A ledge of silver-lead ore is reported opened in the Byrne mine, near Republic, and they are driving a crosscut tunnel.—— At the Iconoclast a steam hoist has been put in and they are drifting on the vein from the bottom of a winze below the 300-foot level, showing copper-silver ore.—— The Summit M. Co., having more water than they can conveniently handle with the whim, proposes to put in a gasoline hoist. The Summit shaft is down 150 feet on the vein, following ore 18 inches wide, which runs $30 per ton in silver, copper and gold.—— The Malachite mine has resumed.

The motor and air compresser are in operation at the Mountain Lion mine, near Republic, furnishing power for the machine drills which are at work above the 300-foot level. Some timbering is being done in the stopes, preparatory to breaking into ore reserves. There are thirty men employed.

Okanogan County.

The Nighthawk M. & T. Co. has ten men on its mine north of Conconully, driving a tunnel, which is 1150 feet in, and they have cut a ledge of mineralized quartz, making the third ledge crossed in the tunnel. They are drifting on the first ledge. Manager Church says a ventilating plant is being put in.——The Six Eagles M. Co. has men at work on its tunnel, in 1500 feet. They have 100 feet more to run to strike the main ledge. The same company also has men at work on its electric light plant at the Similkameen river falls.——The Ruby M. Co. is getting out high grade ore for shipment. They will start another tunnel 300 feet farther down the mountain, and will have to drive 700 feet to cut the ledge. Arrangements are being made to start the Golden Zone mill on Ruby ore.

The sawmill at the Mineral Hill mine, near Conconully, is cutting lumber to replace the building destroyed by fire. Superintendent Wheeler says he is arrangiug to put in an air compressor plant, machine drills and other mining machinery.—— The Prize M. Co., near Nighthawk, is building a mill.——The Favorite M. Co. has men at work running a tunnel on one of the ledges.——The Pinnacle gold mine will put on more men at the mine, at the mill and hauling ore, says Manager Metcalfe. They intend to run a large dump on Bunker Hill mine through the Black Bear mill.

Whatcom County.

The Mount Baker & Shuksan M. Co. will put in reduction machinery on its property near Shuksan, near Mt. Baker. A millsite has been cleared. The ores are said to carry values in gold, silver and copper. G. T. Bacon, part owner in the Mount Baker & Shuksan M. Co., says 300 feet of tunneling has been driven and 150 feet of shaft sunk. The mine is 3½ miles from Shuksan by pony trail route. There are two lodges and assays show $15 per ton.

FOREIGN.

AFRICA.

Natal.

U. S. Consul-General W. R. Bigham at Cape Town says the reports of the collectors of customs at Durban shows, during the year 1902, imports from the United States into Natal included the following: Electrical machinery valued at $119,268.18; mining machinery, $48,168.62; engine packing, $4,642.64; electrical fittings, $47,273.18.

Transvaal.

A meeting under the auspices of the Labor Importation Association was held recently at Maraisburg and was attended by miners from the Consolidated Main Reef mines, the Aurora West United Gold M. Co. and the New Unified Main Reef. The meeting adopted a resolution in favor of the importation of Chinese labor. Another public meeting held at Standerton passed a like resolution favering the importation of unskilled Asiatic labor.

BELGIUM.

The production of coal in Belgium is one of its principal resources, reports U. S. Consul McNally at Liege. Coal is imported into Belgium for various purposes, including that of coke making. Belgium exports some coal to Germany, but the principal country of export is France. The importation of briquettes—a composition of coal dust, fire clay and tar—amounted to 44,000 tons in 1902, of which 39,000 tons came from Germany. The provinces of Liege and Hainaut cover the richest coal region of Belgium. Up to the present Belgium's developed coal fields have been in a tract of land contignous to the valley of the Sambre and Meuse rivers, and having strike of west-southwest to east-northeast, the fields being widest in the west. Recent investigations have shown another promising coal field in the north (the Campines), which is being prospected. The production of coke in Belgium in 1902 amounted to 1,848,000 tons. The gas produced is used for heating the coke ovens. One and three-tenths tons of coal are required to produce a ton of coke. The Copee ovens are principally used. The by-products are sold, as sulphates of ammenia, for agricultural purposes. The tar is sold to rotining works. The cost of mining a ton of coal is between $1.93 and $2.51, according to location of the mines. Charges f. o. b. boat are 58 cents. The mines are drift and sbaft. The shafts are from 1312 to 3937 feet in depth, while the drifts extend up to 1.8 mile. The Government receives 3½% of the gross profits.

The mines are owned and operated by companies or individuals under special legislation. According to the law of 1810—still in force—grants are made by the Government in perpetuity. By the grant the owner obtains a title to the mine distinct from the surface and which can be mortgaged separately from the surface. The operation of the mines is under Government supervision, whose powers are delegated to a beard, the members of which are selected by the State. The liability for damage to the surface or the appurtenances thereon attach to the owner of the mine. Mine owners are compelled not only to pay certain fixed revenues to the Government, but also to the owners of the surface, which latter sum is fixed by the State in its deed of concession and cannot be less than 5 cents per 2.471 acres, together with 3% of the net output. The mines are not subject to a tax, as are commercial enterprises, and pay no license, but must pay annually the sum of $1.93 per 0.386 square mile, together with an amount, fixed annually by the Government, not to exceed 5% of the production. The budget laws, however, invariably fix the amount at 2.5%.

There are in Belgium 134,000 miners, of whom 98,800 work underground and 35,200 on surface. The average wages of miners are $273 per year. Compared with other industries, wages of coal miners are relatively high. Under recent legislation women are forbidden to work in the mines, but are still employed on the surface, leveling coal, etc. Their employment in and about coal mines, however, is being gradually done away with.

BRITISH COLUMBIA.

Boundary District.

It is reported negotiations are under way for consolidation of the British Columbia C. Co., owning the Mother Lode mine and Greenwood smelter, and the Snowshoe C. Co., near Greenwood. The British Columbia company is arranging for enlargements. A 2-stand converter plant will be put in, and excavations of the site are under way. The blowing engine for the converter plant is arranged so that it can be operated either by steam or electricity. The steam cylinders are 16x42 inches and air 40x42 inches, and will be connected with the motor by rope drive. In the converter power house will also be located the hydraulic accumulator, with electrically driven hydraulic pump, to furnish water to operate the converters. In the convertor building there will also be a 72-inch silica mill, for preparing converter linings, and on the north side of the building will bo put up bins for silica and clay, together with crushing machinery. The buildings are of steel, on masonry foundations. A contract has been made between the British Columbia C. Co. and the Cascade Water, Power & Light Co. for electrical power from the latter's plant at Cascade. The Cascade Co. is building a transformer station on the smeltor site to reduce the voltage from 20,000 to 2000. The motors for operating the smelter plant will be as follows: Three 100 H. P. motors for furnace blowers and sample mill; one 300 H. P. for convertor blowing engine; one 15 H. P. for elevators; one 25 H. P. for hydraulic pump, and one 40 H. P. for driving relining machinery; also, one 5 H. P. for sample grinder, and in addition to these will be a 75 K. W. motor generator set to convert the alternating current into direct current to operate the crane. The converter plant will have capacity for treating the matte from 2000 tons of ore per day. The locomotive for carrying away the molten slag is running. Until the slag dump is leveled up to meet the requirements of the track, the slag from one furnace will be granulated as at present, but eventually all the slag will be handled by the railway.

East Kootenay District.

On Bull river, near Fort Steele, work is under way on the ditch being built by the Gold River M. & P. Co.——J. Larsen has men at work on the Tiger-Poorman group.

The Kintla Lake Oil Co. of Fort Steele will resume drilling operations on its well.

The Sullivan M. Co. of Spokane, Wash., owning a group near Marysville, is being reorganized, and they will complete the smelter which was started last year, says B. Layton, of Spokane, vice-president. The company has four men working on the dump and shipping the ore.

Nelson District.

The Poorman-Granite mine, 5 miles west of Nelson, is again closed down, this being the fourth suspension of operations in the past year, says the Nelson News.

Vancouver Island.

J. G. Davis, foreman at Emery's Newcastle island sandstone and granite quarries, has begun clearing away preparatory to resuming shipments. He says blocks of stone weighing up to fifteen and twenty tons will be taken out and shipped south.

CANADA.

The principal portion of the world's supply of asbestos is furnished by Canada, where the production has increased to 40,420 tons for the year 1902. During same year the United States produced 1010 tons and Italy and Russia 2000 tons. The brittle hornblende asbestos is chiefly used where resistance to heat and acids is demanded, but for spinning only the highly flexible fibers of serpentine or chrysotile asbestos are suitable, says F. Cirkel in the American Manufacturer. The principal Canadian deposits are at Thetford and Black Lake, between Sherbrook and Quebec, where serpentine is associated with Cambrian schist, conglomerate and quartzitic sandstone. It contains nodules and masses of steatite and chrome ironstone, and also, though not invariably, veins of asbestos from 5 to 80 milimeters thick and up to 20 meters long. Mining is carried on in open workings. The better grades of asbestos are sorted by hand, and are divided into: Crude 1, with fibers over 30 mm. long; and crude 2, with fibers 6 to 30 mm. long. In mechanical process of preparation the fibers are frequently disintegrated. The product is separated into two classes—fiber and paper stocks. The cost of production amounts to $131 per ton for crude and $17 for mechanically prepared. The selling price is $20 to $28 for paper stock, $30 to $60 for fiber, $100 to $128 for crude 2, and $180 to $200 per ton for crude 1. There are twelve companies engaged in production of asbestos, employing 3000 men.

Alberta.

The International Coal Co., west of Blairmore, reports developing two seams, respectively 6½ and 5 feet wide, of coking coal, producing coke similar to that of Fernie. The International Co. is getting out fifty tons a day, and the Canadian Pacific Railway has placed a standing order for 1000 tons daily. The coke ovens are being built close to the mines and are connected with the Canadian Pacific by a short spur. At Blairmore Proctor & Fishburn are putting a spur from their coal mines to the railway and the Byron Creek property is being opened up.

MEXICO.

The following shows the number and the location of metallurgical establishments in Mexico in operation, says the Mexican Investor:

Coahuila	1
Chihuahua	5
Durango	2
Guanajuato	3
Guerrero	2
Hidalgo	2
Jalisco	2
Mexico	3
Michoacan	1
Oaxaca	1
Puebla	1
San Luis Potosi	2
Sinaloa	2
Sonora	5
Tepic	1
Zacatecas	3
Total Sixteen States	36

The systems of reduction employed in these establishments are the following: Fundiciou (smelters), 12; toneles (barrel chlorination), 1; patio, 7; panes (amalgamating pans), 3; placas, 3; lixiviation, 6; cyanide, 3; destilacion, 1. The twelve smelters are in the following States: Coahuila, 1; Durango, 2; Guerrero, 2; Hidalgo, 1; Mexico, 3; Puebla, 1; San Luis Potosi, 1; Sonora, 1. The toneles system is employed in Hidalgo. The old Mexican

patio system exists still in Guanajuato, 3; Jalisco, 2; Oaxaca, 1; Sonora, 1. The three pan establishments are in Guanajuato. The placas system is used in Chihuahua, 1; Oaxaca, 1; Sinaloa, 1; lixiviation, in Sinaloa, 1; Sonora, 2; Tepic, 1; Zacatecas, 2; cyanide establishments, in Chihuahua, 1; San Luis Potosi, 1; Sonora, 1; destilacion process in San Luis Potosi.

Chihuahua.

Manager G. W. Boyce has started work on the Senorita mine at Victorino. Cyanide tests will be made. The vein is 100 feet wide and carries 0.32 ounce gold per ton, with a little silver.

F. McDonald, J. D. McKenzie and D. Minnahan are working a copper property near Aldama.——F. McDonald is working the San Rafael and Colon properties at Terrazas; also the Santa Elicia at Victorino, 6 miles distant.

T. Williams, B. F. Maurer, D. Bauchert, J. B. Johnstone and C. West, near Minillas, have resumed work on their La Cruz mine.

The Las Vigas mine near Coyame is shipping copper ore.

Urique reports say at the Lluvia de Oro mine preparations are being made to put up a 20-stamp mill.

Durango.

A company has been formed at Monterey, Nuevo Leon, to exploit the Guanacevi district of Durango. M. de la Garza Campos, owner of the San Ramon mine, is president. The San Ramon mine is near Guanacevi, and carries gold and silver.

W. Pettit, of Parral, owner of the Adela mine, near Santa Barbara, has bought the W. S. Benton group of fourteen mining properties, near Inde, for $120,000 Mexican. The ores of Inde carry silver and lead with some gold. Lack of transportation facilities has hindered development of the district, as they have to haul ore 60 miles to Rosario. The National is making preliminary survey from Discubridora to Inde, a distance of 80 miles. From La Cruz mine Avila & Benton ship 200 tons per month, that runs 100 ounces silver, 10% lead and 0.3 ounce gold. The Potrillo mine of V. Mortos, adjoining the Pettit properties, is shipping 200 tons of $125 ore, monthly. R. Towne, of the San Luis Potosi smelter, has perfected title to 135 pertenencias.

Guanajuato.

El Cubo M. Co. has put in an electric plant for a 20-stamp mill, concentrators and twenty drills, and will obtain power from the Guanajuato Power Co.

Mexico.

The annual report of the El Oro Mining & Railway Co., operating at El Oro, shows work was carried on in all levels from the San Juan to the 786-foot level—most of the ore coming from the hanging wall ore body above the 286-foot and 386-foot levels. The vein runs 22 to 33 feet wide. On the 786-foot level drifts have been run north and south from the main crosscut. On the 486-foot level a crosscut is being run east from north shaft to cut the Descuhridora vein. On the Somera, a 13-foot vein has been opened up.——There was mined during the year a total of 114,436 tons of ore. The reserves of ore in mine and dump assay average of $11.75 in gold and 3 ounces silver. The 100-stamp mill crushed 110,958 tons of ore, 16% of the values being recovered hy plate amalgamation. The mill tailings were cyanided, giving a total hullion recovery of $1,522,951, or 82.7% of assay value of the ore. The total tons millod was 110,958. Working costs for year were as follows:

	Total.	Per Ton
Mining	$161,570	$1.46
Development	88,780	0.80
Milling	83,861	0.76
Cyaniding	119,868	1.08
General expenses	96,970	0.87
Total working costs	$551,049	$4.97
Construction expenses	55,867	

The figures are in Mexican dollars. The total costs show an increase over the previous year, due to increased construction and heavier cyaniding, milling and development costs.——Construction has begun on an additiou of 100 stamps to the present milling capacity. During the year, in conjunction with the Exploration Co., secured an interest iu a working option on the extension of the San Rafael vein.

Superintendent J. Devereaux reports developments progressing on the Descubridora mine, near El Oro. The 3-compartment shaft is being sunk.

Sonora.

B. F. Graham of Bisbee, Ariz., principal owner of the Lucky Tiger mine, near Douglas, says development work and ore shipments will he increased. Ahout 3500 feet of tunnels have been driven under the present management. The wagon road has been completed from the railway station to the mine, doing away with the hurro train.

PERSONAL.

J. F. SMITH is superintendent of the Phœnix mine, Liscum, Ariz.

GEO. W. SHELTON has returned to Alma, Colo., from Denver, Colo.

F. W. WILLIAMS, of Seattle, Wash., is in San Francisco, Cal., on mining business.

W. E. SHARON, a mine superintendent of Virginia City, Nev., is in San Francisco, Cal.

C. I. RADER has resigned as manager of the Annie Laurie mine, near Kimberly, Utah.

H. M. PEASE, of Stent, Tuolumne Co., Cal., is in San Francisco, Cal., on mining business.

H. E. CAREY of Salt Lake City, Utah, is in New York in interest of his Mexican gold mines.

W. L. WATTS, E. M., is in San Francisco, Cal., on mining business from Los Angeles, Cal.

S. F. SULLENBERGER, of Glohe, Ariz., interested in Arizona mines, is in San Francisco, Cal.

J. P. HENNESSY, interested in Tonopah, Nev., mines, is in San Francisco, Cal., from Tonopah.

J. R. SERRANO has beon appointed mining agent at Guerrero, Mexico, for the Department of Fomento.

C. W. RAYMOND has returned to San Francisco, Cal., from an examination of mine property in Oregon.

H. B. VERCOE, managing director of the Fresno C. Co., Ltd., has returned to Clovis, Cal., from Los Angeles, Cal.

G. COOPER is superintendent of the Crackerjack M. Co., at Buffalo Hump, Idaho, vice C. Flint, resigned.

R. A. FOSTER, metallurgist, of San Francisco, Cal., has returned from Eureka, Nev., on mining business.

C. C. JONES of the Mountain C. Co., Ltd., at Keswick, Shasta county, Cal., is visiting Utah mines and plants.

G. A. FREEMAN, manager of the Kat and Kittens mine, Mogollon, Socorro county, N. M., is in the East on business.

A. E. HYDE JR. is manager of the Annie Laurie mine, near Kimberly, Piute county, Utah, vice C. I. Rader, resigned.

G. W. CAMPBELL, manager of the Black Oak mines, Tuolumne Co., Cal., is in San Francisco, Cal., from Soulsbyville, Cal.

J. R. COOPER has resigned as smelter superintendent of the Quincy M. Co., at Hancock, Mich., to take effect November 1.

L. GREENE, manager of the Clayton M. & S. Co., whose mines and furnaces are at Clayton, Idaho, is in camp from Salt Lake City, Utah.

E. E. PAYSON is superintending construction of a 100-stamp mill for the Yale-Brown M. Co. at Red Mountain, Ouray county, Colo.

W. TECHOW bas resigned as superintendent of the North Pole mill, near Sumpter, Or., and entered business in Portland, Or.

O. WISER, formerly master mechanic, is mill superintendent of the Annie Laurie mine, near Kimherly, Utah, vice H. Calvin, resigned.

H. G. VERCOE, superintondent of the Fresno copper mine, Clovis, Cal., has returned from the Green Mountain mine, Mariposa county, Cal.

R. L. BENTON, of Bisbee, Ariz., has resigned as manager of Lucky Tiger mine in Sonora, Mex., and the Bishee Queen mine near Bisbee, Ariz.

C. A. MELSON, Salt Lake City, Utah, representative of the London Exploration Co., returned there last week from its mines in South America.

T. S. LEWIS, of Los Angeles, Cal., treasurer of thc Cieneguita C. Co. of Phœnix, Ariz., has gone to Denver, Colo., and New York on company husiness.

ERNEST A. HAGGOTT, manager Arizona Blue Bell C. Co., Mayer, Ariz., has returned from a professional trip to Silverton, Colo., mining district.

D. R. OLIVER, president and general manager of the Zubiate M. Co., has returned to San Francisco, Cal., from a trip to their mines in Sonora, Mexico.

S. E. BOWERMAN, vice-president of the Brant M. & M. Co., has returned to Kansas City, Mo., from a trip to the company's properties at Thunder Mt., Idaho.

T. H. TRACY, general superintendent of the North American C. Co., Encampment, Wyo., has returned from attending a meeting of the stockholders of the company in Denver, Colo.

W. P. SMITH, assistant superintendent of the Calumet & Hecla smelter, at Buffalo, N. Y., will be smelter superintendent of the Quincy M. Co., at Hancock, Mich., vice J. R. Cooper, resigned, to take effect November 1.

Obituary.

THOMAS DAVEY, till recently a mining superintendent at De Lamar, Idaho, died at Boise City, Idaho, on the 8th inst. Deceased went to De Lamar from Granite, Mont., in 1894. He is survived hy a widow and two daughters.

JOHN HILLARY, a pioneer miner of Calaveras county, Cal., died in Alameda, Cal., October 2. Deceased went to Calaveras county in 1852, and was an owner in and locator of the Lone Star and Reed & Hillary mines, near West Point, from 1863 till 1887.

JAMES BECK, who discovered the Alexandria coal fields on Vancouver Island, B. C., died at his home near South Wellington, on the 12th inst. Beck was a partner of the late Robert Dunsmuir in prospecting days, and sold the Alexandria to Dunsmuir for $20,000. Deceased went to British Columbia in the days of the rush to Cariboo, going from Ontario, Canada, to San Francisco, Cal., via Panama, and thence going north.

Catalogues Received.

Catalogue No. 9, from Harron, Rickard & McCone, 21-23 Fremont street, San Francisco, Cal., is devoted entirely to wood working machinery. The 130 pages of finely printed matter give illustrated description of many machines in general use, and a variety of wood working devices that the firm carry in stock for immediate delivery. The contents are admirably arranged and the work is an addition to trade literature.

Commercial Paragraphs.

THE Austin Manufacturing Co. of Chicago has sold to King & Craig of Cripple Creek, Colo., a gyratory crushing plant.

H. K. OLSEN has within the last few days entered into copartnership with A. J. Van Drake, 308 Mission street, San Francisco. Cal. The name of the firm is now Van Drake-Olsen Machine Works. Mr. Van Drake has gone East on business for the firm.

Latest Market Reports.

SAN FRANCISCO, October 23, 1903.

METALS.

SILVER.—Per oz., Troy: London, 28 5/16d (standard ounce, 925 fine); New York, bar silver, 61¼c, refined (1000 fine); San Francisco, 61¼c; Mexican dollars, 49@51c San Francisco, 46¾c New York.

Silver has taken another upward movement since last week, reaching 61⅞ during the week, hut receding to 61¼, the present quotation. The announcement that the Government would discontinue coinage for the Philippines has not affected the market as yet.

COPPER.—New York: Standard, $13.12½; Lake, 1 to 3 casks, $13.12½; Electrolytic, 1 to 3 casks, $13.00; Casting, 1 to 3 casks, $12.75; San Francisco: $15.00. Mill copper plates, $17.00; hars, 18@24c. London: £54 10s spot per ton.

Copper remains weak and the market is somewhat lower, the price of Standard, Lake and Electrolytic having receded to 13 cents. Still authorities on the copper market predict a rally and say that there are no large accumulated stocks on hand and the consumers are running short of supplies. Buyers are holding off for lower prices and producers and dealers are not offering any inducement to huyers, in view of which the market is weak, with a lowering tendency.

LEAD.—New York, $4.50; Salt Lake City, $3.50; St. Louis, $4.00; San Francisco, $4.50, carload lots; 4¾c 1000 to 4000 ℔s.; pipe 6½, sheet 7, har 5¾c; pig, $4.75. London: £11 1s 3d ₱ long ton.

SPELTER.—New York, $6.12½; St. Louis, $5.10; London, £20 10s ₱ ton; San Francisco, ton lots, 6¾c; 100-℔. lots, 7c.

TIN.—New York, pig, $25.70 @ 26.10; San Francisco, ton lots, 27½c; 500 ℔s., 28c; 200 ℔s., 28c; less, 28½c; bar tin, ₱ ℔., 30@32c. London, £116.

PLATINUM. — San Francisco, crude, $18.00 ₱ oz.; New York, ingot, $19.00 ₱ Troy oz. Platinum ware, 75 @ 80c ₱ gram.

QUICKSILVER. — New York, $46.00@47.00, large lots; London, £8 7s 6d; San Francisco, local, $43@44 ₱ flask of 76½ ℔s.; Denver, $49.50. Export, $42.50@43.00.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

SOLDER. — Half-and-half, 100-℔. lots, 18.75c; San Francisco, Plumbers', 100-℔. lots, 15.50c.

ZINC.—Metallic, chemically pure, ₱ ℔., 50c; dust, ₱ ℔., 10c; sulphate, ₱ ℔., .04c.

NICKEL.—New York, 50@60c ₱ ℔.; ton lots, 40@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30@34c.

ANTIMONY. — New York, Cookson's, 7¼c; Hallett's, 6⅞c; San Francisco, 1000-℔. lots, 8c; 300@500-℔s., 8½c; 100-℔. lots, 10½c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, $16.35 @17.10; gray forge, $14.65; San Francisco, bar, 3c ₱ ℔., 3½c in small quantities.

STEEL. — Bessemer billets, Pittsburg, $27.00@29.00; open hearth billets, $28.00 @30.00; San Francisco, bar, 7c to 12c ₱ ℔.

CHICAGO CURRENT QUOTATIONS.

Bessemer	$17 50@18 50
Foundry Northern 1	17 50@17 75
Northern 2	17 00@17 25
Northern 3	16 50@16 75
Southern 1	16 35@——
Southern 2	15 85@——
Southern 3	15 35@——
Forge	14 85@——
Charcoal	20 50@21 00
Billets, Bessemer	28 00@29 00
Bars, iron	1 55@——
Bars, steel	1 75@ 1 80
Rails, standard	28 00@30 00
Rails, light	34 00@40 00
Plates, boiler	1 90@ 2 00
Tank	1 75@ 1 80
Sheets, 26 store	2 90@ 3 00
No. 27	2 90@ 3 00
No. 28	3 00@ 3 10
Angles	1 75@——
Beams	1 75@——
Tees	1 80@——
Zees	1 75@——
Channels	1 75@——
Steel melting scrap	14 00@15 00
Relaying rails	26 00@28 00
Dealors forge	12 50@13 50
No. 1 railroad wrought	14 50@15 00
No. 1 cast, net ton	13 50@14 50
Iron rails	18 00@19 00
Car wheels	19 00@20 00
Cast borings	5 50@ 6 50
Turnings	10 50@11 50

LUMBER. — (Retail): Pine, ordinary sizes, $24.00@25.00; extra sizes higher; redwood, $28.00@30.00; lath, 4 feet, $4.50 @5.00; pickets, $21.00; shingles, $2.50 for No. 1 and $2.25 for No. 2; shakes, $13.50 for split and $15.00 for sawed; rustic, $28.00 @35.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, $3.35; Cut, $3.55; 10d to 16d, Wire, $3.45; Cut, $3.35; 8d Wire, $3.50; Cut, $3.50; 6d and 7d, Wire, $3.60; Cut, $3.60; 4 and 5d, Wire, $3.70; Cut, $3.70; 3d, Wire, $3.85; Cut, $3.85; 2d, Wire, $4.10; Cut, $4.10. Special rates for carload lots.

LIME.—Santa Cruz, $2.35; Roche Harbor, $2.35 ₱ hhl.

CEMENT.—Imported, $2.50@2.75 ₱ hhl.; California carload lots, $2.25 f. o. b. at works; small lots, $2.50 ₱ bbl. in sacks, 4 sacks to bhl.

GENERAL SUPPLIES.

OILS.—Linseed, hoiled, bbl., 49c: cs., 54c; raw, bhl., 47c; cs., 52c; Lucol oil hoiled, bbl., 44c; cs., 49c; raw, bhl., 42c; cs., 47c. Kerosene—Pearl, per gal., 21½c; Astral, 21½c; Star, 21½c; Extra Star, 25½c; Eocene, 24½c; Elaine, 27½c; Water White, in hulk, 15c; Mineral Seal, iron hhls., 18½c; wooden bhls., 21c; cs., 24c; Mineral Sperm, cs., 26½c.; Deodorized Stove Gasoline, hulk, 17c; do., cs., 23½c; 86° Gasoline, hulk, 21c; do., cs., 27½c; 63° Naphtha or Benzine, deodorized, in hulk, per gal., 13c; do., in cs., 19½c; Lard Oil, E. W. S., bhl., 85c; cs., 90c; Neats-foot Oil, pure, hbl., 75c; cs., 80c; Sperm, crude, 50@60c; Natural White, 70c; Bleached, do., 75c; Whale Oil, cs., 50@55c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per ℔., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11⅞c; less than one ton, 13⅞c. No. 2, 40%, carload lots, 10c: less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black hlasting powder

in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2.00 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11c ℔ sot; 14 oz., 40s., 10c.

COAL.—San Francisco, coast, yard prices: Wellington, $8.00: Seattle, $6.50; Coos Bay, $5.50; Southfield, $8.00. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8.00; Cumberland, $13.00; Cannel, $8.50; Welsh Anthracite, $13.00; Rock Springs, $8.50, long ton; Colorado Anthracite, $14.00. Coke, $10.50 per ton in bulk, $13.00 in sacks; Sunnyside, $8.50, long ton.

CHEMICALS.—Cyanido of potassium, 98@99%, jobbing, 23@24c ℔ lb.; carloads, 23@23½c; in tins, 30c; soda ash, $2.00 ℔ 100 lbs.; hyposulphito of soda, 3@3½c per lb.; caustic soda, in drums, 3@3¼c ℔ lb.; Cal. s. soda, bbls., $1.20@1.40 ℔ 100 lbs.; sks., $1.05; chlorate of potash, bbls., 10c; caustic potash, 10c in 40-lb. tins; roll sulphur, 2½@2¾c; powdered sulphur, 2@3c; flour sulphur, French, 3½@3¾c; alum, $2.00@2.25; California refined, 1¾@2c; sulphide of iron, 8c ℔ lb.; copper sulphate, 5½@5¾c; chloride of lime, spot, $2.50@2.75; sulphuric acid, in carboys, 66° B, 1¾@2c ℔ lb.; nitric acid, carboys, 8c ℔ lb.

BONE ASH.—Extra No. 1, 5@6c ℔ lb. No. 1, 4@5c.

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails, ½c ℔ lb. above keg price; in 1 and 5-lb tin cans, 100 lbs. per case, ½c. per lb. above keg price. Dry Lead—In bbls., 1 ton and over, 6c; do. in kegs, 6½c.

RED LEAD.—500 lbs. and over at one purchase, ℔ lb., 6½c; less than 500 lbs., 7c.

LITHARGE.—Pure, in 25-lb. bags, 8@9c ℔ lb.

BORAX.—Concentrated, 6@7c ℔ lb; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

MANGANESE.—Pure, ℔ lb., 60c.

SODIUM.—Metal, ℔ lb., $1.00.

BISMUTH.—Subnitrate, ℔ lb., $1.75.

MERCURY.—Bichloride, ℔ lb., 90c.

MOLYBDENUM.—$2.00 ℔ lb.

CHROMIUM.—90% and over, ℔ lb., $1.00.

PHOSPHORUS.—American, ℔ lb., 75c.

SILVER.—Chloride, ℔ oz., 90c@$1.00; nitrate, 55c.

ALUMINUM.—No. 1., 99%, small lots, 37c ℔ lb.; 100 lbs., 35c; 1000 lbs, 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

URANIUM.—Oxide, ℔ lb., $3.50.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

VEHICLE WHEEL RIM.—No. 741,401. Oct. 13, 1903. H. Harris, San Francisco, Cal. One-half assigned to Wm. J. Gorham, of same place. This invention relates to improvements in vehicle wheels employing inflatable tires, and pertains particularly to a form of sectional rim having means for quickly attaching and detaching the tire. Its object is to provide a rim and a double-tube tire therefor of simple construction and suitable for bicycles, automobiles and other vehicles, whereby in case of puncture or other needed repair the tire may be quickly and easily detached, the inner tube removed and mended and the tire again replaced and locked in position securely on the rim.

HYDRAULIC ELEVATORS.—No. 741,291. Oct. 13, 1903. J. H. Adams, Alameda, Cal. This invention relates to improvements in apparatus for lifting gravel, tailings and the like to elevated points by the aid of a jet of water under high pressure delivered into a pipe into which the material to be lifted is brought in such a manner as to be acted on and carried upward by the jet. The object of the invention is to provide a lift which can be operated no matter to what depth the nozzle may be submerged.

COMBINATION CANES.—No. 741,373. Oct. 13, 1903. Le Roy Robertson, Oakland, Cal. Two-thirds assigned to John Yule and L. W. Forsting, Oakland, Cal. This invention relates to a combination cane and device for concealing and exploding a flag or other ornamental attachment, together with a means for producing a sound. The device is especially intended for political and other marching bodies of men, where it is desirable to provide means for producing a blast or sound at intervals, and by means of the horns all sounded in unison this can be effected. The device can be taken apart and the sections used separately, or the parts can be assembled and the device becomes an ornamental cane suitable for ordinary use.

FRUIT PULP MACHINE.—No. 741,428. Oct. 13, 1903. C. R. Wilson, San Francisco, Cal. Immense quantities of fruit go to waste annually simply for the reason that the growers have often no means at hand of disposing of the fruit which becomes too ripe for shipment. The object of this invention is to provide a crusher of simple construction by which this ripe fruit may be reduced to a pulp and the pits extracted, and to accord means in connection with the crusher whereby the pulp may be spread into a thin sheet and cut into squares preparatory to drying.

AIR DRAFT HEATER.—No. 741,608. Oct. 13, 1903. J. McDermott, West Berkeley, Cal. This invention relates to an apparatus which is designed for heating air to be employed for draft in furnaces in connection with oil burners or for like purposes. It consists of one or more casings having transversely disposed foraminous diaphragms and means for admitting air into one end of the casing and withdrawing it from the other. The object of the invention is to heat air which is to be used for various purposes requiring an elevated temperature.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific Coast inventors:

FOR WEEK ENDING OCTOBER 13, 1903.

741,291.—HYDRAULIC ELEVATOR—J. H. Adams, Alameda, Cal.
741,097.—RAILROAD SWITCH—W. J. Bell, Los Angeles, Cal.
741,471.—CONVEYORS—H. W. Blaisdell, Yuma, Ariz.
741,008.—ROLLER BEARING—F. E. Brooks, S. F.
741,307.—CLOSURE—E. E. Chapman, Los Angeles, Cal.
741,014.—SNAP HOOK—R. F. Covert, Salida, Cal.
741,319.—CLEVIS—J. G. Evans, Baker City, Or.
741,122.—BURGLAR ALARM—W. H. Fletcher, Capitola, Cal.
741,479.—WOOD WORKING MACHINE—H. O. Fry, Cosmopolis, Wash.
741,325.—MOTOR—S. A. Gibbs, Tacoma, Wash.
741,385—STEAM BOILER—B. H. Green, Los Angeles, Cal.
741,401.—VEHICLE WHEEL RIM—H. Harris, S. F.
741,248.—INDICATOR—F. W. Jones, Santa Paula, Cal.
741,504.—OIL BURNER—W. Kemp, Tucson, Ariz.
741,515.—WINDMILL—T. W. Lowe, Stockton, Cal.
741,355.—COLUMBARIUM CELL—W. J. Mathews, Oakland, Cal.
741,608.—AIR DRAFT HEATER—J. McDermott, Berkeley, Cal.
741,278.—GUN—G. D. Potter, Spokane, Wash.
741,609.—SHADE FIXTURE—M. E. Rice, Los Angeles, Cal.
741,373.—CANE—L. R. Robertson, Oakland, Cal.
741,107.—WINDOW SASH—E. Wadey, Los Angeles, Cal.
741,203.—FLUSHING TANK—W. A. Williams, S. F.
741,428.—FRUIT PULP MACHINE—C. R. Wilson, S. F.

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ASSAYER, EXPERIENCED IN CYANIDING, desires position. References. Address "Assayer," care of Mining and Scientific Press.

CYANIDE CHEMIST WHO HAS SUCCESSfully managed cyanide plants will be open for engagement in November. Ten years' experience in different countries. Reasonable salary. Address "Reliable," care of this office.

MINING ENGINEER DESIRES POSITION AS Manager or Superintendent. Good executive ability. Extensive experience in mining and treating large bodies of low grade refractory gold ore. South Africa or West Australia preferred. Address "Telluride," this office.

EXPERIENCED MILLMAN WISHES POSItion. Address Box 117, Oroville, Cal.

MINING ENGINEER AND METALLURGIST, with sixteen years' of practical experience as manager, superintendent and consulting engineer of mines and mills, desires position on or after November 1st. Speaks Spanish fluently. Address P. O. Box 77, Durango, Mexico.

MINING ENGINEER OF GOOD STANDING, with twelve years' experience in mines and mills, wants position as expert. School of Mines graduate. Address V. X., this office.

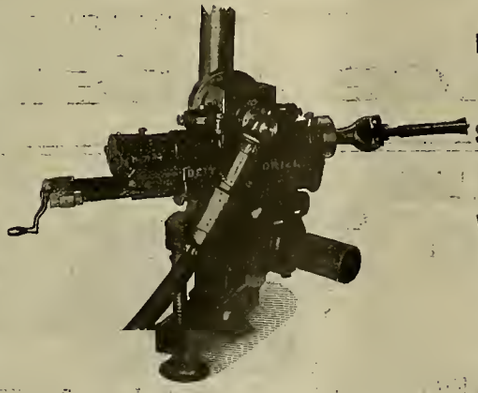
SITUATION AS MILLMAN OR CHARGE OF small mine, after November 15th, by middle-aged man. Over twenty years' experience in mine and mill. All round worker. Nine years with present company. Wish to make change. Good references. Address "Millman," care of Mining and Scientific Press.

SUPERINTENDENT WANTS POSITION WITH substantial company. Practical miner, millman, assayer and cyanide expert. Address Supt., this office.

WANTED, BY A FIRST-CLASS CYANIDE Chemist and Assayer having had ten years' experience in the construction and management of plants in some of the main gold and silver camps of the West, a position with a reliable company. Satisfactory work guaranteed. Highest references given. Moderate salary. Address "Cyanide Chemist," care of Miniag and Scientific Press.

WANTED BY AN EXPERIENCED MINING Engineer and Manager, a position as mine manager in gold, silver or copper proposition, with a first-class corporation. Have had 35 years' experience in U. S. and Mexico; prefer Mexico. Speak Spanish, German, French and English. Am well acquainted with Mexico, and am employed now. Desire a change between November and January 1st, 1904. Salary expected not less than $5000 per annum. Can furnish the best of reference. Address "Mine Manager," care of Mining and Scientific Press, San Francisco, Cal.

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ASSESSMENT NOTICES.

LARKIN MINING COMPANY.—LOCATION OF principal place of business, San Francisco, California; location of works, El Dorado County, near Placerville, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 21st day of September, 1903, an assessment (No. 15) of two and one-half (2½) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 112 Main street, Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 26th day of October, 1903, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 16th day of November, 1903, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
N. F. REMINGTON, Secretary.
Office—112 Main street, San Francisco, California.

WILLIETTA MINING AND MILLING COMpany.—Location of principal place of business, San Francisco, California; location of works, near Jacksonville, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 19th day of September, 1903, an assessment (No. 7) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 233, Crocker Building, corner Post and Market streets, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 27th day of October, 1903, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on TUESDAY, the 17th day of November, 1903, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
E. MCALLISTER, Secretary.
Office—Room 233, Crocker Building, corner Post and Market streets, San Francisco, California.
☞ **Prompt payment is requested.**

GOLDEN WEST MINING AND MILLING Company.—Location of general place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of September, 1903, an assessment (No. 1) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 123 California street, Room 423, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 24th day of October, 1903, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 18th day of November, 1903, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
CHAS. BOVONE, Secretary.
Office—123 California street, Room 423, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING Company.—Location of principal place of business, San Fraacisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 15th day of September, 1903, an assessment (No. 38) of one-half (½) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 31, 214 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 17th day of October, 1903, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 7th day of November, 1903, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
GEO. W. DIXON, Secretary.
Office—214 Pine street, Room 31, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment has been postponed to Saturday, October 31st, 1903, and the day of sale from the 7th day of November, 1903, to Saturday, November 21st, 1903.

By order of the Board of Directors.

A paid-up Hydraulic Engineering Scholarship in the International Correspondence Schools of Scranton, Pa., for sale at a sacrifice.
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FOR SALE.
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THE CALIFORNIA DEBRIS COMMISSION having received applications to mine by hydraulic process from E. C. Kavanaugh and Wm. H. Duffey, in Phillips Mine, near Forest Hill, Placer County, Cal., draining into Missouri Creek which reaches American River, and from North America Consolidated Gold Mining Co., in its mine near Gibsonville, Sierra County, Cal., draining into West Branch of Slate Creek which reaches Yuba River, gives notice that a meeting will be held at Room 96 Flood Building, San Francisco, Cal., Nov. 2, 1903, at 1:30 P. M.

MINE SUPPLIES.

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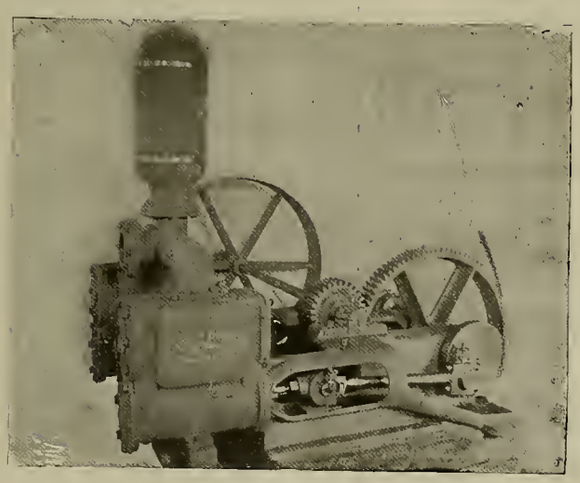
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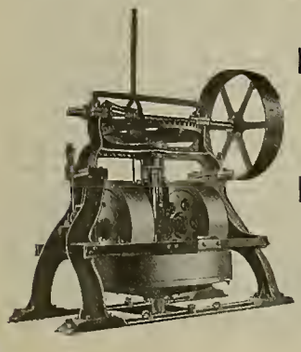
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MINING AND SCIENTIFIC PRESS

Whole No. 2258.—VOLUME LXXXVII. Number 18. SAN FRANCISCO, CAL., SATURDAY, OCTOBER 31, 1903. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Mine Drainage.

The problem of mine drainage is often a serious one, from financial and mechanical points of view, and for this reason mines which may be operated through adits are preferred by many to those which can only be worked through shafts. In former years pumping machinery of more than nominal capacity was more expensive than now, and this, together with the uncertainty of the amount of water which might be met, often deterred capital from investment in wet mines. Modern engineering and mechanical methods have simplified the problem, and pumps now raise quantities of water to a height which a few years ago was impossible with the appliances then in use. Pumps are of many kinds, ranging from the simple China "pump," consisting of two wheels around which passes a belt having cleats secured to the surface of the belt at stated intervals, and run by a water wheel, to the great modern steam and electrical constructions which raise enormous amounts of water by direct lift over 1500 feet.

The best safeguard against the flooding of a mine is in providing ample facilities to handle not only the coming water, but a much larger amount than has been developed in the workings. There are few mines which have facilities for handling water greater than they actually require. At mines where water power is available the question of power is simplified, for Cornish pumps may be operated by water power and steam pumps may also be run by compressed air, the compressor being driven by water power.

Formerly Cornish pumps of various patterns were the most extensively used in deep mining, but the cost of installation of the direct-acting Cornish pump was so great that engineers were urged to devise larger, more efficient and less expensive steam pumps to cope with the increasing volumes of water encountered in some mines. The mechanical engineers met the demand and it is only rarely now that an elaborate Cornish pumping system, with its long, heavy pump rods and expensive balance "bobs," are installed in American mines, the steam and electrically driven pump having superseded, and in many eases, displaeed them. The Cornish pump is an efficient pump, but with high first cost, and this, accompanied by the uncertainty as to what water may be found in the further development of the mine, makes it less popular with mine managers than formerly. A Cornish pump designed to raise 1000 gallons of water per minute to the height of 1000 feet may perform all that is claimed for it by its makers, which is all that can be expected of any pump, but should the quantity of water increase materially the Cornish pump is soon under water, though that proves no disadvantage with it, as it can be operated under any depth of water so long as it remains in working order, but to increase the capacity of a Cornish pumping plant once installed is an expensive and unsatisfactory operation.

If steam or electric pumps be placed in a mine to handle a given amount of water, and the water unexpectedly increases, additional pumps can be placed in the mine at various stations, or at other convenient places, and by this means any probable increase in water is promptly cared for. The first cost is far less than that of a Cornish pumping plant of equal capacity, and the steam and electric plants are capable of being quickly expanded to meet any probable change in conditions.

When designing a shaft for a mine a large compartment should be provided for pumps, pipes and manway, for often the size of shaft compartment determines the size of pump that can be economically placed in the mine. Some of the larger station pumps of to-day are made in sections which cannot be taken down through a small compartment. In such an instance two or more pumps of smaller size would have to be substituted for a large one, which is doubtful economy, both in first cost and future operation.

The employment of skips in hoisting water has been demonstrated to be an economical and satisfactory method of handling mine water, either to unwater flooded workings or to keep the water at a stated level. They are comparatively inexpensive, quickly placed in position or removed from the shaft, as required, and they will handle a large amount of water at low cost, particularly if the skips are of good size, working in a properly constructed shaft in good condition, running in balance. Where a flooded mine is to be unwatered the skips may be run tandem. In a properly equipped shaft an average of 1000 gallons may be easily raised from a depth of 1500 feet every minute without great expense, employing two skips each of 1500 gallons capacity and running in balance. The economic utility of skips is coming to be realized by many who have had little experience with them. They are being more extensively used as carriers of water as well as of ore and rock, throughout the mining world.



Spearfish Co.'s Cyanide Mill, Preston, S. D. (See Page 290.)



Mining by Open Cut Method, Spearfish Mine, Black Hills, S. D (See Page 290.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market Street, San Francisco, Cal.
Telephone, Davis 771.

ANNUAL SUBSCRIPTION.

United States, Mexico and Canada..... $3 00
All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

BRANCH OFFICES:

NEW YORK CITY, 720 Park Row Bldg. BOSTON, 27 School St.
CHICAGO, 1115 Monadnock Block. DENVER, 606 Mack Block.

J. F. HALLORAN.....Publisher

SAN FRANCISCO, OCTOBER 31, 1903.

TABLE OF CONTENTS.

ILLUSTRATIONS: Page.

Spearfish Co.'s Cyanide Mill, Preston, S. D.....281
Mining by Open Cut Method, Spearfish Mine, Black Hills, S. D..281
Map of Horse Fly Hydraulic Mine.....284
Scenes in the Operation of the Cariboo Hydraulic M. Co.'s Property, Bullion, Cariboo District, B. C.....285
Map of Horse Fly Hydraulic Mine.....286
Deitz Electric Rock Drill.....287
Pump Repaired With Iron Cement.....290
Mining and Metallurgical Patents.....291

EDITORIAL:

Mine Drainage.....281
Tin in the United States.....282
Litigation in Butte, Montana.....282
The Labor Situation.....282
Danger in Mine Fires.....282

MINING SUMMARY.....292-293-294-295-296

LATEST MARKET REPORTS.....296

MISCELLANEOUS:

Concentrates.....283
Notes on Gold Milling.....284
Alluvial Deposits of Horsefly, B. C.....284
Notes on Quartz Milling on the Rand.....286
Deitz Electric Rock Drill.....287
Not a Good Precipitant for Copper.....287
Consumption of Zinc in Cyanide Plants.....287
Annealing and Case Hardening Tool Steel.....288
Milling on Douglas Island, Alaska.....289
Iron Cement for Machinery.....290
Drift Timbering.....290
Mining Telluride Ores in the Black Hills.....290
Mining and Metallurgical Patents.....291
Personal.....296
Obituary.....296
Commercial Paragraphs.....296
Books Received.....296
Catalogues Received.....296
New Patents.....297
Notices of Recent Patents.....297

Tin in the United States.

For many years past efforts have been made in the various districts in the United States where tin ores are found to develop a profitable tin mining industry. Up to the present time, however, these efforts have not been rewarded with success, but this fact does not deter others from making a similar attempt, nor is there any reason why it should. The tin districts of the United States are notably those of the Black Hills, South Dakota, where tin occurs in coarse granite dikes, in the Harney Peak region of Custer and Pennington counties, and on the Dakota-Wyoming line in Lawrence county; and that of southern California, near the town of Corona, in Riverside county. Tin also occurs in numerous other localities, though, as far as developed, only in small amount.

In the Black Hills region a large amount of development work has been done in both of the districts mentioned, and expensive concentrating mills have been built—the first at the Etta mine near Keystone in 1886. Although the mine had considerable development and was well situated for attack by mining operations, the vein subsequently proved more valuable for spodumene than for tin, although cassiterite occurred in the rocks. The Etta mill ran but a short time, there being too little tin ore to keep it supplied. Later mills were built at and near Hill City, and further attempts were made to concentrate and reduce the ores. While such operations were generally successful from a mechanical standpoint, they apparently never realized a financial success, which is the usual object in equipping and operating mines.

In California an elaborate plant was built for the treatment of the tin ores occurring on the San Jacinto estate in Riverside county in 1890-91, and considerable tin was produced, but without profit.

Whatever may be said of the management of these several enterprises in the past, all of these operations were conducted at periods ranging from ten to seventeen years ago, since which time many improvements have been made in metallurgical appliances and processes, and the knowledge of concentration has been materially increased. As it is no uncommon thing to see gold, silver and copper mines which in past years failed to pay, or, having once paid, closed because they could no longer be made to yield a profit under existing conditions, are now again successfully operated under the new conditions, it is reasonable to expect that the tin mines under the new state of things may be enabled to make a success.

Litigation in Butte, Montana.

The handing down by Judge Clancy of the District Court of Montana a decision in the Minnie Healey and Parrott cases adverse to the Amalgamated Copper Co. has had an unexpected effect. The Amalgamated Co. has closed down all its mines and works, not only in Butte City, but throughout Montana, throwing 15,000 men out of employment. What the outcome of this arbitrary action will be is difficult to foresee. Different interests view the situation differently. One class looks upon the action of the Amalgamated people as a bid for public sentiment in their favor, in view of pending and possible future new litigation. Others consider it as a "bull" movement in the copper market.

Whatever the motive, it has created consternation among the miners of Montana, and its outcome is looked forward to with doubt, not to say apprehension.

The Minnie Healey and Parrott cases are but two of a number of cases which have been before the Montana court for months past, and it looks as though the litigation between the Amalgamated interests and those of A. F. Heinze and associates will be interminable, unless some sort of compromise is arranged. With this object in view, a mediation committee has been appointed, consisting of W. A. Clark, Paris Gibson, J. J. Hill and Governor T. K. Toole. This committee has been asked to arbitrate the differences, if possible, but little is hoped for from its efforts.

The Minnie Healey case, as well as most of the other cases pending in the Montana courts, is directly the outcome of the pernicious extralateral right law, which permits the following of a vein or ore deposit beyond the side lines of a mining location. In a region where the vein structure is simple the law would operate perfectly, as the framers of it conceived no complications such as are usually found. This aptly illustrates the wide difference between legislative and scientific geology. In a region where the vein system is complex, the extralateral right law invariably results in litigation if all the properties are not owned by one person or company.

In the Butte district the geology is very complex, and the conflicting interests have been many. Long-continued and expensive litigation has resulted in settling or compromising a great number of these contests, but a great many still remain to be adjusted.

In addition to the extralateral right controversy, a new feature has entered into the Butte litigation. Judge Clancy has rendered a decision that under the common law the Amalgamated Copper Company (a New Jersey corporation) has no right to own and hold stock in the Boston & Montana, and the Parrott Silver and Copper companies, which are Montana corporations. It is contended by the amalgamated interests that, if this decision be just, then the United Copper Company—also a New Jersey corporation, controlled by the Heinze interests—has no right to hold the stocks of Montana corporations. If this decision is sustained it would affect other corporations not of Montana, holding stocks in corporations organized under Montana laws.

Judge Clancy has made permanent the injunction restraining the Amalgamated Copper Company from doing business in Montana, and rather than have receivers appointed by the court the Amalgamated Company has closed down every interest controlled by them in Montana.

There were three receiverships sued for: two by J. MacGinniss, vice-president of the Montana Ore Purchasing Co. vs. the Boston & Montana Co., in which Mr. MacGinniss owns 100 shares out of 150,000 shares stock. By this action, it is claimed, $2,000,000 were tied up which would have been disbursed in dividends.

Another case was that of J. MacGinniss and J. Lamm, who own 80 shares out of 240,000 shares of the Parrott Silver and Copper Mining Company.

The court granted everything asked for by plaintiffs in these cases except the actual appointment of receivers, which is held in abeyance pending the action of the Amalgamated Company in complying with certain conditions.

That a complete shutdown was necessitated by the decision of the court is not evident, but rather than submit to the property being placed in the hands of receivers the Amalgamated Company has closed all its mines and works, and as both sides appear to be unwilling to make any concessions, it is impossible to anticipate the end of this, the most serious trouble that has ever confronted Butte. Even the "smoke nuisance" is forgotten in its absence.

If the mines remain closed for any considerable time, it will doubtless affect the copper market. The Boston & Montana is said to be capable of producing 100,000,000 pounds of copper annually, and the Parrott Co. about 12,000,000 pounds. With this large output withdrawn from the market, the price is likely to go up somewhat. The present price is higher than that of last week, but whether as the result of the Butte difficulty or not is as yet indeterminate.

The Labor Situation.

From nearly every district, where a few weeks ago miners walked out at the call of the officers of the Western Federation of Miners, comes the news of renewed activity. In Cripple Creek, Colo., district about 1800 non-union men are now at work, besides 500 union men in the Portland mine. Many of these were formerly affiliated with the Western Federation, but were reinstated upon withdrawing from that organization.

In the San Juan district of Colorado the mines are gradually starting up with non-union crews, and there is more activity generally in those localities in Colorado where strikes have prevailed throughout the greater part of summer.

At Searchlight, Nev., the mine owners who stood together with a single exception, have been enabled to resume operations with non-union men, only one mine being worked with Federation men. At Randsburg, Cal., the Yellow Aster is working to its full capacity with non-union men. In other districts the mines are operating steadily, threatened trouble having been averted generally by mutual concessions. In a few localities the Western Federation is still supreme, but they are far less aggressive than formerly.

In Arizona the southern mines are all at work, and only in Yavapai is the mining industry not under full headway, but an early adjustment of the long continued difficulties in that district is anticipated.

Danger in Mine Fires.

The occurrence of a mine fire attended with death is reported from Eureka, Utah, where a fire starting in the workings of the Bullion-Beck or the Eureka Hill mine flooded the Centennial and Gemini mines adjoining, as well as the workings of the burning mine, with deadly gas, causing the loss of a mine foreman and a large amount of damage to the workings. This occurrence emphasizes the necessity for providing during the development of the mine against spread of fires, and means for preventing the passing of deadly gas and smoke from the burning chambers and other portions of the mine in event of a possible fire. In this case, as usual, there were no means to confine the fire, and men went into the workings with their heads encased in helmets something similar to those used by divers, and although they were enabled by this means to make an inspection, found that they could perform no work with the cumbersome headgear. As in Eureka district a scarcity of water made flooding of the burning stopes impracticable, attempts were made to smother it, but as previously stated, the men were unable to accomplish much with their life-saving apparatus.

If suitable doors of iron with brick casings were provided at points on each level, in order to shut off the fresh air supply, fires would be of short duration in mines, as they cannot make headway without a continuous supply of oxygen. In view of the great damage often done by mine fires, which are not infrequently attended with loss of life, it is strange that the provision of doors, which upon occasion of a fire may be made air tight, are not provided in all dry mines or those where fires may possibly occur.

CONCENTRATES.

THERE are stated to be 98,000 native miners in Mexico and still mine labor is scarce in some districts.

COARSE and fine (relatively) slimes, as well as sands, require separate treatment. Both cannot be treated on the same vanner or table successfully.

THE rock specimen from Midas, Nye county, Nev., is quartz with hematite (iron oxide) and the variety of iron ore known as specular iron, or micaceous iron. The ore may contain gold, as it often does elsewhere.

PLACER GOLD was mined in southern Minnesota on a stream called the Zumbro over forty years ago. The amount of gold obtained was small, and as far as known the source of the gold has not been discovered.

THE greater portion of gold produced in the world is from the native metal direct, by amalgamation. That obtained by smelting, chlorination, cyaniding, etc., is generally a by-product of some previous operation.

THE occurrence of rocks of Devonian age in the Black Hills, S. D., uplift is a matter of dispute. Some authorities claim the Devonian is represented in a stratum of limestone, others refer this stratum to the Silurian.

THE rock sample from Bell Ranch, N. M., is silica and carbonate of lime. The light yellow, silt-like mineral is iron ochre, no uranium, and the heavy metallic mineral iron sulphide. Unless these contain gold or silver they are commercially valueless.

MERCURY will often amalgamate with brass and in time cause it to disintegrate. The mercury probably unites with the zinc in the alloy. A solution of nitrate of mercury will, if applied to thin sheet brass, cause it to disintegrate in a few days.

MUCH of the iron ore of the Lake Superior region occurs in connection with large masses of jasper. The ore bodies, though large, are generally of irregular shape. Ore bodies of this kind are sometimes discovered by use of the magnetic dipping needle.

THE owner of a mine cannot prevent the natural drainage of water from a neighboring mine into his own properties. Each mine owner has the right to mine his property as he pleases, and so long as he does not cause his drainage to enter the property of his neighbor by artificial means he may continue to work as he sees fit.

FULLERS EARTH is a clay-like mineral, but contains only a small percentage of alumina. It has the property of decolorizing and clarifying oils. It contains a large percentage of water, but is not plastic like most clays. It is found in numerous localities. The most extensive deposits developed in the United States are in Florida and South Dakota.

IN melting refined gold, any lead that may be present rises to the surface of the gold, and may be removed by sprinkling bone-ash onto the melt. The bone-ash absorbs the lead and other impurities and is then skimmed off. In melting bullion not refined, the slag formed from the fluxes can be more readily skimmed off if thickened by adding bone-ash.

STEEL is not heavier than the iron from which it was made, unless the iron contained impurities which were expelled during the process of conversion to steel. Steel weighs about 490 pounds per square foot, and a steel stamp shoe 9 inches in diameter, with height of about 9 inches, weighs when new about 185 pounds, more or less, according to height and also to shape and size of the shank. An inch of a shoe 9 inches in diameter weighs about eighteen pounds.

SALTS of antimony, called "antimonites," are of an unstable character. The presence of other substances in mercury is often deleterious to amalgamation. Among these are lead, copper, sulphur, mercurous oxide, etc., and "Concentrates" has never learned that antimony is an advantage in amalgamation. Sodium and cadmium, however, appear to possess beneficial properties when mixed with mercury. That, in any event, antimony and mercury amalgam will collect rusty or coated gold is doubtful.

IN some milling plants the mill men avoid making slimes as far as possible, in view of future difficulties when the pulp reaches the cyanide tanks. At the Homestake, Lead City, S. D., all of the ore is crushed with a view of creating slimes, as it has been found that by so doing a much higher extraction is possible. This instance can not be taken as a rule which should be followed by all gold mill men, though there is an increasing tendency in the direction of finer crushing.

THE locator of a placer claim who may know of the existence of a vein or lode within the placer location may also locate the lode. No person other than the owner of a placer claim may enter the same for the purpose of prospecting for a vein. The fact that a lode or vein exists in a placer claim not being known to the locator of the placer claim, when such fact was known to others who had properly made a location of said lode, does not secure the owner of the placer against the claimant of the vein.

BLEACHING POWDER (chloride of lime) is manufactured by exposing slacked lime to chlorine gas. The gas is absorbed, the product being a dry white powder which has a strong odor of chlorine. It is used in the barrel chlorination process. The "bleach" is charged with the ore, water and sulphuric acid. The reaction being as follows: $CaCl_2 + Ca(OCl)_2 + 2H_2SO_4 = 2Cl_2 + 2CaSO_4 + 2H_2O$. The sulphur of the sulphuric acid unites with the calcium of the bleaching powder forming calcium sulphate (gypsum), chlorine being freed, which unites with the precious metals in the ore.

STEAM SHOVELS are extensively used in mining iron ore in the Minnesota and Michigan iron "ranges" by the open cut system. The ore is first "stripped" of surface soil and other debris by the shovels and the underlying iron ore is then scooped up by the shovels and deposited in cars standing on a track at the side of the shovel. The mines are usually worked in a series of benches or terraces. In underground operations several different systems of ore extraction are employed, dependent on the size, shape and general character of the ore body. Most of the mining is carried on at a low cost, a minimum of timber being employed.

ANALYTICAL ASSAYS or analyses of country rock for gold with a view to the determination of their relation to the genesis of the ore deposit probably give no definite knowledge on the subject, for the reason that the mineral solutions, which, coming from great depth, deposited their values in the vein or ore deposit, may also have deposited a small portion of their values in the wall rocks as well. Many wall rocks contain gold, silver and other metals, similar to those found in the neighboring vein, but this fact is not conclusive evidence that the values in the vein were derived from the wall rocks, by what is known as "lateral secretion."

SINKING or tunneling through rock strata of unequal hardness is often attended with difficulty, particularly when the hardness of the several strata vary greatly. Should the drill be driven through a hard layer and suddenly penetrate a soft one, it is generally advisable to abandon the hole and drill another in the hard stratum about three-fourths of the way through it. Blasting will throw out the hard stratum, when the soft one may be removed by picking. Better headway can usually be made by drilling short holes than long ones when this condition obtains. Rock strata of this character are not of infrequent occurrence in sedimentary formations.

THE "ore in sight" in a mine can only be determined approximately at best. Long experience has proven that appearances in mine development are often deceptive and unreliable. No mining engineer is safe in assuming a larger tonnage "in sight" than he can estimate in ore bodies cut on four sides, within relatively short distances, although some are willing to base their judgment on cuttings exposing three sides of the block of ore. Those suggestions contemplate the measurement of a body of ore in a vein of moderate width—20 feet or less. When the vein exceeds this width even greater caution is necessary. It is a curious fact that ore bodies upon being extracted rarely produce a tonnage in excess of estimates previously made.

THE only stamp mill in which the batteries were placed in a double line facing each other of which Concentrates has any knowledge, was that built at the Father de Smet mine at Central City, S. D., in 1878, and contained eighty stamps—afterward increased to 100. The mill had larger ore bin capacity than is usually found in mills of similar size. All of the plates can be watched at one time, and all machinery is easily accessible. Beyond this a mill of this type of construction has no advantages, and it is not a popular method of construction. The central portion of the mill was always dark. It contained eight rock breakers when one large one outside the mill would have broken all the ore for the eighty stamps, thus dispensing with three breaker men.

GOLD has been reported discovered at various times in the past on the Jaina and Isabella rivers in Santo Domingo, and it is said that immediately after their discovery in the early part of the fifteenth century that the placers produced a large amount of gold, but the field has long since been worked out. The quartz of the veins or zones is interbedded with slate and follows its foldings closely. These veins cannot be considered fissures. They occur most abundantly near intrusive dikes. Those portions near the dikes are gold bearing, and as distance from the dikes increases the gold diminishes until the rock is barren. Only those streams which cut metamorphic rocks are gold bearing, the streams running through syenite carrying no gold. Although many veins of quartz contain gold on the island, it has never been discovered in paying quantity.

THE richest ore deposits discovered in the Leadville, Colo., district were on Fryer Hill. The ore bodies were covered with from 100 to 150 feet of glacial lake drift—sand, gravel and cobbles, and no ore outcropped anywhere on the hill, the nearest point of approach of ore to the surface being in the Little Pittsburg mine. Nearly all the blue limestone on this hill was found replaced by ore, much of it of phenomenal richness. All of the carbonate (oxidized) ores of the district were of greater average richness than the sulphide ores. This is known as secondary enrichment of ore bodies, and has been the subject of much research and speculation by students of mining geology. While the fact that secondary enrichment has often taken place in oxidized ore bodies is recognized, the source of enrichment is many times obscure, and theories regarding it are unsatisfactory.

A ROCKER OR CRADLE for washing gold-bearing gravel may be made of any size from 12x24 inches to one 30x48 inches. A fair size is one 20x36 inches. It should have a riddle or sieve of sheet iron or steel, having ¼-inch round holes punched in it. This is secured to the square frame or hopper on top of the rocker, and must be easily detachable, for the purpose of throwing out coarse rocks, etc. Underneath the riddle is placed an inclined frame covered rather loosely with canvas, so that the cloth will sag down when wet. On this will usually be found the greater part of the coarse gold, as well as some of the fine. In the bottom of the rocker cross riffles should be placed to catch fine gold. In setting the rocker the grade at which the machine is placed should be such that the rocks and earth passing through the riddle shall pass out quickly in a steady stream. The rocking should be done vigorously, but carefully, and the stream of water poured into the hopper should be regulated as uniformly as possible. The rocker is at best a rude device, but it will do good work in experienced hands. The capacity of the machine is determined by the class of gravel or other material being treated, size of cradle and skill of the operator.

TELLURIDE ORES may be concentrated satisfactorily if the appliances are properly adjusted and the operater understands his business. The coarser particles usually give no trouble in concentrating on shaking tables, but the fine slimes can not be concentrated equally well in this way. Canvas tables adjusted as to grade, quantity of water employed and amount of material fed will concentrate a high percentage of these slimes. A sloping table, similar to the canvas table in design, but covered with cement, also affords an excellent surface upon which to concentrate telluride slimes. Some constructors build these tables on a masonry base, with fixed grade, but by using care in building the foundations, tables may be made adjustable. The board surface is first studded with shingle nails, which project about ½ inch, and over this the mixture of sand and cement is spread to a depth of at least ¾ inch, completely covering the nails to the depth of ¼ inch. The surface may be finished with neat cement or sand and cement, as experience has shown is necessary with the particular ore under treatment. Usually when tellurides have been concentrated and roasted properly they give no further trouble in the recovery of the gold they contain.

THE broken condition of the limestones and quartzites, etc., along the northern base of the San Bernardino range of California is due, probably, to crushing of the rock masses at the time of the uplift of the San Bernardino range, which must have been more abrupt than mountain elevation generally is. It has resulted in fracturing all of the sedimentary rocks over an area of several hundred square miles. The rocks have been recemented in part by the infiltration of calcium carbonate and iron, forming a massive, but incoherent rock mass. The region is faulted by step and thrust faults, but no intrusive dikes have been observed. In some portions of this greatly disturbed region the crushed rocks are ore bearing, as at Silver Reef, where they carry chloride and bromide of silver in limestone; at Gold mountain, where gold occurs in shattered quartzite, and at the Black Hawk mines, where gold occurs in the limestone, associated with hematite, the latter both massive and in dust-like particles scattered through the lime. Throughout this region the rocks, though shattered, have not been displaced in most places sufficiently to destroy the planes of bedding. In the ore-bearing zones, however, the crushing has been extensive and stratification is practically destroyed.

THE Ballarat district of Victoria, Australia, comprises two distinct belts—the east, about 8 miles long, and the west, about 5 miles long. In the east belt the formation has been much folded, and fissure veins have formed. These are accompanied by what are locally termed indicator veins or beds. These are certain beds of dark-colored shale which follow the fissures, but are confined to the country rock. They carry pyrite and mispickel, and these minerals sometimes replace the original rock completely. The indicators run parallel with some of the veins and are intersected by many of them. At points of intersection the vein is generally rich. In the west belt the veins are fissures cutting folded sandstones and shales. "Feeders" to the main veins are numerous, and these with the main vein sometimes form "stockwerks" many feet in width. The east belt at Ballarat has produced a number of masses of gold in place (pockets) ranging from 30 to 135 ounces. In some respects these pocket mines resemble some of those of California, notably the Bonanza mine at Sonora, Tuolumne county, where the pockets followed a thin fissure in the slates, which was filled with a soft material, largely iron and black oxide of manganese. The vein in which these pockets are found cuts the slates obliquely.

Notes on Gold Milling.

Written for the MINING AND SCIENTIFIC PRESS.

It is desirable in milling gold ores, whether the tailiugs are to be cyanided or not, to have the ore crushed to uniform fineness. This can only be accomplished by using a constant quantity of water in the battery, and keeping the drop of stamps and height of screen above the die absolutely uniform. Under this set of conditious the product will be fairly uniform. As the shoe and die wear, the stamp becomes lighter, and would have reduced crushing capacity except for the fact that the additioual height of fall results in a greater uumber of foot pounds, so that the crushing capacity of a stamp will really be increased rather thau diminished, if the screen be lowered to the same height above the die. This is accomplished by the use of chuck blocks having a 2-inch differential. Thus, the uniformity of the product of stamping is only approximate, and not actual. The tappet, which regulates the height of drop, may be shifted to keep the drop nearly uniform, but the difference in height of chuck block still exists. This may be lessened by employing ⅜-inch strips beneath the chuck blocks, which may be removed as the die wears down. By the use of two chuck blocks, having a difference of 2 inches in height, and providing three ½-inch strips of iron to place beneath the blocks, the discharge may be kept nearly uniform.

Generally when dies are renewed the particles of saud are coarser thau when the die is worn down. This is because too little attention is given to keeping the discharge as uuiform as possible. The amount of water fed to the battery must also be kept constant.

Fine crushing in the rock breakers greatly increases the capacity of the mill. It also reduces the wear of shoes and dies in the battery, as well as increases the life of screens.

This is not a new discovery, but a well-knowu fact, though one which is seldom put iuto practice in the operation of quartz mills.

Wet clay and earth in ores require constaut attention at the feeders to prevent clogging. Sometimes the feeder will clog at the top while the plate below is bare. This may be avoided by careful watching.

The loss of quicksilver in a mill where inside amalgamation is practiced is always greater than where amalgamation is done outside the mortar in the same mill. When the stamp strikes a globule of mercury fairly it divides it into microscopic spheres which are splashed about among the fragments of ore which are being coustantly churned by the rapidly dropping stamps, and they have small chance of uuiting with other particles while remaining in the mortar. There are a vast number of these minute globules of quicksilver in the mortar and these are dashed out through the screen together with the pulp, and the greater number of them attach to the outside plates, but many others float upon the surface of the stream flowing over the plates, and reach the vauners where they wash over and are lost, or are carried by the belts, together with the sulphides, to the washing box beneath the machine, where they are washed off together with the conceutrates. Here again extremely fine globules of mercury have a teudency to float, aud these particles, together with that portion of the sulphides known as "slimes," may often be observed floating on the surface of the water in the washing boxes. This overflows into the settling boxes beneath the vanners. If this overflow passes over a small weir in the washiug box, or is drawn off through a pipe, the stream falling iuto the settling box, a large percentage of the floating slimes and quicksilver will asceud to the surface of the water of the settling tank and float again, being eventually lost. If, however, the pipe from the washing box be made to discharge beneath the surface of the water the slimes will settle to the bottom of the box, where they may be recovered.

Dies having an outwardly flaring base are a uuisance to handle in the battery. All shoes and dies of whatever material should be of uniform size, having shanks of equal dimensious, but they are not found to be cast in this way. For some reason difficult to explain mill founders appear to think that having furnished a mill they will ever after be called upon to supply the shoes and dies, and to still further enhance their chance of getting this business, cast the boss-heads and shoes a little different from any other. The result ofteu is that in a single district where there may be a dozen or more mills no two have exactly the same shaped shanks on their mill shoes, and consequently the shoes are not interchangeable rom one mill to another. There should be established a standard size for the shanks of mill shoes, that all should be of uniform size regardless of the weight of stamp, boss, stem and tappet.

Sizing of battery pulp before sending it to conceutrating machiues produces better results than can be had by sending the pulp to two machines without sizing, which is generally the practice. It is not reasonable to expect to separate slimes and coarse sulphurets from gaugue mineral in a single operation, with a given grade, fixed amount of water and certain number of vibrations of the machine.

Alluvial Deposits of Horsefly, B. C.

Written for the MINING AND SCIENTIFIC PRESS by W. M. BREWER.

The Horsefly river, in the southeastern portion of the Cariboo mining district, B. C., flows for some distauce from its source in a westerly direction, thence uortherly, and empties into the great Quesuelle lake. The section of couutry drained by it is a vast plateau, its elevation ranging from 2000 feet to 3000 feet above sea level.

To the east, about 50 miles distant, is situated the Selkirk range of mountains, and to the west, about the same distance, is the Fraser river. To the south lie the agricultural lands of the Lac la Hache valley, aud the stock rauges coutiguous to it, and to the uorth the Cariboo mouutains and the placer miuing section.

The history of the Horsefly country is particularly interesting, from the fact that the same party of prospectors who discovered Hill's Bar, the first important discovery of gold ou the Fraser river, in 1858, also discovered placer gold on the Horsefly river during the same year and blazed the trail into the Cariboo mining country proper.

During the late fall of 1901 important discoveries of placer gold were reported to have been made in the mouutains to the eastward and near the head of the Horsefly river. These reports caused a small stampede, but as no phenomenally rich diggings were found, aud the couutry proved a difficult one to get into, the excitement died out, and that section still remains unexplored.

The geology of the Horsefly territory is particularly interesting. To the south lies an extensive area of basaltic rocks. The rock formations in the area containing the auriferous gravel deposits belong to



the Tertiary period, and within that area occur the channels of ancient Miocene rivers of stupendous proportions. Underlying the basalt, in places, occur beds of white quartz, water-worn gravel. At one point on an ancient river channel a shaft has been sunk to a depth of 480 feet without reaching bedrock. The rimrock was cut into at the bottom of this shaft, and the shaft continued down 50 feet into the shale which formed the rimrock. From that point a tunnel was run under the channel and an upraise made into the gravel. There apparently occurred the bedrock, and it was reported that the gravel prospected and showed good pay; but the influx of water drove out the miners and afterwards operations were abandoned. This shaft was sunk through white quartz (water-worn gravel) nearly its entire depth, but as it is reported that the gravel carried very little values above the bedrock, it would have been necessary to have found phenomenally rich pay on bedrock to have warranted the continuation of mining operations by the drifting system. One peculiar feature about this very deep channel, at the particular point where it was attacked, was the fact that, while the gravel carried such low values, yet the work was done because it was supposed that that portion of the channel was an extension of a channel immediately to the north, where is located the Ward claim, which has yielded very rich pay, over a surface area covering about forty acres. Although the character of the material forming the bedrock at both places is almost identical, yet it is doubtful if the rimrock can be traced from one to the other, and there is considerable difference in the character of the auriferons material; therefore, it appears to be quite possible that the deep workings to the south are located on a separate and distinct channel from that on which the Ward claim is located. Another reason for this conclusion is that in following up the course of the present river for a distance of 5 miles above the Ward claim, there occurs apparently the same ancient channel paralleling the present course of the river as is being worked at the Ward claim; the bedrock at both places is of the same character of shale and is encountered at about 150 feet—the same depth below the present surface—and the auriferous material, which carries values from the surface down, appears similar and is reported to carry about the same values at bedrock.



SCENES IN THE OPERATION OF THE CARIBOO HYDRAULIC MINING COMPANY'S PROPERTY, BULLION, CARIBOO DISTRICT, B. C.

The course of this ancient channel appears to conform closely to the course of the present river, which in many places has apparently intersected the ancient channel. This condition is shown at the Ward claim, where the owner, in working on the ancient channel, has more than once completely changed the present course of the stream in order to work the channel on the opposite side.

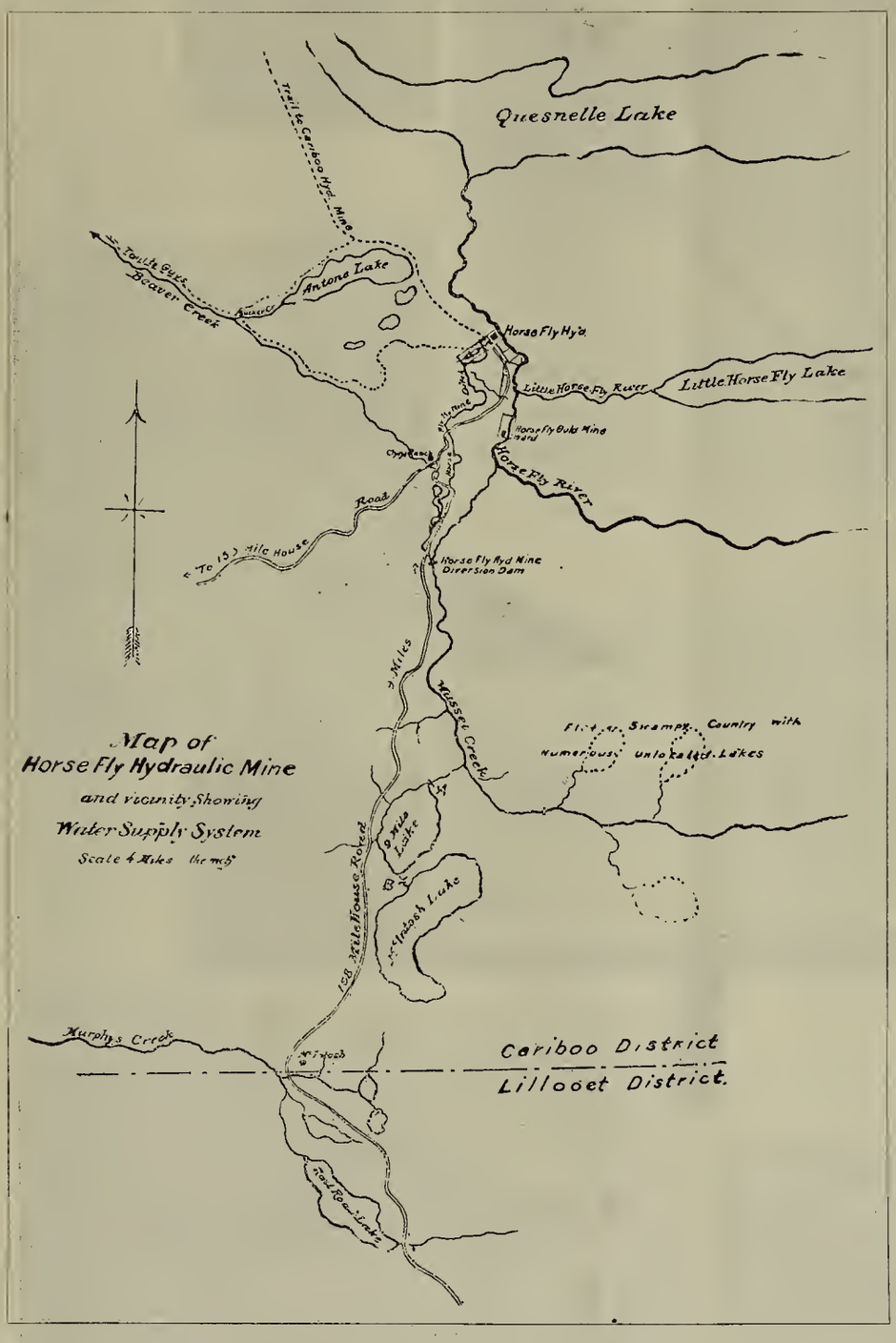
The Horsefly portion of the Cariboo district presents a marked difference with regard to the available water supply for carrying on extensive hydraulic workings to the Quesnelle Forks portion. Mussel

creek, a tributary of the Horsefly, which has its confluence with that river, a short distance south from the Ward claim, will furnish from 4000 to 6000 miuer's inches of water during the entire season of seven months, and that taken out from the creek within 5 miles of its mouth. There are two systems of canals constructed from this creek, one having a length of about 6 miles, the other about 12 miles. The first one carries the water supply for hydraulic operatious at Ward's claim, while the second carries the water for hydraulic operatious at the Horsefly hydraulic mines, 5 miles northerly from Ward's.

The last-mentioned caual is interrupted iu two places by 8000 feet of 30-inch pipe laid in the form of iuverted syphons, to carry the water across two depressions 180 feet in depth.

So far as oue can judge from the results of operations iu both placer and hydraulic mining, it would appear that the area contaiuing auriferous gravel in paying quautities is comparatively limited in extent in this particular portiou of the Cariboo district. But there are extensive areas of the ancient river channels which have not beeu exploited. One of the principal reasons for this is the great depth to the bedrock and auother is the lack of dumpage facilities. In consequence of this latter reason the alluvial deposits would have to be attacked, either by drift mining, as has been done at the Horsefly hydraulic mine, or by a method of elevating the tailings, as is practiced at Ward's claim, or by dredge mining, which latter has not yet been introduced into this portion of the Province.

The Horsefly hydraulic mine affords an excellent opportunity for studying systematic drift mining, as will be seen from the accompauying map of the undergrouud workings. (See Fig. 1.)



Uutil the early 90s this property was worked by the hydraulic method aud about $150,000 produced.

In working by the hydraulic process, as the bedrock was followed towards the south, it was found that the gravel immediately overlaying the bedrock had become cemented so hard that it was impossible to successfully attack it with water under pressure; consequently, a 10-stamp mill was erected and a system of drift mining iutroduced. A main tunnel was run from the hydraulic cut towards the south, the mouth of this tunnel being connected with the mill, which was built near the bank of the river, by a covered track. From the main tunnel drifts were run towards the east and west and the body of cement blocked off into squares.

It was found that, in driving the maiu working tunuel to the south, the bedrock continued at variable augles, and sometimes at almost 45°, iudicating that the workiugs have not reached the bed of the channel, but are probably on the northern rim of what may be an extensive alluvial deposit belonging to an ancient channel. During the progress of opening up the mine for operations by drifting aud milling process, 9901 tons of cemented gravel, bedrock, etc., mined from the various drifts, were run through the company's stamp mill and produced $14,564.21—an average of about $1.46 per ton. The extent of the development is 1200 feet main tunnel and 3165 feet of working crosscuts and drifts, which have been driven at right angles to the main tunnel.

During the drifting operations on this property it seems, from the mauager's report, that about 25% of the material miued was free gravel, which it was not uecessary to run through the mill in order to save its values.

(TO BE CONTINUED.)

Notes on Quartz Milling on the Rand.*

Written by FRASER ALEXANDER.

Millmeu are not taxed with a theoretical and an actual output. The millman is at peace with all the world so long as he is doing big duty and has no stoppages. If he had a chain round his neck with a heavy weight at the end of it labelled "daily residue," "theo. aud actual output," to drag about every hour of the day as cyanide men have to do, I should not be in the unpleasant position of throwing this accusatiou at them. Iu discussing theoretical and actual, it will probably be said that it is impossible, owing to the difficulty of sampling. Mr. Roskelly has shown us that this difficulty cau be overcome, and I am convinced that once this method is adopted, and the mill is called upou to account for the gold according to asssy results, the millmeu will soon fiud means of taking accurate samples, and see that their tounage is correct, and I should expect that daily free milling assays will be made, uot occasionally for curiosity. In fact, what is desired is that the mill should look upon the cyanide plant as a residue dump, in the way that the cyanide works look upon their dump, and not allow any gold to go there if possible. Let them remember that a grain of gold that is recoverable in the mill, if allowed to pass on to the cyauide plant, is theu only 85% of a grain, for that is all that we can expect to recover.

I am of opinion that, if we are to obtain that much-to-be-desired 5% extra recovery on the value of the ore milled, it is the mill that will be the means of accomplishing it. Whether the gold is finally won ou the cyanide plaut or uot it will still be the mill that brings the result about, for it will be due to a better product reaching the cyanide plaut, thus allowing better recovery. In modern cyanide plants, where there is ample capacity, it can be claimed that uearly all, if not all, the accessible gold is dissolved, and in plants to be erected in the near future provision will be made to ensure this. Accepting this as a fact brings us to a poiut where there is little hope of any great improvement under present conditions, but under changed milling conditions there is a very promisiug future. To illustrate what I mean I give you the history of a concentrate residue.

Duriug the war the Boer Governmeut worked the Bonanza cyanide plaut, aud ou the occupatiou of the British the tanks were left full and treatment was completed on behalf of the company on my return to the mine in July, 1900. A wooden vat, coutaining coarse sands and concentrates, was sampled and the residue was found to be 3.5 dwts. KCy solutiou was circulated contiuuously through the vat in order to prevent the woodeu vat from drying aud opening out. In the following November the vat was again sampled aud the result was found to be practically the same.

It was again sampled when discharged in August, 1901, it still haviug been under solutiou, and the value was still the same. I used this residue as a filter for slime solutions, aud for another four months solutiou carrying 0.02% KCy was constantly filtering through; and yet, on again sampling, approximately the same value was found. Iu all, this residue had been treated from May, 1900, to December, 1901, without improved extraction, a proof that none of that 3.5 dwts. could be recovered by a solvent unless the imprisoned gold was released. Further, I can state, from a great number of residues investigated, that without exception, after panniug off the sulphides, the coarser the particles the higher the gold conteuts; but this law does not hold good with originals, in which it is not unusual that the fiuest portions will give the highest assay value.

Under present couditions millmen are urged on aud pitted oue against another to smash as big a tonnage through as possible without consideration as to the effect on gold extractiou. We want to learn whether it is not more profitable to mill less, crush fiuer, aud whether the extra recovery resulting from this change would not more thau pay for extra stamps to make up for decreased tonnage. There are so mauy points from which this phase of the subject can be discussed; for instauce, would it be better to take the pulp leaving the mortar boxes and pass it direct to a grinding machine, or to separate, by meaus of classifiers, the particles requiring grinding, before amalgamation or afterwards? It would appear to be better to do so before, for, if doue afterwards, the reground portion would have to pass over the plates for the secoud time. Is it uot likely that it is the coarser particles that help to scour the plates?

Regarding mercury losses and flouring of amalgam, a very interesting fact has come under my uotice. It happeued iu a mine where inside amalgamatiou is used. The pulp leaving the mill is lifted by a pump 40 feet in a vertical column aud then passed ou to the usual spitzlutten, from there over sand spitzkasten, across a large return sand spitzkasten, and so to the slime separator spitzkasten. Small cast-iron hollow plug valves are used for the discharge of this slime spitzkasten, and they are continually getting choked up with hard, bright, clean amalgam. Some of this

*Abstract Journal Chem., Met. and Min. Society, S. A.

chipped off the valves was found to contain 22% of gold. Also in the same tank Peat valves are used, and twice since the war they have been renewed owing to mercury amalgamating with the copper that faces the valves, thus rendering the copper so brittle that it breaks away and the valve cannot be kept from leaking. It seems an extraordinary fact that amalgam should be able to travel so far and pass or float across spitzkasten that will settle the smallest and lightest particles of sands. In connection with this, in the first spizlutte, where one would expect all the mercury to be caught, although mercury is caught in an appreciable quantity, this carries little gold, no more than 2%. The explanation of this, I suggest, might be that the mercury caught in the spitzlutte is mercury that is washed or spilt off the plates during dressing, and the amalgam found on the slimes plant is floured amalgam. With my limited knowledge of milling I should not like to express an opinion as to the cause of the amalgam escaping in the finely divided state, but I would value millmen's opinions on this interesting fact. I often wonder that no means have been tried or experiments carried out to attempt to prevent this loss. Perhaps they have, but I am not aware of it. The very primitive mercury trap in general use cannot be considered the only possible means of dealing with this. A. M. Day of the Nigel tells of an interesting fact in connection with this matter. By using a discarded vanner for the purpose, he shows a recovery in thirteen months of 14,082¾ ounces amalgam, an average of 1083 ounces per month, equal to 300 ounces gold per month. It almost looks from this that even the expensive vanner plant might give a good return on the money for equipment on a mine of twenty years' life. I think, however, that millmen may be relied upon to find means to prevent this loss as soon as they realize the necessity. I call these "losses," for gold in the form of amalgam in the cyanide plant is only to a very limited extent attacked by KCy solutions.

It is to the advantage of the cyanide plant that millmen should use every endeavor to keep the mill at a constant weight, not at one time heavy and at another time light. Cannot renewal of shoes be arranged so that the mill shall at all times be of a regular average weight? In connection with this, I have found that the product reaching the cyanide plant from a heavy mill is different from the product when the mill is light, although using the same screening. With the mill heavy there is a higher percentage of coarse particles. This, I know, accounts for some of the otherwise inexplicable difference in residue values on the cyanide plant. When there is found suddenly an increase in value of residues, there being no change in the ore milled, on investigating the residue to determine where the gold is, in my experience this will generally be the cause—the product will have changed.

I should like to know from millmen whether they have any experience of counter-weights being fixed to the stems to make up for wear and tear of shoes. Has this been tried? It seems feasible. Could not a quick way of fixing varying counter-weights on the stem be devised? If not, why? I believe a shoe in its first week of life will crush, say, half a ton per day more than in its last week of life. If this difference is due merely to loss of weight then a great gain could be attained by adding counter-weights to make up the difference.

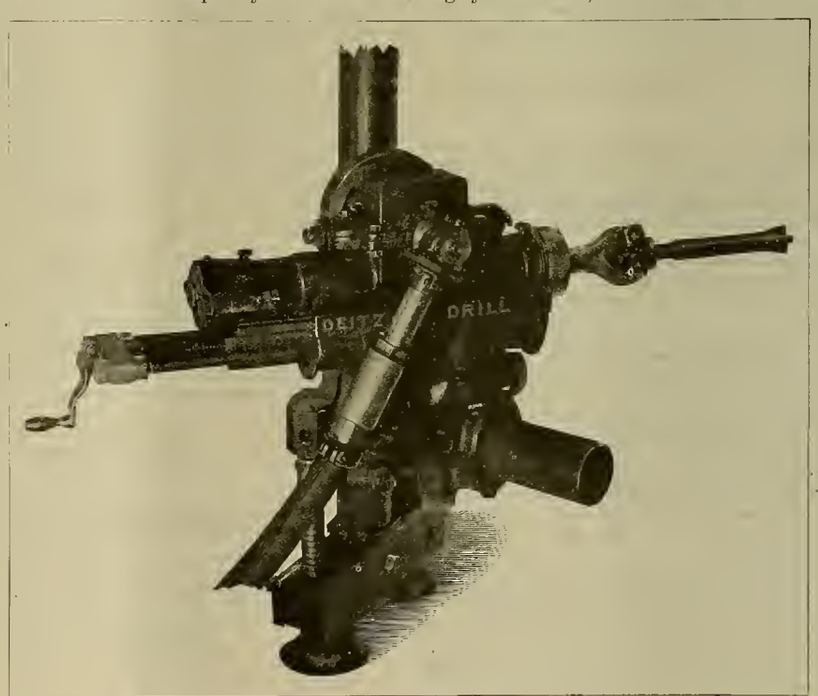
Another question of importance to the cyanide works is the varying quantity of water used. I know of a case where the cyanide men knew who was on shift in the mill by the quantity of water used. One man in particular used water so much in excess of his fellow shiftsmen that when he was on duty the launders were always flooded and overflowing. It seems to me that there must be a correct quantity, and too much might mean a serious loss to the mill, and too little, loss of efficiency. Mr. Harland of the Robinson mine has a very simple system, in fact, so obvious that I cannot understand why it is not universal in mills. He has two valves to the mortar box and a steady head of water to the mill. One valve is set by him to the correct amount of water and afterwards never touched. A shiftman shutting off water for dressing plates or other cause merely closes the second valve, which shuts the water off; and on restarting the battery all he has to do is to open this valve. The valve in front being always set, there is no waste of time by men standing adjusting the quantity of water, and it is unnecessary to leave the adjustment to the shiftmen, each of whom may have a different opinion as to the correct amount and so cause varying quantities. The objection to this variation on the cyanide plant is that the spitzlutten are set and depend to a great extent for classification on the volume of water passing through the machine. Varying quantities of water will, therefore, give varying percentages of sands classified. On the slime plant it is a great inconvenience, for, if using an automatic lime feeder, the machine has to be constantly adjusted. It is found that it is useless to add lime in excess of what will bring the pulp to .005% alkalinity. If the machine is adjusted to accomplish this at a time when a large quantity of water is being used, and later the water is diminished and yet carries the same quantity of slime, lime is being used without advantage, and so adds to the costs. Excess of alkalinity has also other serious disadvantages, which it is unnecessary to go into here.

Another point I have noticed which I think will interest millmen: At times coarse pebbles in some quantity will reach us, from the size of a pea, due to broken screens; and also, where inside amalgamation is used, these partly crushed pieces escape out of the mortar box when screens are off to allow of getting at inside coppers. These pebbles are then washed off the plate and reach the cyanide plant. On sieving them from the sands I have found them of considerable higher value than the ore milled. The only explanation of this that occurs to me is that it is due to the heavy particles having secured amalgam and picked it up in their journey across the amalgamated plates. It would be a very simple matter to catch this product before reaching the cyanide plant and to return it to the mortar box. If these particles rob the plates it must also be remembered that not only is there this loss of amalgam, but the cyanide plant will get but little recovery from these pebbles, the gold being imprisoned in such coarse particles that solution will not reach it.

Men on the cyanide plant are naturally more familiar than millmen with the product leaving the mill, for it is on this that the attention of the cyanide men is centered. Therefore we should endeavor to bring before millmen as much light as possible on this subject. The man in the mill has little or no opportunity of studying the pulp; he is confined to the mill, and his time and attention are fully occupied in keeping his mill and plates in order. On the cyanide plant we see the product in all its separate conditions, and it should be our business to keep millmen informed of our observations. As I before stated, I believe the millman has a more promising future before him than the cyanide man. Improved, changed conditions of milling are, I believe, the only means that will realize our ambition—another 5% recovery bringing the total recovery to from 95% to 96% as against our present 90% to 91%.

Deitz Electric Rock Drill.

A new electric rock drill known as the Deitz electric rock drill is being placed upon the market and is illustrated herewith. The manufacturers of this drill claim that the construction is such that the piston carrying the drill steel is completely released from the driving mechanism before striking the rock; that this prevents the concussion from being transmitted to the mechanism, and thus thoroughly overcomes and prevents breakdowns. The manufacturers also claim that they have had these drills in steady use now for a year past in different mines under different conditions, and the results have in every case exceeded their most sanguine expectations. The mining world is interested in the development of rock drilling by electric power, and if this drill will do what the manufacturers claim it will certainly merit endorsement. The drill is being manufactured and for sale by the Deitz Electric Drill & Machinery Co., 1606 Blake street, Denver Colo.



Deitz Electric Rock Drill.

Iron ore is not a good precipitant for copper from its solutions. Scrap iron, particularly sheet scrap, including tin scrap, is the best known material for this purpose. The "cement" copper obtained is not absolutely pure, but is of good grade. Copper may be precipitated from solutions emanating from roasted ore heaps or from solutions which are the result of treating naturally oxidized ores by sulphuric acid process.

Consumption of Zinc in Cyanide Plants.*

Written by Walter H. Vigor.

In considering the consumption of zinc on any cyanide plant, where zinc in a filiform condition is used as a precipitating agent, it will be observed that the consumption of zinc is always in very large excess over that amount theoretically required for the precipitation of the metals obtained in the product. It will also be observed that this loss or consumption of zinc is due to two causes, the one mechanical, the other chemical. There is a loss of zinc mechanically in cleaning up metallic zinc with the deposited metals in the product, and there is a chemical loss owing to zinc being dissolved in the cyanide solution in excess over what is actually required for the precipitation of metals.

It is customary to record the consumption of zinc in pounds or ounces per ton of ore treated, or in kilos per metric ton, if the metric system be used. Such a record is sufficient when calculating working costs, but on the plant the chemist should record the consumption of zinc not only per ton of ore treated, but also per unit of solution flowing through the boxes, and should record the loss under the two heads of loss by mechanical means and loss by chemical means. Such additional records, though they may not be absolutely accurate, yet will be approximately so, and will afford a great deal of information that is valuable and interesting.

By mechanical loss is meant that loss or consumption of zinc involved in the removal of zinc from the extractor boxes in the product, whether as metallics or slimes, during the process of cleaning up. By chemical loss is meant that amount of zinc dissolved by the solution flowing through the boxes which is represented more or less accurately by the difference between the zinc removed in the product and the amount of zinc found necessary to refill the boxes after the cleanup.

The causes which govern the consumption of zinc on any plant should be most carefully considered, because a heavy consumption of zinc not only increases the cost of treatment of the ore, but, if the loss be largely mechanical, it increases the cost of reduction of the product, which, owing to its baseness, requires refining before or during smelting, and, if chemical, the plant solution is apt to contain more zinc than is advisable, perhaps.

Gold product is always much baser than silver product, and the expenses of reducing such product are, therefore, always much higher per ounce of fine metal obtained than the expenses of reducing silver product per ounce of fine metal. The reason for this is obvious enough: Fifty tons of solution, containing 25 ounces of gold, may flow through 200 pounds of zinc in twenty-four hours, and deposit 25 ounces of gold, whereas a silver-bearing solution of equal amount and value would deposit some 1000 ounces, and although both the chemical and mechanical consumption of zinc might probably be higher in the case of the deposition of the silver, yet it would be in no way proportionate to the amount of fine metal deposited, and, therefore, the resulting product would be of much finer grade.

As a matter of fact, silver-bearing solutions require far less zinc box capacity than gold-bearing solutions,

*Jour. Chem. Met. and Min. Soc., S. A. (Condensed.)

and the consumption of zinc per ounce of fine metal deposited is very much less. Commonly, with gold-bearing solutions, the consumption of zinc is in the proportion of 16 to 1 of gold deposited, whereas in the case of silver-bearing solntions the consumptiou may be in the proportion of 1.3 of zinc to 1 of silver deposited, or even as low as 1 to 1, which proportions I have observed from figures afforded by the practical results of the operation of various plants in Mexico and elsewhere.

It is customary on most cyanide plants when making the periodical cleannps to class the product under two heads, viz., metallics and fines, the fines prodnct being such material that admits of being smelted direct in nearly all cases, and the metallics that portion which consists of broken particles of zinc, which arc in too fine a state of division to be returned to the extractor boxes, and which cannot be generally smeltcd to advantage without some preliminary treatment.

Metallics represent that part of the product which will pass throngh the screens with which the boxes are provided, and which is retained afterwards on that screen by which the fines are separated. The sizes of these two screens are determined by what experience dictates as most suitable aud economical. For instance, on plants where the product is very base it may be advisable to defiue as fines that portion of the product that will pass a 60-mesh screen, experience showing, perhaps, that this grade of mesh yields the best product, economically speaking, for direct smelting; and it may be advisable to determine as metallics that portion of the product which, passing from the boxes through an 8-mesh screen, is retained on the 60-mesh.

Metallics which are likely to pack and hinder the proper flowing of the solntion must not be returned to the boxes, neither should fines be produced of too base a character by the nse of too coarse a screen for direct smelting. On some plants in Mexico the nature of the prodnct cleaned up is such that all the product which passes a 12-mesh screen can be smelted direct with ease, and no metallics are produced which cannot be returned to the boxes.

Excessive mechanical losses of zinc are generally due to such simple causes as:

(a) Unnecessary handling of the zinc during clean-ups, due generally to a desire to obtain as much prodnct as possible by scrubbing and rubbing the zinc, a practice that cannot be too strongly condemned.

(b) Care not being taken to place thc zinc under water directly it is removed from the boxes, whereby it oxidizes very rapidly aud becomes heated and brittle.

(c) Uneven flow of solntions through a sponge of zinc, whereby the zinc mass or spongc becomes broken np through holes and channels being bored through it, the uneven flow being generally produced through the blocking of screens, or to the too tight packing of the zinc in the boxes.

(d) The zinc threads being poorly cut, with threads of uneven thickness, the gradual weariug down of these threads producing a large number of short pieces of zinc.

(e) An excessive amonnt of metallics or shorts is likely to be prodnced where large bulks of very weak solntions flow through large quantities of zinc, depositing over a large area a small amount of the precions metals, especially when the zinc is hand-cut instead of being cut by self-feeding lathes.

Excessive chemical losses are generally dne to:

(a) Excessive alkalinity of the solntion.

(b) Precipitation of base metals, such as copper, mercury, manganese, etc., on the zinc.

(c) Contact of the zinc in the boxes with unprotected iron surfaces.

It is also observed that strong solutions of cyanide flowing through zinc will produce much heavier chemical losses than are prodnced by weak solntions.

When too much lime is used on a plant the result is very noticeable in the extractor boxes, a too vigorons evolution of hydrogen being in evidence, showing that a wasteful solution of zinc is taking placc.

The precipitation of base metals naturally causes the chemical consumption of an eqnivaleut amount of zinc and entails a waste of that metal by inducing more vigorons electrolytic action. The contact of iron with the zinc in the form of unprotected screeus, iron screen frame handles, etc., acts in the same way.

No metal is more destructive than mercnry when deposited on the zinc, as it rapidly reduces it to a pulpy mass, from which the metallic mercury may be largely separated by sqneezing it in a cloth. I have had cousiderable experience with this metal in the treatment of old pan amalgamation tailings in various parts of Mexico.

Again, the consumption of zinc per ton of ore treated will depend largely upon the amount of solutiou that flows through the boxes in comparison with the amount of ore treated. For instance, the treatment of a slow-leaching ore may be attended with a very low zinc consumption, whereas the elimination of slimes from such an ore may facilitate its leaching capabilities, and, more solution being nscd, the consumptiou of zinc per ton of ore will be increased, although the actual consumption of zinc per ton of solutiou flowing through the boxes may remain practically the same. For this reason I always consider it advisable, when cousidering the consnmption of zinc on a plant, to look at it first from the standpoint of consumption per unit of solution flowing throngh the boxes.

There is no doubt in my mind that the consumption of zinc on any given plant wonld be largely decreased if the solutions were allowed to accumulate a certain degree of valne before being passed through the zinc boxes, in which case it would be advantageous to displace the cyanide solntion in the boxes by water, after the passage of the solution through them, to prevent loss of zinc through its being needlessly in contact with the cyanide solntion; bnt such a procednre should only be attempted by oue who was perfectly familiar in every detail with the chemical features in connection with the plant handled.

Where zinc fume is used as a precipitant it is sometimes the case to allow the solution to accumulate values before being agitated with the zinc. This method is very effective and insures a minimum time of contact between a minimnm quantity of zinc and the cyanide solution. Therefore chemical losses should be low, although the exceedingly fiue state of division of the particles of zinc might be considered to render it in a fit condition for dissolving very rapidly in a strongly alkaline solution. The chief difficulties attending its use appear to be in the collecting of the precipitate and in the acid treating of the collected and filter-pressed material. It has been urged as a drawback that the process is not a continuous one, but if two gold precipitation tauks be employed the method is, to all intents and purposes, continuous.

Zinc dust is used in several plants in the United States—at the Consolidated Mercnr Co.'s mill, which is the largest cyanide plant in the United States, at the De Lamar mill in Idaho, at De Lamar's Nevada Gold Mining Co.'s property at De Lamar, Nev., and elsewhere. It is reported that the process is snccessfully used at these places. Filter presses are nsed at the De Lamar piant in Idaho, where the consumption of zinc dnst is stated to be 3 pounds to 4 pounds per ton of ore treated. At the mill of the Nevada Gold Mining Co. the process has been used for several years, aud it is found that five miuntes of agitation of the solution after the addition of the precipitant is sufficient for complete precipitation. At this plant the precipitate is collected in ordinary zinc boxes, the compartments of which are filled with oakum. Thc advantages of this method of precipitation have not been made apparent to me from such data as I have been able to procure from practical working results, and sevcral mills in the Black Hills of South Dakota have discarded this method in favor of the ordinary method of thread precipitation.

TABLE A.—SANDS PLANT: 64.4% OF PULP.

MONTH.	Tonnage.	Product Removed from Boxes.		Total.	Zinc Added to Boxes, Kilos.
		Metallics, Kilos.	Fines.		
October	611.1	20.0	47.9		358.3
November	684.3	38.7	53.5		354.5
December	704.9	48.25	48.1		355.6
January	646.1	44.95	41.8		328.9
Totals	2646.4	151.9	191 3	343.2	1397.3
SLIMES PLANT: 35.6% OF PULP.					
October	362 5	101.0	59.3		192.7
November	347.3	120.7	71.0		189.4
December	396.0	125.5	73.2		198.0
January	375.2	121.3	56.9		204.6
Totals	1481.0	468.5	260.4	718.9	784.7

Sands: Tonnage, 2646.4; consumption of zinc per ton = .52 kilo.
Slimes: Tonnage, 1481.0; consumption of zinc per ton = .53 kilo.

TABLE B.—SANDS PLANT, SHOWING THE RELATIVE CHEMICAL AND MECHANICAL CONSUMPTION OF ZINC ON SANDS AND SLIMES PLANTS FOR THE MONTHS OF OCTOBER, NOVEMBER, DECEMBER, 1901, AND JANUARY, 1902.

MONTH.	Zinc Added to Boxes, Kilos.	Zinc Removed From Boxes in Form of Product.		Total.....	Chemical Loss Shown by Difference....	Mech. Loss, %...	Chem. Loss, %...
		Metallics.	Fines.				
Oct., 1901, to Jan., 1902	1397 3	147.6	47.8	195.4	1201.9	13.9	86.1
SLIMES PLANT.							
Oct., 1901, to Jan., 1902	784.7	454.9	41.1	496.0	288.7	63.2	36.8

Sands Plant: Total tonnage treated, 2646.4; zinc consumption per ton, .52 kilo.
Slimes Plant: Total tonnage treated, 1481.0; zinc consumption per ton, .53 kilo.

If the zinc dust method is the better method, then the sooner it displaces zinc thread the better, for the time will come when its merits will be recognized and its use will become general. But the process is growing old, and the patentees cannot, or do not, convince the cyanide world of its advantages by the publication of practical statistics which alone appeal to it.

A plant in the State of Mexico treats 660 tons per month of sands and 390 tons of slimes, the product of a 15-stamp wet crushing battery. The consumption of zinc on both is practically the same, viz., .5 kilo, or 1.1 pound per ton of ore. Table A shows tonnage treated and the amouut of product removed from the boxes aud the amount of zinc added to the boxes over a period of four months. It will be observed that the amount of zinc added to the sands plant boxes during the four months was 1397.3 kilos and the amount of product removed was 343.2 kilos, of which 151.9 kilos represented metallics and 191.3 kilos represeuted fines. Again, it will be observed that the amount of zinc added to the slimes plant boxes was 784.7 kilos and 718.9 kilos of product were removed from the boxes, 458.5 kilos being metallics and 260.4 being fines.

Inasmuch as the zinc consumptiou per ton of sands is practically the same as the zinc consumption per ton of slimes, viz., 0.52 kilo, as compared with 0.53 kilo, it is evident that there is a heavy mechanical loss of zinc in the slimes boxes and a light chemical loss as compared with the mechanical and chemical losses on the sands plant. To arrive at some idea of these two losses on the two plants, the following must be considered:

The value of thc metallics produced on the sands plant is abont 3.6 times the value of those produced on the slimes plaut in bullion contents. For instance, 50.3 kilos of sands plant metallics were found to contain 16.8 ounces gold and 30.7 ounces silver, and 184.4 kilos of slimes plant metallics were found to contain 18.5 ounces gold and 38.3 onnces silver.

Thc exact values of the metallics produced separately on the two plants during the period mentioned is not known, as the metallics of the two plants are treated together during the process of reduction and smelting, but it is safe to assume the data yielded by thc above figures as correctly indicative of their respective values.

(TO BE CONTINUED.)

Annealing and Case Hardening Tool Steel.

In annealing tool steel in small lots in an ordinary blacksmith's fire my method is to cut the steel to the desired length and heat it evenly and thoroughly to a good red heat, but not hot euough to scale it, says E. A. Spaulding, in Sparks From the Anvil. The work is best done in a hollow or mound fire, which is made by packing wet coal on the fire until a good mound is formed, when an opening is made in front, of a size large enough to admit the steel that is to be annealed. Such a fire is practically an oven.

When the coal is well charred the steel is put in and heated up slowly and thoroughly, care being taken that it shall not get above a good red. The steel is then put in a bed of ground wood charcoal in a box to cool. My annealing box is made of cast iron, 4 feet long, 15 inches wide and 12 inches deep. This is filled about two-thirds full of the charcoal dust. If quite small pieces are to be annealed, I heat them in an iron pipe 2½ inches diameter, plugged at one end, the pieces being packed in with charcoal and all heated together. When thoroughly heated, the pipe, with its contents, is placed in the charcoal dust in the box to cool.

Small pieces if placed in cold charcoal, without the protection of the pipe, will come out imperfectly annealed and with more or less hard spots. I have used lime to some extent for cooling, bnt do not like it as well as coal dust, as it does not retain the heat as long. Some persons complain that cooling in lime pnts hard "pins" and "streaks" in steel, but I do not think any trouble will arise on this score if the piece be large enough to heat np the lime; if, however, the piece is rather small, it is better to heat it packed in a pipe and cool it as above mentioned. I have had very good results from this mode of treatment.

For case-hardening we use prussiate of potash, pulverized and mixed with fine salt, abont eqnal parts. We heat the pieces to be hardened, apply the potash and immerse while it is flowing. I wish to emphasize this. Many smiths hold the piece until the potash is burned off. This is a mistake. It should be dipped while the potash is in a liquid state, as otherwise the piece will not come ont as hard as it should. If we want a piece very hard we sometimes use cyanide of potassium, and heat in an ordinary forge fire, but this method is resorted to only when there are but a few pieces to be hardened.

We very often have pieces to harden, snch as steps, centers, cups and tracers, which require to be soft on one end so that they can be riveted after hardening. For this pnrpose we nse "carburizer." the pieces are packed in a box made for the pnrpose, about 5x3x1½ inches deep.

A layer of carburizer is pnt in first; theu the pieces are placed in the box, with the ends down that are to be hardened; the mixture is then filled in over and around the parts that are to be hardened, the qnantity to be proportioned, as nearly as possible, to the depth of hardening required, and the parts that are not to be hardened are covered with slaked lime.

The box is theu placed in an idle forge and kept at a good heat for an honr or more according to the size of the work. At the end of the heat, before quenching, the fire is forced so that the pieces may be hardened on a rising heat; they are then dipped. If the operatior has been properly done the pieces will be glass-hard where covered by the carburizer and soft where covered by the lime.

Milling on Douglas Island, Alaska.*

NUMBER II.

Written by R. A. Kinzie.

Starting with the 5-stamp mill of the Treadwell, erected in 1881, the number has been increased from time to time, until at present there are 880 stamps dropping on the island, and these are distributed in the various mills, as shown in Table I.

sonable rates. The coal is transported to the mines by means of barges, which on their return trips carry concentrates in bulk to the Tacoma smelter.

The free gold is caught both inside and outside of the mortars by means of quicksilver. There is a diversity of opinion among the various amalgamators as to where, when and in what quantities the quicksilver should be fed. Table II gives quantities used. The result of a series of tests in the various mills shows that the quantity of quicksilver fed in the mortars and on the plates varies directly with the gauge of the screen, and, consequently, with the except the Ready Bullion, where it lasts only fifteen days. Salt water is used in this mill, and the corroding action seems to be intensified by the scouring of the sands in the mortar, which keeps the inside surface of the screen bright, thus always furnishing a fresh surface for the action of the water. These screens do not wear out as in the other mills, but become brittle and break.

Experiments are now in process with a make of iron-wire screen, but they have not advanced far enough for any conclusion to be reached.

The motion of the battery water, caused by the

TABLE I.—EQUIPMENT OF MILLS AND COST OF MINING ON DOUGLAS ISLAND, ALASKA.

EQUIPMENT OF MILLS.

Name of Mill.	Crushers. Number	Crushers. Size	Crushers. Make	Capacity of ore bins, square feet	Stamps. Number	Stamps. Weight	Stamps. Drops per minute	Stamps. Height of drop, inches	Feeders. Number	Feeders. Style.	Mortars. Number	Mortars. Style.	Amalgamating Plates. Number of chuck blocks	Apron Plates. Number	Apron Plates. Grade per foot	Apron Plates. Area in Sq. Ft.	Vanners. Number	Vanners. Style	Vanners. Size, feet	Motive Power. Kind.	Water Wheels. Number	Water Wheels. Style.	Time. Time Run. Per cent by water	Time Run. Per cent by steam	Time Run. Total	Time. Per cent time lost.	Average tons crushed in twenty-four hours.
Treadwell "300"	2	"E."	Comet	81,795	300	1,020	98	8½	60	Suspended Challenge	60	"67-A," F. & C..	60	4-in.	1½ in.	45	120	Frue	6	Water	4	Pelton	93 19		93 19	6 81	5 53
Treadwell "240"	2	..	Gates	59,100	240	850	98	..	18	Challenge	48	Moran	48	4-in.	1½ in.	45	96	Frue	4	Steam and water.	2	Pelton	51 64	40 19	91 83	8 17	4 86
Mexican	1	..	Gates	31,950	120	1,020	98	8¾	24	Challenge	24	"67-A," F. & C..	24	4-in.	1½ in.	45	48	Frue	4	Steam and water.	1	Pelton	11 64	36 42	78 06	21 94	5 73
Ready Bullion	1	"E."	Comet	49,380	120	1,020	100	8½	24	Suspended Challenge.	24	"67-A," F. & C..	24	6-in.	1½ in.	45	48	Frue	6	Steam					97 82	2 18	5 34
700-Foot Claim	1	"E."	Comet	33,150	100	1,020	99	8¾	20	Suspended Challenge.	20	"67-A," F. & C..	30	4-in.	1½ in.	45	40	Frue	6	Steam and water.	1	Pelton	92 22	4 88	4 88	2 90	5 69

During the summer months there is sufficient water to run 760 of the 880 stamps, and during the winter there is always enough to supply the batteries and vanners and run a portion of the mills.

This water supply is obtained from a series of ditch lines running along the mountain sides and aggregating 18 miles in length. The main Treadwell ditch starts from a lake in the mouutains 14 miles distaut from the mines. It follows the coutour of the mountain range, gathering water from numerous small springs and streams, and delivers it to the penstoeks at an elevatiou of 480 feet above the mills, and at a

coarseness of the ore. The coarser the crushing, the more quicksilver it is necessary to add to the mortars to make any saving at all.

On the other hand, the seouring action of the coarse sands on the plates uecessitates frequent dressing to keep them well coated with silver. It was the praetiee up to 1901 to keep the plates very wet (soft), and even though the crushing was much finer an exeessive amount of quicksilver was used. It will be seen from Table III that, although the tounage crushed per stamp has shown a marked increase, the quantity of quicksilver used per tou is

falling of the stamps, throws the pulp against the sereeu, and all particles fine enough pass through it and fall on the lip of the mortar. At the edge of the lip are placed two dashboards arranged in steps to stop the rush of water aud sand, and cause it to drop in a steady flow on the aprou plates, which are placed immediately in frout of the lip of the mortar, with the upper edge under the lip. This diuminishes the scouring action, allowing the amalgam to collect near the upper end of the plate. The amalgam here is kept harder than at the lower end. This allows the lower end of the plate to be kept quite wet,

TABLE II.—COST OF MILLING (PER TON OF ORE) FOR TEN MONTHS ENDING SEPTEMBER, 15, 1902.

Name of Mill.	Crushing. Labor	Crushing. Supplies	Crushing. Total	Concentration. Labor. Concentrators	Concentration. Labor. Sulphurets	Concentration. Supplies	Concentration. Power	Concentration. Total	Sulphurets. Labor	Sulphurets. Sulphides	Sulphurets. Car	Sulphurets. Assay	Sulphurets. Total	Total of All Expenses. Labor	Supplies	Iron and steel	Foundry	Electric light	Hauling supplies	Repair	Assay	Power	Legal	Total
Treadwell "300"	.0082	.0046	.0128	.0001	.0042	.0005	.0090	.0147	.0068	.0007	.0015	.0003	.0093	.0560	.0141	.0211	.0109	.0001	.0003	.0057	.0004	.0061	.0055	.1205
Treadwell "240"	.0095	.0040	.0135	.0133	.0047	.0029	.0090	.0308			Wharf.			.0720	.0370	.0058	.0058	.0010	.0000	.0106	.0016	.0058	.0032	.2040
Mexican	.0109	.0007	.0116	.0095	.0080	.0060	.0090	.0325	.0052	.0003	.0042	.0006	.0103	.0720	.0523	.0220	.0121	.0027	.0009	.0091	.0017	.0600	.0033	.2359
Ready Bullion	.0261	.0010	.0280	.0147	.0070	.0177	.0185	.0586	.0087	.0002	.0052	.0006	.0140	.0934	.0360	.0362	.0135	.0009	.0012	.0099	.0020	.0232	.0030	.3193
700-Foot Claim	.0096	.0008	.0104	.0103	.0095	.0014	.0086	.0298	.0047	.0005	.0049	.0005	.0106	.0712	.0285	.0165	.0081	.0021	.0002	.0064	.0014	.0575	.0062	.1981

distance of 1500 feet from them. Ou aecount of the heavy snowfall and low temperature in winter, the ditches are covered throughout their entire leugth by split lagging and boughs of trees. The snow on the mountains usually lasts until the end of April, and from then to the end of November rains are depended upon to supply the requisite amount of water.

At the Ready Bullion mine no provision has been made for a supply of fresh water for mill use other than that for the boilers. Here salt water is pumped from the channel and used for all purposes in the mill. Experience has shown that while it is very

only about one-half the quautity formerly used.

The ouly amalgamated eopper plates used inside the mortars are the chuck blocks. Two sizes are used at present (the 4-inch and 6-inch in height), but very little amalgam is collected from them. Formerly they furnished 13.7% of the amalgam collected, but since the fine screens were replaced they colleet practically no amalgam, except duriug short periods in the winter wheu salt water is used. At these times the chuek blocks become eoated, but as soon as fresh water is again used the amalgam is scoured off, leaving the copper bare.

TABLE III.—DETAIL OF CLEANUP AND EFFECT OF COARSE CRUSHING ON DISTRIBUTION OF AMALGAM.

RESULTS FOR TEN MONTHS, 1901.

Mill.	Tons crushed per stamp in twenty-four hours.	Ounces Quicksilver Fed per Ton Ore Crushed. Battery	Plates.	Total	Distribution of Cleanup, Per Cent. Blocks	Barrel	Vanners	Tanks	Traps	Tail boxes	Ashes	Tables	Value amalgam per ounce	Value bullion per ounce	Free gold per ounce quicksilver fed	Per cent of cleanup in free gold	Per cent of concentrates	Value tailings per ton	Gross value per ton ore crushed
Treadwell 240	4.00	.2008	.0319	.2417	.0742	.1938	.0181	.0188	.0199	.0151	0017	.6584	$6 12	$18 65	$5.00	57 87	1.75	.083	1.943
Treadwell 300	4.59	.1264	.0695	.1958	.0896	.0961	.0282	.0107	.0136	.0128	0015	.7475	6 12	18 65				.071	
Mexican	4.33	.1794	.0845	.2639	.1952	.0793	.0082	.0284	.0302	.....	.0037	.6550	6 48	18 70	4.15	67.85	1.65	.101	1.842
700-Foot	3 97	.....	.....	.2022	.1893	.1295	.0111	.0167	.0262	.....	.....	.6282	6 10	18 50	5.73	47.40	1.77	.038	1.498
Ready Bullion	4.24	.1316	.0861	.2177	.8955	Blocks, Barrel, Table.	.0823	.0207	.....	0015	.....		5 94	18 25	6.12	70.00	1.74	.068	2.058
Total	4.27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	$18 59	.....	.....	.....	.076	.....

RESULTS FOR TEN MONTHS, 1902.

Treadwell 240	4.86	.0849	.0357	.1206	.....	.0901	.0216	.0119	.0303	.0277	.0011	.8172	$6 12	$18 65	$5 80	45.09	2.	.104	2.031
Treadwell 300	5.53	.0117	.0532	.0649	.....	.1067	.0483	.0257	.0366	.....	.0003	.7724	6 12	18 65				.092	
Mexican	5.73	.2076	.0366	.2442	.0221	.0556	.0111	.0423	.0401	.....	.0031	.8257	6 48	18 70	3 63	48.87	1.71	.105	1.979
700-Foot	5.70	.2200	.0279	.2578	.....	.0421	.0164	.0295	.0382	.....	.....	.8738	6 10	18 50	3 57	48.36	1.83	.088	1 933
Ready Bullion	5.34	.0824	.0381	.1205	.0012	.0963	.0060	.1936	.0444	.....	.0019	.6557	5 04	18 25	7 18	53.75	2.07	.001	1.705
Total	5.38	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	$18 59	.....	48.04	.....	.094	.....

destructive on all exposed iron in the batteries and on the vanners, it is better than fresh water for amalgamating purposes, but this advantage by no means compensates for the loss caused by its corrosive action on all exposed iron and on the vanner belts. The coal—about 22,000 tons per year—is obtained from the mines on Vancouver Island, at rea-

The diagonal slot screens which are used in all the mills are made of No. 23 gauge heavy Russian iron. Both the No. 4 aud No. 5 are in use, these being equivalent to the 20 aud 18-mesh wire screens, and are mouuted in frames in the usual mauner. Two widths are used, viz.: 9-inch and 12-inch, the former giving the better satisfactiou.

A screen lasts about seven weeks in all the mills

which gives a better chance to catch the finer particles of gold that otherwise might float off.

These plates are made of the best Lake copper, $\frac{3}{16}$ iueh thick, 4 feet wide, 10 feet long, and are given a fall of 1½ inch to the foot. The plates are prepared in the usual mauuer by cleaning with a weak solution of potassium cyanide aud rubbing in quicksilver until the upper surface is thoroughly amalgamated. While in use they are dressed with quicksilver twice a day, and the time taken for dressing should not exceed four miuutes per day.

At the lower end of each plate is placed a wooden trough lined with copper, called the tail box, where very little amalgam is caught. From the tail boxes the pulp is conveyed through 3-inch pipes to the mercury traps. These traps are made of cast-iron in the shape of a four-sided truucated pyramid, having the smaller end down. The trap is 14 inches square at the top, 15½ inches deep, with the lower end 6 inches square. In the bottom is a 2-iuch tap closed by a plug for drawing off the contents when cleaning up. Iuside the trap is a block 14 by 8 inches on top, 11 inches deep aud 8 by 8 inches ou the bottom. It then flows up through the space betweeu the trap aud the wooden block, and thence into the discharge launders.

These boxes are usually suspended under the battery floor aud from them the pulp flows through launders, where it is divided and conveyed by 3-inch iron pipes to the distributing boxes of two vauners.

On the floor of the distributing box of each vanner is placed an amalgamated copper plate, varying with the size of the vanner used, those ou the 4-foot vanner being 18 inches by 3 feet 4¾ inches, and on the 6-foot vanners 18 inches by 5 feet 9 inches. From this plate the pulp flows over the vanner, the heavy particles, including sulphurets and some free gold, being saved, while the lighter passes over the tail of the vanner into the tailings launders, which discharge into Gastiueaux channel.

By reference to Table III it will be seeu that 47% of the value contained in the ore is recovered by coucentration. For purposes of concentration two sizes of Frue vanners are used: the 4-foot and 6-foot. These vanners are so arranged that the pulp from five stamps is divided between two vanners. This style of concentrator is adapted to the ore, and from a study of the tables given above it would be hard to realize a much better saving. The wear and tear on

*Abstract Trans. Amer. Inst. Min. Engrs.

the machinery is very light in all the mills, with the exception of the Ready Bullion, where the vanners get more than their share of the destructive effects of salt water in use.

When a stamp is crushing 5.6 tons of ore in twenty-four hours, each stamp requires 4.25 gallons, and each vanner 1.5 gallons of water per minute. In the mills where the 4-foot vanners are used they are overloaded. This accounts for both sizes of vanners using the same amount of water.

There is a little less than 2% of concentrates in the ore. The concentrated product has a value of about $51 per ton in all the mills, with the exception of the Ready Bullion, where the concentrates assay about $35 per ton.

In connection with each mill is a storage bin for concentrates, holding about 400 tons. These bins are situated near the mill, and when the concentrates have been collected at the vanners and shoveled into cars, they are trammed to a small hydraulic elevator which raises the loaded car to the level of the top of the bin, where it is dumped. From these storage bins the concentrates are drawn off through chutes into cars holding two and one-half tons, and hauled by locomotives to the wharf, where they are dumped through chutes into the hatches of the barges which transport the concentrates to the Tacoma smelter, where they are treated.

Table II shows in detail the cost of the different departments of milling as well as the equipment and running time of the various mills for the last ten months.

(TO BE CONTINUED.)

Iron Cement for Machinery.

Many breakdowns, incidental to machinery subjected to steam and hydraulic pressure, can be successfully repaired by use of material known to engineers as Smooth-on Iron Cement. The uses of this material in repairs are numerous, and one of these shown in the engraving is of the repairs to a



Pump Repaired With Iron Cement.

large centrifugal pump in a dry dock pumping station, New York navy yard.

The following is an extract from a report made by an engineer in the department of construction and repairs:

"For over four years I have used your Smooth-on Iron Cement No. 1 and have found it to be as good as a new casting, when used in repairing breaks in castings. I have found it to make steam joints tight when everything else failed. I have used it on porous castings that had to stand 180 pounds steam pressure. I have used it on steam pipes that leaked and will say that I have never had any trouble with anything I repaired with the same.

"About four years ago one of our 45-inch centrifugal pumps split almost in two, due to a sudden strain. The crack was over 20 feet long and in some places opened up ¾ inch. To replace this pump would take months, and we needed it badly. This fracture was repaired with Smooth-on Cement No. 1, and the pump running on the third day after the break, and ran successfully for thirteen months, when it was replaced by a new pump. The repaired pump was, however, still giving as good service as when first repaired. This pump (above cut) broke about one and one-half years ago and was repaired with Smooth-on, as was the first pump, and it never has given us any trouble since. The cut shows the pump as now in use. The fracture extends from A through B to C, and from C to D; patches 1, 2 and 3 are brass; straps 4, 5, 6 and 7 are of wrought iron; Smooth-on was used in fracture and under patches and straps.

"When the new pump (see cut) was placed, the flanges connecting the gate valve with the pump did not come in line by 2½ inches; to make this joint the pump flange was cut off, a plate of wrought iron was flanged and shaped to fit the interior of the main and bolted to it, so the flange fitted the flange of the gate valve; both the flange joint and the joint between the main pipe and the inserted flange sleeve were made with Smooth-on.

"The suction pipe to this pump broke in two, underground, due to settling of the ground, over three years ago. This was also repaired with Smooth-on and has never given any trouble since. I have had at least a dozen more of these breaks, and after repairing them with smooth-on, have never had any trouble with them."

Smooth-on Iron Cement No. 1 is a metal cement which, when properly mixed with water, metallizes and slightly expands during the process. This action makes it valuable for many mechanical uses. This iron cement is made by the Smooth-on Manufacturing Co., Jersey City, N. J., U. S. A., who will send their illustrated book free. Sold in 5, 10 and 25-lb. tin cans. The Western Repair & Supply Co., 61 Steuart St., San Francisco, Cal., are Pacific coast agents.

Drift Timbering.

Written for the MINING AND SCIENTIFIC PRESS by W. H. STORMS.

When the floor of the drift in soft ground is wet it is often necessary to place the foot of the posts on sills or blocks to prevent their being forced down into the soft rock. Face boards may be held in place by the forward ends of the side lagging, a head block being interposed between them, and the face boards removed, one at a time, to permit the cutting out of the soft ground, the board replaced and the lagging driven forward before another board is removed, the work progressing from the bottom upward. It is a slow and laborious process, but in wet, running ground is often the only way in which headway can be made. The head blocks are cut from 6 inches to 12 inches wide and 4 inches long. In very wet ground—such as wet, caved, foliated slate—the face boards cannot be removed with safety for fear of a run. In such case the ground is cut out from beneath and behind the face board, which is kept advancing by driving up the side lagging, this carrying the face board forward. The details of this method of drifting are shown in Fig. 7.

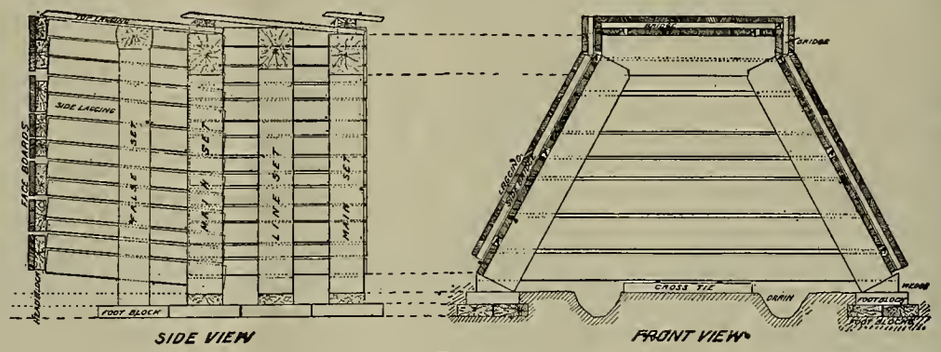


FIG. 7.

Soapstone, serpentine and some other rocks, which when wet cave unexpectedly, should always be substantially timbered when first cut through to prevent caving later on. When passing through sheared zones, faults or cross heads, as well as veins, extra

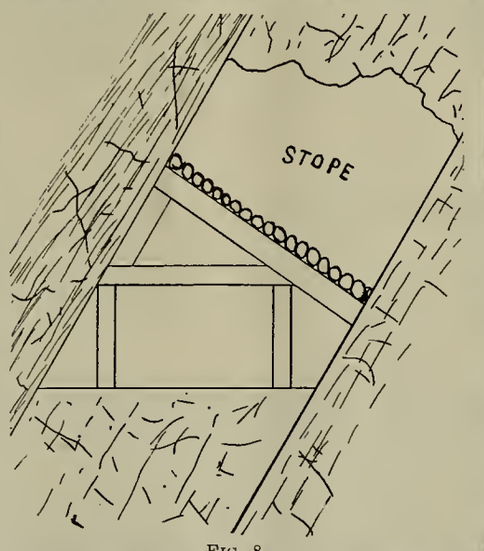


FIG. 8.

precautions should be taken to prevent subsequent caving, though the ground may stand well at the time of excavation.

In Fig. 8 is shown an unusual method of timbering a wide drift beneath a stope. This method gives additional support to the stull where the hanging wall is not secure, and is a very strong set and capable of sustaining great weight. It is a question, however, if the modification of the square set system, known as the "cap sill method," would not prove as economical and satisfactory.

In some mines the ore deposits lie nearly flat, and, having moderate height, are timbered in the same manner as the workings of many drift mines, by a system of "posts and breasting caps." These consist of single posts, over the head of which are placed a head block (breasting cap), and in some cases two other caps are placed transversely across the top of the first cap, the whole set being secured by wedges, tightly driven from all sides. Stoping may be carried on on both sides of the main gangway by this method, or from one side, any waste accumulating being thrown behind the workmen. The best practice is to drive crosscuts from the main gangway and from one side of the crosscut stope backward from the crosscut, setting up the posts and breasting caps as the work progresses, and throwing the waste behind. Often many of the timbers may be recovered; if not, and the roof falls, no particular harm is done and the miners at the face are always safe from falls of rock excepting such as may occur at and near the face, which they should anticipate and endeavor to prevent by prompt timbering.

The ways of timbering tunnels and drifts are so various that only the general principles can be given. Knowing these, the miner must adapt some method or variation of a known system to each particular case. The great variety of conditions and the frequent changes in these conditions, even in the same mine, require that the timberman of a mine be a man of fertile resource, and often he must show a fearlessness of danger that in other occupations would make him a hero.

Mining Telluride Ores in the Black Hills.

The ore deposits of the Cambrian formation in the Black Hills were discovered early in 1877, and for several years considerable development work was done in the Bald Mountain and Terry's Peak section. At Galena, also, east of Deadwood, lead-silver ores were discovered, and the mines of this camp were extensively and profitably mined and treated. Large shipments were made from the Galena district to smelters at Omaha, Denver and elsewhere. It was found that the siliceous ore of the Bald Mountain and Terry's Peak region were not readily amenable to amalgamation, the saving by that process often being less than 50% of the values, while both mining and milling were expensive, due to the extreme hardness of most of the rock, and the fine crushing and grinding in the mills, necessary to secure even 50% of the values. In 1881 the ores of the carbonate camp district west of Deadwood were discovered and a large output of lead-silver ore resulted. This success led to the discovery of extensive gold-bearing deposits in the Cambrian quartzites and Carboniferous limestones in that region. Among these discoveries were those of Squaw Creek canyon and the Ragged Top district on the limestone plateau northwest of Terry's peak.

Until the introduction of the barrel chlorination process and the cyanide process in the Black Hills in the treatment of these ores, it cannot be said that success had been achieved in the treatment of these ores. The mining of these deposits was an easy matter. Most of the deposits lie flat, or nearly so, and large amounts of the ore are mined by open cut system, as shown in the illustration on front page. In some of these mines drifts are extended into the ore body beneath the overburden, which may consist of porphyry or the original sedimentary strata. In the Ragged Top section, near Preston, the Deadwood Standard M. & M. Co., owning 400 acres of ground, are operating by the open cut system, mining 125 tons of ore daily. They are also developing underground to secure a supply of ore during the winter season, when the heavy snows will make open cut work difficult, if not impossible. Their mill contains crushers, rolls and cyanide plant. W. O. Morrison is president and manager.

The Spearfish G. M. & R. Co. own 400 acres of ground near Crown Hill, in Ragged Top district.

They have a mill of 300 tons daily capacity. The ore occurs in limestone, and $7 ore pays a good profit. The mill (see illustration, front page) is composed of crusher and rolls. The ore passing a grizzly goes to a 10x20 Blake crusher and from there passes to a set of 16x36 Davis rolls, set to ¼ inch. This product is elevated to ¼-inch screen, and the rejected product passes through a set of 14x27 rolls and elevated to ¼-inch screen, which is as fine as they crush. The ore is then trammed to the leaching tanks, which consists of ten tanks, 26 feet in diameter by 7 feet deep, each tank holding 133 tons dry weight. The tailings are sluiced out through two bottom-discharge gates, 10 inches in diameter. The ore is treated about eighty hours with strong cyanide solution—six pounds to the ton—which is followed with a weak solution, containing two pounds cyanide to the ton, and treated for twelve hours, and then followed by wash water, making the total treatment ninety-six hours. The gold solution passes from the leaching vats to the gold tanks—one for strong and one for weak—and from there through three steel zinc-precipitation boxes to the sump tanks, where it is standardized and returned to the storage tanks at the top of the mill.

The precipitates from the zinc boxes are washed through steel launders to a refining tank, where the precipitates are treated with sulphuric acid, washed, filtered, dried and roasted at a slow heat in cast-iron muffles and then melted into bars averaging over 900 fine in gold. The mill has a capacity of 300 tons of ore per day and it is the intention of this company to increase the capacity. The plant is located at Cyanide P. O., 3½ miles from the railroad. According to figures furnished by O. N. Brown, general manager of the company, costs are divided as follows:

Mining	$ .98 per ton.
Transportation, mine to mill	.12 " "
Milling	.98 " "
Total	$2 08

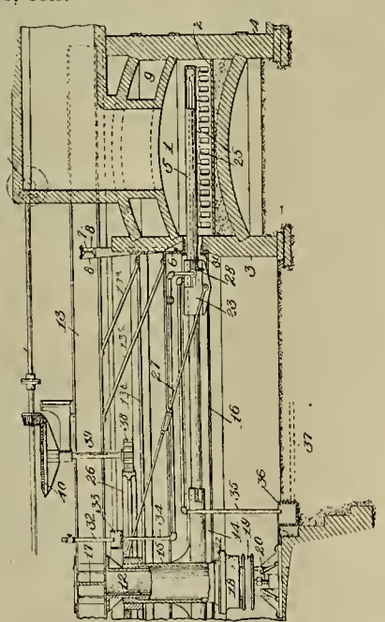
The ore is mostly mined by the open cut system (see illustration, front page), though they also have extensive underground workings. The ore is hauled on a 24-inch gauge track by small mine locomotive in trains of forty 1-ton cars. The railroad is ¾ mile in length, with about the same length of switches to the various openings on the property.

Mining and Metallurgical Patents.

PATENTS ISSUED OCTOBER 20, 1903.

Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

ORE ROASTING FURNACE.—No. 741,549; J. Roger, Denver, Colo.

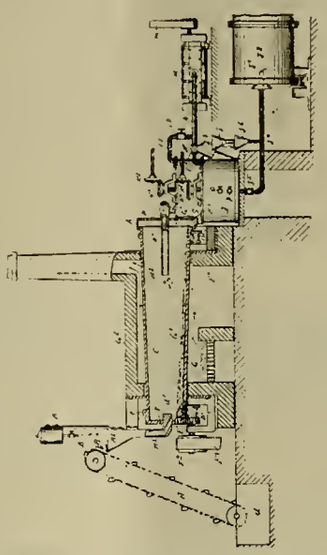


Combiuation with circular furnace, of column or pillar arrauged concentrically thereof, sleeve rotatably mounted upou column, beariug arranged at lower portiou of column, adjustable ring supportiug bearing, rabble mechanism carried by sleeve, and stay bolts or guy rods connecting upper portion of sleeve and outer portions of rabble mechanism.

PROCESS OF TREATING REFRACTORY ORES.—No. 741,712; E. C. Pohle and S. Croasdale, Denver, Colo.

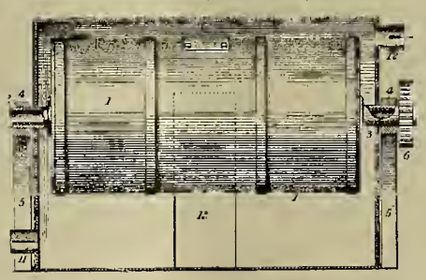
Process of effecting mixture containing ore, sulphur and haloid of alkaline or alkaline earth metal, relative proportions of materials being those quantitatively requisite to produce, when heated in the presence of oxygen, haloid of metal or metals to be extracted from ore and sulphate of alkaline or alkaline earth metal; roasting mixture with free access of air and agitation at temperature sufficient to effect reaction mentioned; and volatilizing and recovering metal values as haloids or oxyhaloids.

ORE DEARSENICATING AND AMALGAMATING APPARATUS.—No. 741,338; T. H. Hicks, Fort Wayne, Ind.



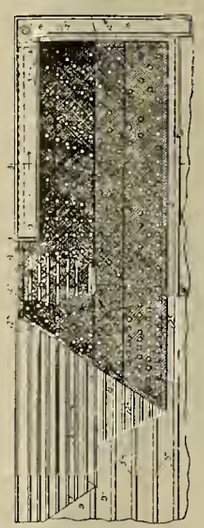
In combination retort adapted to be rotated and having open outlet end; statiouary eud casing having loosely fitting union with open outlet end of retort; ore collecting tank adapted to contain water and receive discharged ore contents from retort; cover arranged to seal top of tank to prevent escape of fumes therefrom; downwardly projecting partitions depending from cover of tank and arranged to dip into water contained in tank; and suction device attached to tank and arranged to draw air and fumes from retort under partitious and from tank.

PROCESS OF TREATING ORES.—No. 741,439; C. E. Baker and A. W. Burwell, Clevelaud, O.



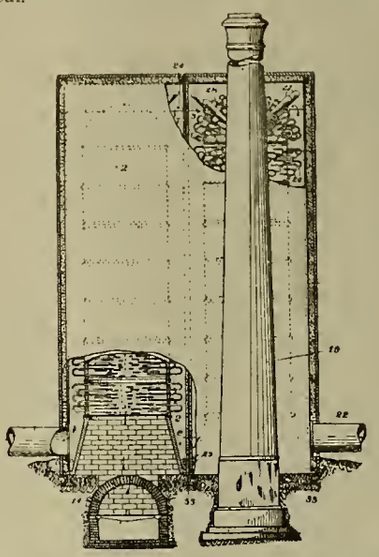
Process of treating ore containing base metal or metals and metalloid by combining metals and metalloid with chlorine, and supplying sufficient heat to vaporize aud separate metalloid chloride from metal chlorides.

CLASSIFYING OR SIZING APPARATUS.—No. 741,565; A. Ten Winkel, Denver, Colo.



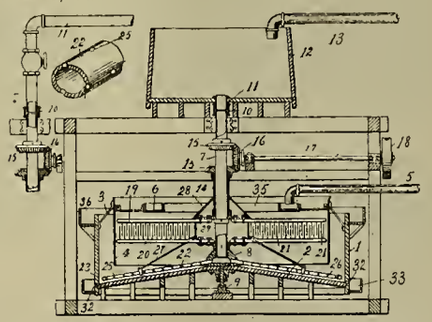
Classifier or sizer comprising transversely inclined riffled bed, provided with screen sections varying in mesh, finest mesh section being placed uppermost on bed and other sections below in order of fineness, coarsest section being lowermost, the sections being all located in same inclined plane and provided with projections applied to upper surface of finest section, and section coarser than finest section, but finer than other sections lying in same plane with finest section, coarser section being placed upon projections of finest section, and riffle placed on finest section below its projection to direct material to riffles beyond screen.

HOT BLAST STOVE.—No. 741,680; H. Lang, Oakland, Cal.



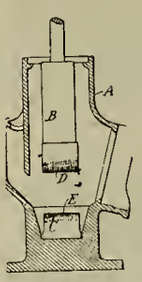
In hot blast stove or air heating apparatus, series of more than two adjacently placed air cells in communication alternately at top and bottom, air inlet to first cell, air outlet from last cell, series of superimposed retort sections forming contiuuous tier in each cell, all in communication at bottom, heating furnace, and means for sendiug products of combustion of furnace into and out of retorts in successiou, in reverse direction to that of air current through cells.

CONCENTRATOR.—No. 741,725; E Schutz, San Francisco, Cal.



In combiuation, tank having conical bottom sloping outward and having in its side at juncture with bottom small hole for escape of conceutrates, rotating pipes also sloping downwardly outward in close proximity to bottom of tank, and having perforatious for discharging water therefrom at bottom of tank, means for feeding water to pipes and shell within tank having its lower edge raised above bottom of tank whereby lighter material iu escapiug from tank is compelled to pass below lower edge of shell aud in close proximity to bottom.

STAMP MILL.—No. 741,852; G. Thomsou, Elizabeth, N. J.



Stamp, die or like, haviug face composed of alloy of copper, nickel and steel.

MINER'S BLASTING SQUIB.—No. 741,968; T. R. Jones, Wilkesbarre, Pa.

Miner's squib comprising body portion and two matches connected thereto, one of matches being adapted to burn without flame, and other match being detachable and adapted to burn with flame.

Mining Summary.

SPECIALLY COMPILED AND REPORTED FOR THE MINING AND SCIENTIFIC PRESS.

ALASKA.

Five miners report having located placer gold diggings at the headwaters of the Sushitna river, in Western Alaska. The strike is on the east side of that river, 65 miles from Slate creek. The find was made on Aug. 16, when the prospectors were ready to return to Valdes, after having spent the summer in prospecting the lower tributaries of Sushitna river. Pay was found on Valdes, White and Wickersham creeks, and prospects on other creeks. Two men, shoveling for fifteen days into two lengths of sluice boxes, cleaned up 100 ounces of gold. Monohan, Clarkson, Smith, Johnson and Windemeller say that bedrock is 4 feet from the surface. They came out from the diggings to Valdes in thirteen days. The winter route will be from Valdes and over the Valdes glacier, a distance of 200 miles. The summer route will be via Copper Center and up the Tazelina river.

A ledge of free gold-bearing rock has been crosscut on the Alaska Perseverance and Greek Boy mines, near Juneau. After drifting 2200 feet, at depth of 1300 feet below the surface, a ledge of 22 feet of ore is reported cut in the Greek Boy. The same ledge traverses the Alaska Perseverance. The latter is owned by W. J. Southerland and J. T. Gilbert of New York. Southerland is also interested in the Greek Boy. Arrangements have been made for a 200-stamp mill on the Alaska Persoverance mine and a 40-stamp mill on the Greek Boy.

ARIZONA.

Cochise County.

Superintendent C. C. Warner of the Copper Glance mine, in Warren district, near Bisbee, says they have put in additional pumping facilities and sinking has been resumed. All of the pumps have a capacity of 700 gallons a minute. The shaft is down 540 feet.

Work is progressing in cutting out the pump station on the 700-foot level of the Con. C. Co.'s shaft at Tombstone, says the Prospector. This station will be 16 feet wide, 14 feet high and 83 feet long, while the sump into which the water will be pumped will be 10x12x40 feet. Foreman Saunders expects the work will be completed next week and work of putting the pumps in place started.

Gila County.

A strike of sulphide ore is reported in the Old Dominion mine at Globe, being cut on the tenth level crosscut, 400 feet uorth of the old shaft and 350 feet beyond any ore previously found, says the Silver Bolt. The ore body is 9 feet thick and carries 3% copper, but runs higher in sulphur than any sulphide yet found in the mine, and is a desirable matting material. The four-compartment shaft has reached 495 feet depth and is going down at the rate of 2 feet 4 inches per day, and by Jan. 1st it is expected the tenth level connection will be made. A heavy pump will then be set up and will handle over half the water now being raised with difficulty through the old shaft. The installation of the compressor of 2000 cubic feet per minute capacity is completed. Also an additional battery of boilers at the shaft has been bricked in and connections made. The foundation for the hoist is completed. The work of erecting the steel smelter and converter building is progressing. Work on the concentrator building is temporarily suspended. A battery of boilers for the smelter has been set up. The cable tramway above the old smelter has been raised hy building the two 30-foot towers to permit of railroad trains passing undor the tramway, says Superintendont Hoar. The converter at the old smelter is in operation.

Graham County.

W. Climo, superintendent of the Shannon mine, near Clifton, says he has 300 miners at work in their properties, which are producing an average of 600 tons of ore per day. During the past month 1000 feet of development work has been done and new ore bodies are being opened up. The Shannon mine is producing some high-grade ore and Climo says he has one stope 80 feet wide of low-grade ore. He has opened up a body of high-grade ore on the Sands group, owned by the Shannon Co.

Maricopa County.

(Special Correspondence).—R. E. Humphries has fifteen men at work on his group, near Hot Springs Junction, and more will be added.——The Mormon Girl mill, in Cave Creek district, will be put in operation this week, as an abundant supply of water for mill purposes has been developed.

G. Hamlin of the Relief mine, near Peoria, will build a mill. Water has been struck while sinking the shaft. This water will he utilized in the mine.

Phœnix, Oct. 26.

Yavapai County.

(Special Correspondence).—The Whipsaw Copper Co. is building a telephone line from its camp in Whipsaw gulch to connect with the main line of the Sunset Telephone Co., near Prescott. Development work is being done hy the company. A gasoline hoist has been put in.

Phœnix, Oct. 26.

(Special Correspondence).—The Bisbee Belle M. Co., near Constellation, is increasing development work. The tunnel is in 625 feet. The tunnel crosscuts several ledges and a body of high-grade sulphide ore was cut last week, says P. H. Hughes, superintendent.

K. Barrett, near Briggs, will start bis mill this week. The mill and mine are in Buzzard's Roost gulch.

Prescott, Oct. 27.

The Jesse M. Co., operating the Little Jesse group in Chaparral gulch, near Prescott, is increasing operations. A gallows frame will be placed over the double-compartment shaft, in which cages will be run. The shaft, down 657 feet, is being enlarged and retimbered. The shaft will he sunk to depth of 1000 feet. Air compressor and drills will he put in and a mill and cyanide plant will he built. J. S. Jones is manager.

Demory, Starks & Keaves are developing a group of claims on the flat between Groom Creek and Senator, says the Prescott Courier. They started a shaft on a lead of white quartz which showed on surface, and at depth of 30 feet are on a ledge 10 feet wide which assays $10. The ore is free milling.

CALIFORNIA.

Calaveras County.

The Othello G. & S. M. Co. has been incorporated in Stockton by D. C. Shepherd of Stockton, W. and A. Garland and J. M. and J. S. Shepherd of Murphys, to operate in Calaveras county.

Contra Costa County.

The Mitchell Bros.' S. & R. Co. has been incorporated by R. and H. Mitchell of Los Angoles, W. S. Gage of New York and W. H. Morrow of San Francisco. Negotiations for the Bay Point smelter of the Copper King, Ltd., have fallen through, and J. B. Miller for Mitchell Bros. has an option on forty acres of land east of Antioch for a smelter site. The advantages of the site near Antioch are transportation facilities on the Santa Fe road, with switching facilities with the Southern Pacific, with plenty of fresh water and water deep enough for oceau carriers to unload at their wharves.

Fresno County.

President J. M. Wright of the Peerless and Fulton Oil Co. of San Francisco has hought oil land near Coalinga, and north of the Caribou holdings. He will start operations this week.

The Genesee Oil Co. has been incorporated by W. H. Ingels, P. E. Daniels, W. G. Uridge, G. A. Hare and M. Hansen, to operate at Coalinga.——The Keystone Oil Co. has heen organized to operate on the Plymouth lease; and a contract has been let for No. 1 well, which will go 1650 feet if necessary. The property is east of the Commercial Petroleum Co. land.

Inyo County.

(Special Correspondence). — At Camp Lyon, near Ballarat, the Golden Argus M. & M. Co. are increasing work on the crosscut to tap main lodge. S. R. Phail is taking out ore on his Red Rock mine. At Millspaugh development work is progressing and next month they will have their mill rebuilt. In the Panamint range work is going ahead. At Tuba canyon J. P. Flint has men at work and expects to have his 12-stamp mill dropping next week. At Jail canyon it is reported C. C. Calkins has bought the property there and will hegin development work. At the Ratcliffe mine a few men are at work and the mill is kept running. The Cecil R. M. Co. has twenty men on the payroll. At the property formerly owned by the Ballarat M. Co. a mill is going up under Superintendent Vahrenkamp. At the Mineral Hill mine the crosscut will be completed next month, and they will be able to get the ore to the tramway on an economical basis.

Camp Lyon, October 27.

Nevada County.

T. Kohler of Grass Valley has bought the Belden one-half interest in the Gold Bank and Oro Fino mines and the entire Belden interests in the Anaconda mine, near Maybert. This mine was owned jointly by Belden & Fischer, and the interest of the latter has been honded hy T. Dorsey of Grass Valley. A 3-stamp mill will be huilt.

Superintendent W. H. Bray is building a canvas plant at the Posey mine in Willow Valley, near Nevada City.

Manager J. L. Bryson, of El Oro mines at Mayhert, says an aerial tramway will be built and the mill overhauled.

Machine drills are being put in at the New York-Grass Valley Co. mine at Forest Springs, near Grass Valley. The compressor is in place. The shaft has reached a depth of 600 feet. The mill is in operation.

The Suow Point gravel mine (the Hudson River claim), above Moore's Flat, near Grass Valley, will resume this week. Men will he put to work to run a tunnel to tap the channel. J. & J. Watton of Bay City, Mich., are at the head of the company. It is intended to run a lower tunnel.

The Excelsior Hydraulic M. Co. has heen incorporated at San Francisco to operate near Nevada City, and H. W., F. M. & E. C. Cowell, F. J. Ensign and C. E. Thomas are directors.

The South Yuba M. & S. Co. is increasing development work on the Virginia-Gold Hill copper mine at French Corral, says Superintendent J. F. McPherson. The vein carries both copper and gold. There are three tunnels, each over 400 feet in length.

Placer County.

R. Watson says he has leased the Haub mine of Shady Run, which has been idle for several years. Watson will repair the tunnel and increase development.

Riverside County.

W. H. Trenchard, manager of the San Diego Gem Co., owning the Cahuilla tourmaline mines near Cahuilla, says development work has been started. The company has a lapidary shop at San Diego.

San Diego County.

The Oro Blanco M. Co. of Banner will drivo their main tunnel 400 feet to the Bell mine.

At Mesa Grande, the Himalaya M. Co. has twelve men at work at its mines and tourmalines are being sent to New York to he cut. The San Diego Tourmaline M. Co. has mines at the same place and a lapidary establishment in San Diego.

The San Diego Gem Co. has heen incorporated by J. J. Hetzel, D. Wilson, C. O. Johnson, E. W. Peterson and W. H. Trenchard of San Diego, the last named being manager. The company owns five gem mines in San Diego county, also others in Arizona and Lower California, the product of which will be cut and polished at their lapidary establishment in San Diego.

The Fano gem mines, bought by E. A. Fano (known as the Fano Kunzite & Tourmaline mines), 15 miles northeast of Oak Grove, are heing opened up. The ledge has been prospected for 600 feet, and is being developed by cuts in several places.

Sierra County.

(Special Correspondence).—L. H. Carver of San Francisco, manager of the Mountain mine, near Sierra Buttes, 5 miles northeast of Sierra City, is preparing to reopen the property, which has been idle several years. The mine is 7000 feet above sea level and has been developed by a series of tunnels. An aerial tramway 6200 feet in length connects the mine with the 40-stamp mill, which is on the river, 1800 feet lower in elevation. Twenty stamps in the mill will be dropped to start with, until further development. Belt concentrators will be put in, as only amalgamating was done in previous operations. The principal development has been from No. 3 tunnel. A lower tunnel (No. 4) was started and will be continued to the vein, which contains several shoots. The ore values are mainly in free gold, with some auriferous pyrite.

Sierra City, Oct. 27.

Santa Barbara County.

The Graciosa Oil Co. has resumed drilling on its first well near Graciosa.

Superintendent Squier, of the Santa Maria Oil & Gas Co., reports drilling progressing. The Brookshire has begun drilling on well No. 2.——The Union Oil Co. is laying its pipe line from the wells to Graciosa station. The new tank, which has capacity of 35,000 barrels, is completed. Well No. 1, a producer, is capped awaiting completion of pipe line. Work on well No. 2 is progressing.

Siskiyou County.

Operations are being increasod in the Yellow Rose of Texas, Red Rose, Pirate of Coffee Creek, Rey Del Norte, Mayflower, Larboard Watch, Tubo Rose, Salmon River and Piedmont quartz mines, along boundary of Siskiyou and Trinity counties, on the headwaters of Salmon river and the tributaries of Trinity river, near Sawyer's Bar and Callahans. All these mines are under the management of the Yellow Rose G. M. Co.

The work of sinking on the coal mine at the Herr ranch, between Yreka and Ager, is progressing, says the Yreka Journal. They have considerable water to contend with. Some strata of good coal have heen found, hut the main coal hody is not expected to he reached till a depth of 300 feet.

Trinity County.

The Bullychoop M. Co., operating at the head of Indian creek on Bullychoop mountain, near Shasta, is running its mill on ore resulting from development in progress on No. 3 level. They have twenty men employed, and report thirty tons a day is heing crushed by working the mill half time. Manager W. B. Gester says an air compressor will he put in to supply power drills and a lower tunnel will be driven from the mill level. This tunnel will be driven on the vein.

Tuolumne County.

The M. McCormick Co. has bought the Flat Vein quartz mine on Bald mountain (the Cleveland claim), near Columbia. A fourth interest in the Lucky Jack quartz mine, 2 miles southeast of Confidence, has boen sold to J. F. Trailer; also a fourtb interest to E. W. Burley.

T. A. Piper and F. R. Moore, of Santa Clara, have a bond to huy the Morning Star, Comet, New York, North Star, Last Chance and Blue Gravel placer claims for $5000, within three years, during which time the present owners are to receive a royalty of 33⅓% of the net output of gold. Tho group is on Tahle mountain, 2 miles southeast of Tuttletown.

The Harvard mine at Jamestown has closed down indefinitely, says the Independent. —— At the Soulsby mine at Soulsbyville sinking the shaft is in progress. The 8-inch pump is working satisfactorily. The mill is not running during the dry spell. —— J. W. McGinn has bought the Golden Thread quartz mine, near Algerine.

The Dutch mine at Quartz is running and the twenty stamps in the mill are dropping regularly. Steam is used as power, with oil for fuel.——A half interest in the Hardtack quartz mine has beeu sold to A. White, of Vallejo, for $10,000.

COLORADO.

Boulder County.

The mill of the Caribou mine at Nederland has been leased to the United States Tuugsten Co. for treatmcnt of tungsten ore. Operations will he begun this week under suporintendency of G. Taylor, secretary of the company.

Chaffee County.

In Goldfield, the Cleo G. M. Co. has been organized by C. R. Miller, L. L. Palmer and L. Nugent. The company owns claims on Big Girl mountain. Palmer is manager.

The Yankee Blade and Excelsior mines (the Baxter group), on Cascara mountain, in Gunnison district, have heen sold to the Black Queen M. Co. This group adjoins the Black Queen properties, says W. W. Roller of Salida, part owner of the Yankee Blade.

The management of the Vivandier mine at Turret will build a 50-ton mill to treat its low-grade ores. Huntington rolls will be used.

Clear Creek County.

(Special Correspondence).—Within the uext 50 feet the Capital M. & T. Co., near Georgetown, expects to cut the Mills County lode at a depth of 700 feet, and have 200 feet to drive in the upper tuunel. The lower tunnel is in 1200 feet, and the country rock is granite. They are using one air drill, but will put in a second one. The group is composed of twenty-eight claims on Griffith mountain. They have a shaft 428 feet deep and intend sinking 300 feet dceper. They have put in a 4-drill compressor. W. Cooper is manager.

The Commercial Men's M. M. & T. T. Co., of which F. L. Miner is manager, has three claims on Leavenworth mountaiu, and has a tunnel in 450 feet, which cuts with 250 feet of drift the Colorado Central vein at depth of 250 feet.

C. W. Teagarden, manager of the St. Paul mine, in eight months has driven 300 feet of tunnel and has cleaned out 350 feet of tunnel on the upper level. There are three sets of lessees at work. This company owns 4500 feet of the Colorado Central vein and 1½ miles on the Curtley vein.

The Centennial G. M. Co., D. Kennedy owner, is being developed. The shaft is 600 feet deep and is taking out ore, and treating 15 tons per day in the mill. Some of the ore runs 5 ounces per ton in gold, and the concentrates, after shipping ore is taken out, runs $40 per ton. Negotiations are pending for sale of this mino and if closed, it is understood a 100-ton mill will he built.

The Kelly tunnel, which has been closed

down since September, is expected to remain closed until after the stockholders' meeting in January, 1904.

Georgetown, Oct. 25.

(Special Correspondence).—The Empire tunnel is in one-half mile and has cut twelve veins. Driving the tunnel has been suspended temporarily while work is being done on the dam to increase capacity. They expect to be working again in the tunnel Nov. 15.

Empire, Oct. 26.

(Special Correspondence).—The Commodore M. Co. has its tunnel on Red Elephant Mt., near Lawson, in 1200 feet, and expect to drive it to 2400 feet. The tunnel is 8x8 feet. They are running two machine drills in the breast.

Lawson, Oct. 26.

(Special Correspondence).—The Bonieta mill is dropping twenty stamps—all they can handle at present with water power; but they expect to be using steam next week. F. F. Reed is manager.——J. G. Roberts of the Jackson Concentrator has his mill running full capacity.

The Alpine mill is in operation. This mill has been overhauled and repaired.

Idaho Springs, Oct. 26.

(Special Correspondence).—An efficient powder thawer is in use by W. Cooper, manager Capital M. & T. Co., near Georgetown, arranged as follows: A small pipe is laid from the exhaust of the engine to a small building about 30 to 40 feet from boiler house and connected to a radiator. This, it is claimed, will thaw powder in large quantities with safety and no expense, as it uses exhaust steam.

Georgetown, Oct. 25.

It is reported that the Red Oak M. Co. will increase operations on its group, near Georgetown. Electric wire has been strung from Georgetown to the mine and an electric motor set up at the Scepter tunnel for running the suction ventilating fans. The crosscut from the Scepter to the Astor vein will be continued, and the directors will let a number of leases in the Scepter level, in addition to those in operation on the Sunburst.

Secretary Marihugh of the Marshall-Russell M. Co., operating near Georgetown, says they will resume work of driving the main tunnel. The Marshall-Russell Co. has a group on Miller mountain, which adjoins Covode mountain on the east, and is driving a crosscut tunnel to develop them. The course of their tunnel is nearly parallel with the Empire tunnel and its entrance is 1 mile east of the Empire tunnel mouth, the lodes to be cut being the eastern extensions of those of the Empire Co. The tunnel is in 500 feet.

Dolores County.

G. Lawrence has a lease on a block of United Rico M. Co.'s ground at Rico, and has started work.——Hedrick & Ditchfield, lessees on United Rico M. Co.'s ground, are shipping ore to the smelter at Durango.——Miller, Reid, Lee & Moore are shipping a carload of concentrates to Durango from their lease on the Vestal mine dump.

J. Mundt is doing development work on the Hibernian lode, near Rico.

Gilpin County.

The Mutual Benefit G. M. Co. has unwatered its Pleasant View mine on Gunnell hill, near Central City. Development work will be resumed in the lower levels. Ore is being shipped from the upper levels, says Superintendent W. C. Carnegie.

The Fortunate G. M. & M. Co. has been incorporated by M. U. Randel, G. E. Prehle, R. S. Beall, E. W. Morse and A. M. Stevenson, to operate the New Hampshire and Fortunate group of claims near the head of Lump gulch, in Central mining district, near Rollinsville.——It is reported the War Eagle mine, on War Eagle hill, between Perigo and Gilpin, will resume.

Work on the mill at Phœnix for the Blue Grass M. & M. Co. is under way. The plant will be equipped with ten rapid-drop stamps with cast iron concentrating tables, and also tables for slimes, and will be both amalgamating and concentrating. The power equipment will consist of a 25 H. P. slide-valve engine and 60 H. P. boiler. The mill is being built on Beaver creek and is expected to be ready for operation by Jan. 1. At the Lone Star mine of this company development work is progressing in south crosscut at depth of 154 feet, which has been driven in 120 feet, reports Superintendent R. L. Alexander.

Machinery is being put in at the Gilpin group, near the head of Lump gulch, near Rollinsville, which is under lease and bond to Omaha, Neb., parties.

On the Federal mine at the head of Graham gulch, near Russell Gulch, buildings are going up and Superintendent R. Hughes is putting in a hoist and a 30 H. P. boiler. The plant is on the Federal shaft, which is 75 feet deep, and sinking will be resumed to a depth of 200 feet. The Federal G. M. Co. has been incorporated, with J. F. Church, W. B. Lewis, F. E. Mulvihill and B. F. Threewit as directors. The company is operating both the Federal and Becky Sharp lodes.

Gunnison County.

D. J. Stuart & Co. are preparing to work their Italian mountain property, near Crested Butte.

At the Yankee Blade tunnel, it is expected, work will be resumed next week and continue during the winter. The drift will be extended until the Excelsior territory is reached and will then follow the vein entire length of the claim. The proposed Augusta tram will take the ore down the mountain by a spur connected with the Yankee Blade, and both tunnels will thereby be furnished transportation through the one main line, which will be 2 miles in length, says the Elk Mt. Pilot. The Augusta sawmill is cutting timbers to be used in construction of derricks and buildings. Drifting on the Augusta vein is progressing.

Lake County.

The Damascus M. Co., of New York, has a lease on the Maud Hicks mine, near Leadville, and has begun operations. Machinery has been put in, including a hoist, and the Maud Hicks shaft is being cleaned out and retimbered. The Maud Hicks is near the Ibex ground, toward the south.

The zinc production from Leadville camp at present will average 7500 tons daily, says the Carbonate Chronicle. Of this amount, 5000 tons is sorted zinc mineral and concentrates and the rest is dump material.

The Fryer Hill M. Co. has its pumps running in the Pride of the West shaft at Leadville and will put the shaft down. It is not expected that any great depth will be required, as the new shaft is already down 330 feet and in the contact. It is being sunk to catch the Progressive ore shoot. From the El Paso and other workings the company has increased its shipments and expects for month of October to make tonnage of 4000 tons of ore.

The Great Central M. Co. has been organized to develop a group of claims near Oro, including the Leo, Miner's Hope and Seven-Twenty. St. Louis people are interested, says Superintendent Dewecse, formerly with the Printer Boy.

La Plata County.

The Pay Day mine, near La Plata, has been sold to D. G. Miller of Denver for $50,000.

The Bonnie Girl M. Co., operating in La Plata mountains, 20 miles west of Durango, reports having improvements under way. These consist of a 100-ton stamp mill, equipped for cyanide treatment of the ores, offices, laboratory, etc., together with a gravity system of tram cars for transporting ore from mine to mill. The mill will be run by water power during greater part of the year, but a steam plant will also be installed to supplement this. The group comprises several claims, covering the ore bodies of the "Baker contact," which shows average value of $4.50 in gold and one ounce in silver per ton. The ore will be mined from open quarries and transported by gravity tram cars into the crushers at the mill. Boston and Denver men are interested.

Hinsdale County.

The Black Crook M. Co. is having 500 tons of ore milled as a test in the Golden Fleece mill, near Lake City, to determine if it should build a mill.——A new hoisting plant is being set up at the Ohio group, in Poverty gulch, says Manager Sherhino. The shaft is down 130 feet and shows a body of iron ore carrying values in gold.

Saguache County.

A 100-ton smelter will be built at Villa Grove by the Stoel Canyon M., M. & I. Co. of Florence, says the Times. They have opened ore in three of their properties and only the higher grade rock is being shipped, pending erection of their smelter.

San Miguel County.

Operations are again under way in the mines and mill of the Tomboy G. M., Ltd., near Telluride.

Summit County.

The Michigan mine, on Sheep mountain, near Kokomo, is shipping lead ore.——P. R. Arnold has started work on his group, which adjoins the Wilfley mine.

Teller County.

President D. Hanley of the Cripple Creek Enterprise M. Co., at Cripple Creek, last week resumed work with non-union men on the lease the company has on the Deadwood claim, owned by the United Mines Co.

The Cripple Creek Times gives the following list of men working in the mines, mills, samplers and plants that are declared "unfair" by the Western Federation of Miners:

Stratton's Independence, Ltd	370
El Paso & Lessees	150
Elkton & Lessees	134
Vindicator & Lessees	112
Strong	95
Gold Coin	73
Golden Cycle & Lessees	100
United Mines Lessees	80
Mary McKinney	52
Findley	41
Anaconda Lessees	40
Anchoria-Leland & Lessees	35
C. C. Enterprise & Lessees	14
C. K. & N.	39
Abe Lincoln	35
Gold Sovereign Lessees	31
Shurtleff	24
Last Dollar	31
Old Gold	21
Cresson	15
Morning Star Lessees	6
Katinka Leasing Co	15
Rocky Mountain	5
Christmas	6
Isabella Lessees	16
Ajax & Lessees	38
Doctor-Jack Pot Lessees	38
Taylor & Brunton Sampler	23
Rio Grande Sampler	12
Eagle Sampler	21
C. C. Sampling & Ore Co	23
Economic Mill	45
La Bella M. W. & P. Co	21
Colorado Trading & Transfer Co., Ore Haulers	50
Total	1786

The total output for month of October is expected to reach a total of 30,000 tons of $1,500,000 value. Few of the mines are working more than two shifts, but beginning November 1st will put on three. The Findley mine has thirty-two air drills in operation.

IDAHO.

Blaine County.

The Oregon Short Line traffic department has announced a rate of $4 per ton on low-grade ores shipped from Hailey, in Wood River district, to the Salt Lake smelters.

Boise County.

J. Turtle has a bond on the Champion and Eureka quartz claims, which are east extensions of the Gambrinus mine, in Gambrinus district, near Idaho City. Ore has been taken from a shaft sunk on the Champion. Turtle will run a tunnel to tap the ledge at depth.

J. T. Hodson of Boise, manager of the Lincoln mine and mill, says the mill is being run by electricity, replacing the gasoline engine formerly used.

Elmore County.

Operations will be resumed at the Old Bonaparte mine near Atlanta—a former producer—which had been closed down for several years. The property is equipped with a 20-stamp mill and other machinery. E. Hayden of Boise is manager. The mine is 4 miles east of Rocky Bar.

Idaho County.

The Crackerjack M. Co., operating at Buffalo Hump, will put in a fifty-ton cyanide plant and a four-drill compressor, says W. A. Stephens of Spokane, Wash., manager of the Crackerjack. The cyanide plant will handle the tailings, as they will put in a Huntington mill behind the stamps. Two more tunnels will be started.

Near Warren, at the Hixie mine, which is being developed by Hathaway & Co. of New York, they are putting up a mill, having moved down the Goodonough plant of ten stamps from Steamboat creek.

Lincoln County.

N. M. Ruick of Boise and J. E. Lane of Shoshone, for W. A. Clark et al. of Butte, Mont., owning land surrounding Shoshone, have filed with the State Engineer an application to divert 2000 cubic feet per second of the waters of Snake river to be used for developing electric power. The power house will be below Shoshone falls. The water will be conveyed thereto by a tunnel 2000 feet in length. It is proposed to generate 48,000 H. P. Associated with Clark are J. A. Croighton and Dewey & Stone of Omaha, Neb.

Shoshone County.

The annual report of the manager of the Bunker Hill & Sullivan M. & C. Co., operating a group of silver-lead mines near Wardner, shows a total of 260,070 tons of concentrating ore mined at a cost of $544,650 and 430 tons of shipping ore at $2721. The ore was obtained from the separate mines in the following ratio: Sullivan, 1.05%; Bunker Hill, 33.97%; Stemwinder, 61.13%; Tyler, 3.85%. Gross value of concentrates and shipping ore was $1,623,290; freight and treatment charges and discounts, $725,562; total operating costs at Wardner, $685,946. The operating costs were divided as follows:

	Total.	Per ton.
Stoping	$547,372	$2 101
Tramming	24,656	0 095
Concentrating	61,793	0 237
Shipping	6,996	0 027
Superintendent and office	24,549	0 094
Legal services	4,200	0 016
Contingent expense	16,380	0 063
Totals	$685,946	$2 633

Following are detailed costs of mining:

	Total.	Per ton.
Foremen, machinists, blacksmiths	$ 67,981	$0 261
Timbermen and carpenters	17,402	0 067
Miners	111,359	0 429
Car men	31,719	0 122
Shovelers	173,873	0 668
Power labor	8,612	0 033
Repair labor	9,960	0 038
Explosives	23,747	0 092
Illuminants	9,025	0 035
Lubricants	964	0 004
Iron and steel	5,075	0 019
Miscellaneous supplies	10,095	0 039
Timber and lagging	53,321	0 205
Power supplies	2,892	0 011
Wood	10,234	0 039
Stable and stock	2,153	0 008
Exploration	6,237	0 024
Totals	$541,650	$2 094

The total production was less than that of the preceding year. At the beginning of the present calendar year the stoping force was reduced 35%, decreasing the tonnage of ore mined. But the grade of ore handled was so maintained that the yield of shipping product was but slightly decreased under that of preceding months and the cost per ton of both shipping product and run-of-mine ore was reduced. The most important feature of the year's development work was completing connections between all mines of the group and the Kellogg tunnel. This suspended operation of the aerial tramway and affords a direct outlet to the concentrator for all the ore, as well as giving ventilation and drainage. Machinery is being put in to use electrical power in both mills and mines.

The Highland Chief mine, in Pine Creek district, near Wardner, reports having cut through 12 feet of carbonates in the lower tunnel. The strike was made on a contact vein. The tunnel had been driven 850 feet, giving a depth of 500 feet. When the vein was tapped water poured in on the miners, forcing them from the face, and 4 inches are flowing from its mouth, rendering work difficult. The mine is under bond for $150,000 to B. L. Grant, A. M. Phillips, J. E. King, C. C. Whitney and C. W. Stanton of St. Paul, Minn. In driving the tunnel four veins were cut.

MICHIGAN.

Houghton County.

The management of the Winona mine at Winona will sink No. 2 shaft to the sixth level this winter, bringing it to equal depth with No. 1, and all drifts will be opened through.

The Osceola Con. M. Co., near Calumet, reports that the production of the company, which for the month of September amounted to 800 tons refined copper, will be increased through careful selection of the rock to 1000 tons per month, or at rate of 24,000,000 pounds of copper per annum.

Houghton reports say a shortage of miners exists in the lake copper country. Some of the mines have drills to operate and stopes in which to place them, but cannot find enough men, although many are being thrown out of work in the iron country.

Keweenaw County.

The hoist and compressor bought by the Ahmeek mine, near Allouez, from the Meadow mine, will be set up at No. 1 shaft.

MISSOURI.

Jasper County.

The exodus of miners to Cripple Creek, Colo., Arizona and California, as strike breakers, has made machine men scarce in Joplin district.

The Ishpeming M. Co. has material on the ground to build a 100-ton mill at Reeds.

The Con. Troup M. Co. mines No. 1 and No. 2, near Webb City, are running steadily and mill No. 3 has been put in running order, to mill dirt from an adjoining shaft.

The Lima M. Co., since sinking a new shaft and cutting for air to the pump shaft, has drifted southeast and opened up a good prospect, says the Joplin News-Herald, and is running the mill on half time. Work will be resumed from the south shaft.

The Ora May M. Co., of Joplin, has been incorporated by E. O. Bartlett, J. F. Wise, H. Murphy, D. M. Sayers and J. H. Spencer.

The Florence F. mine, near Prosperity, will resume operations. A shaft will be sunk on a drill hole 200 feet west of the mill. In drilling, ore was struck 75 to 85 feet in lead, jack and lead 140 to 165 feet, and high-grade cuttings from 206 to 230 feet. Two other drill holes showed same formation in lower level.

The Chapman M. Co., at Prosperity, is running its mill steadily with satisfactory results, says the News-Herald. The company has put in a sludge table, is building roads and putting the ground in shape.

The Daisy Bell M. Co., composed of J. Boyd of Carthage and St. Louis men, is making output of thirty-five tons of jack per week. They are working with five hand jigs and six men in the ground.

Their lease covers sixty-five acres, and the Seven Devils mine on another part of the lease is making similar output to the Daisy Bell mine. The tract is 1½ mile south of Smithfield.

The Lill M. Co., on the Cherokee lease, near Joplin, will work the upper level, having good face of ore to start on. The company has been prospecting with drills. ——The Crescent M. Co., on the Forestall & O'Donald lease, has leased four lots on the O'Neill lease, adjoining them on the east, and a drill is prospecting the ground to locate continuation of the run of ore on which they have been running. The company, in cutting the prospect drifts, produced 697,447 pounds of zinc from August 3 to September 30, and sold at average price of $36 per ton.

MONTANA.

Beaverhead County.

A strike of silver ore is reported made on the Christie claim, in Bryant mining district, at Helena, owned by H. J. Just, C. Christie and J. Haylor. It is west of the Hecla claim, and the shaft is down 26 feet.

Fergus County.

The owners of the Victor group of mining claims on Plum creek, 1 mile north of the Kendall group, in the North Moccasin mountains, near Kendall, are preparing to increase development. The claims are owned by W. L. Martin, S. & H. Armstrong and M. Dunn of Great Falls. The Victor group shows a vein carrying a shoot of galena 1 foot wide and assaying $25.

The Gold Reef mine (formerly the Gilt Edge), the Barnes-King and the Kendall mines, near Kendall, are turning out monthly $130,000 and employing 350 men, says the Argus. E. W. King is also president of the Alder Gulch M. Co., in the Little Rockies, which property is turning out $10,000 a month. A new mill is running.

Flathead County.

The Libby M. Co. has given an option and bond on its Ida, a quartz claim in West Fisher district, Libby, to F. E. Lucas of Spokane, Wash. In addition to the claim the company owns a 2-stamp mill, which is on the mine and included in the deal. Lucas will begin development work this week. The property is in Fourth of July guleh, 2 miles from Cahinet, and adjoins the Illinois and Montana properties. The vein is 2 feet wide between slate walls. The values are in free milling gold.

Granite County.

The Hope mill, near Phillipsburg, was started up last week, after having been shut down for two years. Both steam and water power are used. The first run is on rich ore which has been stored in the mill. As soon as this is disposed of the ore in the ore bins at the mine and near the mouth of the Jubilee tunnel will be run through.

Jefferson County.

P. F. Dowling, working the Hiawatha mine, in Cataract district, near Basin, is putting on more men and is shipping smelting ore. The ore is quartzose and carries values in gold and silver, and is used in the converters in the smolters. Dowling is also working the Custer, adjoining, and is tapping this claim through the tunnel on the Hiawatha. The tunnel is in 400 feet and will tap the Custer at depth of 130 feet.

The B. F. Forbes' interests in thirteen claims in Dry Creek district have been sold to F. A. Heinze of Butte. They are the iron claims.

It is reported work will be resumed on the White Pine group of claims in Cataract district, near Basin. They have a shaft down 500 feet. H. Turner of Saginaw, Mich., is superintendent and manager.

Lewis and Clarke County.

Mulvahill & Ely of Helena have an option for a bond on a group of claims near Rimini. They are running a crosscut to tap the lead at the 75-foot level.

Madison County.

The Fortune group of mines has been sold to a company of St. Paul and Minneapolis mining men, with W. H. Nichols of Butte. R. Cook of Virginia City is manager. They will build a concentrator to have a capacity of fifty tons per day. The group is located on Williams gulch, 4 miles west of Virginia City, and comprises 300 acres. The Fortune claim is patented and developed by a tunnel 330 feet long and a 200-foot shaft near the mouth of the tunnel. There are eight claims in the group.

Operations are suspended temporarily at the Watseca mine, near Rochester, because of the large amount of water. The pump at the 600-foot level and two on the 450-foot level are drowned, but with five smaller pumps on the 400-foot level, they are preparing to put in heavier pumps.

Work on the Broadway mine, at Silver Star, has resumed, and the mill that was burned will be rebuilt. Superintendent Dahler is working the Hudson, adjoining, and is taking out ore.

Silver Bow County.

Judge Clancy, in the District Court of the second judicial district of Montana, has rendered a decision in the MacGinniss suit for a receiver for the Boston & Montana M. Co., temporarily refusing to appoint a receiver, but issuing an order to restrain the Boston & Montana M. Co. from transferring its stock to the Amalgamated C. Co. or from paying any dividends to that corporation. The Minnie Healey case is decided in favor of F. A. Heinze. As a result of these decisions, all the properties of the Amalgamated C. Co. in Montana have been closed down by the management, and it is estimated that 15,000 men are idle. The following properties are affected by the shut down: In Butte—Boston & Montana mines, Anaconda mines, Syndicate group, Butte & Boston mines, Parrott group, Colorado Co.'s mines, Washoe group, Colorado smelter, Butte & Boston smelter, the Butte, Anaconda & Pacific railroad; at Anaconda—Washoe smelter, lime kilns, Anaconda foundry, brick yards; at Great Falls—Boston & Montana smelter; at Belt—Belt Coal & Coke Co.; at Bonner—Blackfoot Lumber Co.; at Horr—Horr Coal & Coke Co.; at Diamondville—Diamondville Coal Co., curtailing production; Pleasant Valley Co.; in Jefferson county—Lime and silica quarries. In Butte the company employs 6500 men; in the smelters at Anaconda, Butte and Great Falls, 5000 men. A pay roll of $50,000 a day is cut off in Butte.——An appeal from the decision has been taken to the Supreme Court, but it is thought it may take several months before a hearing can be obtained. The duration of the shut down is uncertain.

NEVADA.

Eureka County.

(Special Correspondence). — A. Fraser and J. Fine, working the Cyanide claim on Adams hill, have obtained values from shipping ore sacked from old dump. Development work will be increased.——F. & D. Harris, working the Bullwhacker, are increasing developments and making shipments.

There are 200 shafts, drifts and open cuts on Adams hill, from which $4,000,000 have been taken, but none of these workings exceed 100 feet in depth. The formation is quartzite and limestone, with a porphyry dike running from southeast to northwest. This ore can be handled by cyanide treatment and averages $7 in gold and silver.

Eureka, Oct. 27.

Lander County.

P. Porter of Salt Lake City, Utah, manager of the Keystone group of mines at Cortez, says development work is progressing and ore shipments have begun. In the tunnel 4 feet of ore averaging 12% copper, 25 ounces silver and 19% lead has been opened at 400 feet in the tunnel.

Lincoln County.

A half interest in the Chief mine, between De Lamar and Panaca, has been bonded to Whitmore & McDermott, of Salt Lake City, Utah, for $20,000. A body of ore has been opened up and by the terms of the bond a cyanide plant, capable of handling thirty tons per day, will be put in. It is reported the vein averages $9 per ton.

Lyon County.

The Nevada Chief mine at Rockland is shut down, throwing fifteen men out of employment.

Manager Rae of the Como-Eureka mine in Como, near Dayton, says the water supply for his milling plant has been cut off. The Como-Eureka is in Como district, while the North Rapidan mine is in the Palmyra district, the elevation of the former being several hundred feet higher than that of the latter, says the Virginia Report. Before the North Rapidan drain tunnel had attained its present length of 2000 feet, there was an abundance of water available in the Como-Eureka shaft for supplying the mill batteries, but this supply gave out, due to the water finding its way through crevices in the formation to the North Rapidan tunnel level, which accounts in a measure for increase in flow of water through the tunnel, which has also drained the main shaft of the North Rapidan mine. As the Como-Eureka is near the summit of the Como range, Manager Rae says to obtain a supply of water for the mill hatteries he will have to sink the Como-Eureka shaft to water level or move the mill to a lower altitude. The company owning the Como-Eureka has expended $30,000 in installing a dynamo plant on the Carson river at Dayton and building a pole line to its property for transmission of power to operate its mill and hoisting plant.

Storey County.

Work at the Ward shaft at Gold Hill, on the Comstock, is under full headway, and three shifts of four men each are repairing the shaft. This will be continued to the 1675-foot level, or Sutro tunnel level, when a drift will be run 275 feet to the east to connect with the south lateral.

There are twenty-five mines in operation on the Comstock lode at present, exclusive of those interested in the drainage of the Ward shaft between Gold Hill and Virginia City. The Bullion, Alpha, Julia and Exchequer are included in the number defraying the expenses of recovering the lower levels by that method. The Davis drill on the Brunswick and the Butters Cyanide Co. are not included in the above figures.

Washoe County.

E. S. Bach of Colorado Springs, Colo., secretary of the Con. Nevada M. Co., says operations will be resumed on their group near the Wedekind mine, near Reno. Development will be carried on to determine if the Reno Star ore body continues its trend through their property. A. F. Price is superintendent and manager.

White Pine County.

A. D. Campton has men at work taking out high-grade silver-lead ore from the Stromberg mine in Duck Creek district, near Ely. The mine is owned by Campton & McGill.

The Butte gold mine, lying parallel with the Maggie Maud, being worked under lease by Miller & Peterson, in Cocomungo canyon, 5 miles south of Cherry creek, has men at work sinking a working shaft on a lodge of free gold ore.

NEW MEXICO.

J. E. Sheridan, United States mine inspector for New Mexico, in his annual report shows the coal mining industry of the Territory to be increasing, both by reason of increased operation and favorable showings made in new fields being opened. Production for the fiscal year ending June 30, 1903, was 1,359,530 tons, an increase of 19.99% over preceding fiscal year. The number of men employed was 2233, 1597 men being employed under ground and 636 on outside work. There were fifty-six boys employed underground and fifty-three outside. In addition to the men working at the mines, a large number of others find employment cutting timber for the mines.——The production by counties is given as follows: Colfax county, 558,805 tons; McKinley county, 539,910 tons; Lincoln county, 98,096 tons; Santa Fe county, 92,359 tons; Rio Arriba county, 39,100 tons; Socorro county, 29,460 tons; San Juan county, 1800 tons. Socorro county returns were only approximated, as the principal coal operator of the county had not yet sent in his returns when the mine inspector closed his report. The returns from Socorro county may be 25% larger than given in the list, says the New Mexican.

Grant County.

Litigation over the Wild Cat mine and mill having been settled by compromise, the Clifton C. Co. again assumes full control of the property and will resume work this week. They will increase the concentrator from 65 tons to 150 tons daily capacity. The Wild Cat mine is near Santa Rita, and has a vein averaging 40 feet of 3% copper ore.

President Lister of the North American M. Co., near Lordsburg, reports the 35 H. P. steam engine has been set up, and sinking has been resumed. Lister is sinking the shaft on the Black Sam, one of the group owned by the North American Co. The vein shows values in gold, silver and copper.

Taos County.

Metallurgist M. Stewart of the Glenwoody M. Co., at Glenwoody, says they are building a cyanide mill. The quartz will be crushed in a Huntington mill of fifty tons daily capacity, and another of sixty tons capacity will be added later. The ore averages $3 per ton in gold. Besides the gold property the company has a vein of high-grade copper ore, but little work has been done on it. W. N. Woody is principal owner.

OHIO.

The United States Court of Appeals at New York handed down a decision on the 22nd inst. upholding the validity of the so-called Bradley patent for smelting by the use of electricity. The suit was brought by the Electric Smelting and Aluminum Co., of Cleveland, against the Pittsburg Reduction Co. The court reversed the decision of the lower court, granted the Cleveland Co. an injunction restraining the Pittsburg Reduction Co. from the use of the process at present employed and ordering an accounting of the profits for the time it has been manufacturing aluminum in infringement of the Bradley patent (twelve years). The Bradley patents sustained by the court were taken out by C. S. Bradley in 1891 and 1892, and covered the use of the electric current to fuse and electrolyze a material, the current acting both to maintain the compound in a fused state without the use of external heat, and to separate it into its constituent parts, aluminum being separated from clay in this manner. The patent is a general one, applying to the electrolysis of any material.

OREGON.

Baker County.

Development work has been started by Manager M. E. Bain at the Overland mine in Cable Cove district, near Sumpter. The first work will be driving on the three Overland veins opened by surface work. They will open the first, or larger, and crosscut from these workings to the others.

Douglas County.

The 30-stamp mill of the Oregon Securities Co., near Bohemia, is about completed and will begin dropping stamps next week.

Jackson County.

The New York & Western Mines Co. is preparing to increase development work at the Oregon Belle mine, in Forest Creek district, 7 miles southwest of Jacksonville. Manager Gunnell, of Grant's Pass, says they will put in a steam hoist, compressor and other machinery, and it is proposed to build a mill in the spring. A tunnel has been started and will be driven in 200 feet below the old workings.

Grant County.

The Red Boy mine, near Alamo, has been placed in the hands of a receiver, and will remain closed pending adjustment.

Josephine County.

The New York & Western M. Co. is preparing to increase development work at the Oregon Belle mine in Forest Creek district, near Grants Pass. Manager Gunnell says they are putting in a steam hoist, compressor and other machinery. By next spring they expect the property will be ready for a mill. A tunnel has been started and will be driven in 200 feet below the old workings.

The double-compartment shaft being sunk in the Granite Hill mines on Granite Hill, near Grant's Pass, by the American Gold Fields Co., has cut an 11-foot ledge, and 5 feet of the hanging wall carries average values of $50 a ton. The remainder of the foot wall averages $11 a ton. Free gold and galena are shown. This shaft will be sunk to depth of 600 or 700 feet and the ledge crosscut at every 100-foot level. The 5-stamp mill is kept at work on ore of the upper stopes. A 10-stamp mill is being built. A boiler, hoists, compressors and air drills have been put in at the Granite Hill mines, says Superintendent Wickersham. A sawmill is operated by the company in the heavy fir timber of its claims. There are also several hundred acres of placer ground on the Granite Hill properties, equipped with a hydraulic plant, which will be operated this winter.

The dam which the Golden Drift M. Co. is building across Rogue River, near Grant's Pass, is about completed, says the Jacksonville Times. It is built to its required height across the stream and men are filling in the cribs. The machinery will not be put in till spring. There are fifty men employed in construction of the dam and operating the sawmill. This dam will be capable of supplying 10,000 H. P., part of which will be used in operating the pumps that will supply the giants in Dry Diggings placers with water. The Golden Drift Co. owns 1000 acres of placer ground in Dry Diggings that will be piped off when the dam is completed and the pumps and giants put in.

Lane County.

Near the Blue river the Great Northern mine has been bonded to W. S. Standish, who has put men at work running additional tunnels. A 2-stamp mill is on the property.

SOUTH DAKOTA.

Lawrence County.

The Gilt Edge-Maid M. Co. is doing development on its property near Galena. It is expected next spring work will be started on a cyanide mill for the mine. G. A. Duncan, of Deadwood, is superintendent.

J. Couzette, president of the Ruby G. M. & M. Co., operating in Bear Butte section, northeast of Deadwood, says he is arranging for machinery for his company's mill, the building for which has been completed. It is intended to put in a Chilian mill, operated by gasoline engine of 40 H. P. A cyanide plant is also expected to be added.

W. W. Kelley of Des Moines, Iowa, of the Gladiator Con. G. M. & M. Co. says a 10-stamp mill will be built on the Gold

Fish group of their claims on Lead Hill, ¼ mile from Lead City. Development work is being increased. The ore carries values in free gold, besides containing bismuth, telluride and arsenical pyrites. C. H. Crabtree is secretary and manager.

The report of the Homestake M. Co. for fiscal year ending June 1, 1903, shows production, amounting to $4,526,942.04, exceeding the former year by $258,964.47. This increase is due to the continuous operation of the stamp mills, made possible by the new water supply from Spearfish river, the starting of the Father De Smet mill and the working of the two new cyanide plants. The Homestake's output has increased by half in four years as regards bullion production and tons of ore milled, while the average value per ton has decreased from $4.373 to $3.539 since 1899. The largest single item of expenditure is mine labor. Its property purchases were smallest in the past year. Its taxes have nearly doubled since 1900. The Ellison shaft was sunk from the 900-foot level to the 1100-foot level, and the Golden Gate, a new shaft at north end of mine, sunk from surface to 700-foot level. They are preparing to add 100 stamps to the Amicus mill, but the time required to get a necessary new engine will delay their dropping until next summer. A comparison of the figures for the last three years, says the Black Hills Review, is shown in the following table:

	1901.	1902.	1903.
Tons milled	935,441	1,218,089	1,279,075
Total production	$3,639,232.03	$4,303,977.57	$4,526,942.04
Average per ton	$3.890	$3.533	$3.539
Dividends paid	$1,260,000.00	$1,260,000.00	$ 819,000.00
Property purchased	114,075.64	302,451.95	5,167.76
Ellison Shaft	13,834.86	21,753.12	205,869.76
Mine Labor	1,226,143.27	1,463,626.47	1,548,447.07
Taxes	53,944.95	59,506.00	67,530.59
Water	52,891.86	379,878.58	96,099.44
Interest	23,993.42	25,539.20	31,139.56
Indebtedness	1,038,327.49	510,406.66	425,784.97

The company's indebtedness has been reduced since 1901 by the proceeds of $1,000,000.00 from sale of the Black Hills & Fort Pierre R. R. Co. and the increased earnings of the operation and reduction in dividends.

Pennington County.

(Special Corrospondence).—Work has been resumed in the Gopher mine, near Hill City, after being closed down several years on account of reported loss of the veins. The Lona shaft, 110 feet deep, and the Gopher shaft, 175 feet deep, have been unwatered and several crosscuts will be driven at the lowest levels to cut the veins. The mine is equipped with buildings, hoists, air compressor and drills. A. H. Elftman is consulting engineer, with A. D. Arundel superintendent at the mine.

Hill City, Oct. 26.

The Central Black Hills C. Co. is preparing to put its leaching plant in operation. It is in the copper belt in the southern part of Pennington county, 12 miles northwest of Custer City. The plant has a capacity of 100 tons a day, using sulphuric acid lixiviation process, and precipitating copper on scrap iron.

E. C. Johnson, manager of the Gertie Tin M. Co., operating near Hill City, says his company proposes to build a tin mill at the mine. The mine is developed by an incline shaft 500 feet deep, in which the vein has been explored to the bottom. It carries a good percentage of tin and is 8 feet wide. A test of the ore is being made in the Golden Slipper mill. The plant is a stamp, amalgamating affair, equipped with concentrators, but the tin ore pulp from the stamps is run direct to the concentrators.

UTAH.

Beaver County.

Work has been resumed on the Lenora mine in Elephant canyon, near Milford, owned by Burns et al, and high grade ore is being shipped. F. Killam is superintendent.

Juab County.

Work has been resumed on the Manhattan mine, at Mammoth, and the shaft will be sunk an additional lift.

Manager C. E. Allen of the Centennial-Eureka mine, at Eureka, says they succeeded in hulkheading the drifts leading to the Bullion-Beck and Eureka Hill workings—shutting off the gas and smoke from the fire that has been burning there since the 5th inst. Work has been resumed in the Centennial-Eureka and shipments are again going out. The bodies of seven mules which were suffocated were found and removed. The mine is now accessible down to the 1400-foot level. Superintendent Earls says he is forcing his way toward the fire region slowly at the Bullion-Beck and on the 24th inst. reached within 200 feet of the Caroline stope with the air line. He expects to turn a stream of water into the Caroline. Smoke still continues to emerge from the Eureka Hill shaft in dense volumes.——During the temporary shut-down at the Gemini, Superintendent Jackson is having the new boilers set up and a general clean-up made.

Salt Lake County.

The New Eugland G. & C. M. Co. will build a mill at the Nast mine, near Bingham, to handle their low-grade ore, says Manager Adkinson. Framing, foundation and other preliminary work will be done this fall and wintor, so that machinery can be put in place on its delivery in the spring. The Nast has milling ore in both new and old workings, some of it accumulations of twenty years, says the Bingham Bulletin, and is in the way of further developments. The mill will have fifty tons daily capacity.

Tho directors of the Utah Con. C. Co., operating the Highland Boy mines at Bingham and the smeltor in the valley, have authorized expenditure of $250,000 on enlargements at the smelter, which will add 40% to its present capacity. They expect within six months to bo turning out copper at rate of 20,000,000 pounds per annum. The elevation of the main stack at tho smelter to heigbt of 350 feet (50 feet above the former top), is in progress, says Superintendent Fischer. D. O. Jackling of Colorado Springs, Colo., is manager.

The Dalton & Lark tunnel at Bingham has unwatered the Dalton shaft.

At tho Columbia mines, at Bingham, five machine drills have been put in operation, being supplied with air from the United States Co.'s compressor. Tho hoist has been set up at tho winze below tho main tunnel and in the All's Well vein, and the winze will bo sunk to depth of 200 feet. At depth of 80 feet tbe winze is in ore that averages 10% copper, says Manager Tibbitts.

A series of twenty-seven locations were filed at Salt Lake City last week, covering 5000 acres of oil lands on the edge Great Salt Lake, by C. K. & L. J. Rowland, P. S. & N. F. Keogh, J. A. Kuykendall, T. J. Anderson and J. F. & M. E. Hinton. Tho tract is situatod botweeen the city and the lake, beginning west of Beck's hot springs and running toward Saltair. Drilling rigs will be put up and the oil indications developed.

The Bingham Bulletin says the Fortune mine, together with its ore dumps, is under lease to tho Bingham Con. C. Co., and a track connecting its main tunnel with the Dalton & Lark Electric tramway is being huilt.

Summit County.

C. E. Myers has put men to work in the East Valeo mine near Park City, and work will he done on the contact. The shaft is down 150 feet and a crosscut 200 feet run from this point.

Superintendent Sherman of tho Daly-West mill at Park City says the management will enlarge the plant, and he has hegun grading for an auxiliary one with which to recover the metals that have passed away with the slimes. This will increase the capacity of the concentrator to 300 tons daily, or 75 tons more than it is now reducing. Of the mass of tailings that have collected in the ponds and to which is heing added a large amount daily, he will be equipped, independent of the main plant, to handle 250 tons daily. The concentrator is recovering 97% of the lead contents of the ore and a satisfactory percentage of the silver, says Sherman. But, carried away in the slimes, is sufficient to enable the management, with a slimes plant, to create a product containing from 8% to 10% lead, 45 to 50 ounces silver and some gold, with an iron excess. In addition to these improvements, a set of storage hins will he built and an automatic sorting belt put in.

Tooele County.

Superintendent E. J. Raddatz of the Honerine mine at Stockton says water is coming out of the drain tunnel at the rate of 5000 gallons per minute, 3000 of which is coming through the face where the men ceased work when the water channel was hroken into. Little can be done in the tunnel until the volume decreases. The nearest shaft is that of the Black Diamond Co., which will be the first unwatered. The nearest Honerine shaft is 1800 feet away. Before starting the drain tunnel the Honerine Co. operated pumps, which hoisted water out of the mine at the rate of 3000 gallons per minute.

WASHINGTON.

Ferry County.

Considerable development work is being done in Park City district, on the south half of Colville reservation, south of Republic, says the Spokesman-Review. The Montana and Iron Mountain claims, owned by J. Stack of Repuhlic, E. Dill and F. Birney of Spokane, have a 12-foot vein that runs $6 per ton in gold and silver. It has been developed by an open cut, two 10-foot shafts and a tunnel. The vein is an extension of the Mountain View group and is between the Park and Central mine and Park City. R. Parcell and H. Crounce have a year's lease of the Mountain Boy and are getting out silver-lead ore to ship to the smelters. Q. R. Reisser and W. J. Casey are working the Cliff group, which adjoins the Mountain Boy. Superintendent D. Coughlan has five men working on the Ramore group and getting out gold-silver-copper ore. Coughlan, who is part owner in the Wasco group, has arranged to continue driving the tunnel, which has cut three veins of ore. Balthus & Sharp are at work on the Galena King group driving a tunnel, which is in 260 feet.

Okanogan County.

Superintendent H. Thompson of the Interstate M. Co. reports a find of lead ore on their Delate mine at Chesaw, showing 20% lead, with values in gold and silver. Superintendent Thompson has men at work at the concentrating plant owned by the company 2 miles south of Chesaw. The mill will bo remodeled and a water flume built.

Snohomish County.

Tin is reported found in the Cascade Range, near Snohomish, by J. J. Minnis, while working placer ground.

WYOMING.

Carbon County.

G. Smith and A. LaMarsh of Dillou report finding a deposit of jet near there.

A hurricane passing through southern Wyoming last week is reported to have done considerable damage to the 16-mile aerial tramway of the North American C. Co., from their mines at Rudefeha to their smelter at Grand Encampment.

Converse County.

A gas discovery is reported in Brenning Basin, 11 miles west of Douglas. Tho flow was struck at depth of 475 feet, and it forced the heavy drill out of the well and threw gravel and dirt over the top of the derrick. The well has been cased and capped. It is proposed to pipe the gas to Douglas, Caspar and Glon Rock.

At the Oriole and Tenderfoot mines, near Douglas, owned by the Oriole C. M. Co., of which C. D. Clark is president, development work is progressing and sulphide ores are being opened up with depth. There are four lode claims with a millsite in the Oriole group, and an abundance of timher within half a mile, says the News. They are equipped with machinery which has capacity for hoisting from 600 feet. The main shaft is down 155 feet, and at 145 feet passed into a vein of carbonates 3½ feet in width, and running well in copper. The discovery shaft, 300 feet south of the main shaft, is 76 feet in depth, with a 50-foot crosscut. The Tenderfoot group comprises six lode claims on which machinery with a depth capacity of 700 feet is being set up. The shaft is 90 feet in depth and in ore showing 4½% copper. One factor in the future development of the Oriole and Tenderfoot will be the natural gas which has been struck nearby. In one well the gas registers a pressure of 500 pounds and will be used as fuel for milling and smelting purposes.

Laramie County.

The Copper Belt M. Co., in which Omaha, Neh., and Black Hills, S. D., men are interested, is preparing to increase development work on its copper mines at Rawhide Buttes. They will build a 40-ton matte smelter. The Copper Belt Co. owns thirty-five claims adjacent to the forty claims of the Sunrise C. Co., owned by A. A. Spaugh et al. of Manville. They will sink two 300-foot shafts and drive a tunnel.

FOREIGN.

AUSTRALIA.

New South Wales.

The New South Wales gold output for month of September was 60,613 ounces, valued at £219,374, making the yield for 1903 to Oct. 1, 237,054 ounces, valued at £866,461.

Victoria.

The gold yield of Victoria for 1903 to Oct. 1 amounted to 587,058 ounces, an increase of 24,951 ounces over same period of 1902.

Western Australia.

Searching for the deepest of the two telluride shoots cut by the diamond drill is under way at the 1050-foot level of the Associated Northern mine, near Kalgoorlie. Under Superintendent Roberts prospecting work is being done in other parts of the property. The ore treatment plan is ready for operation.

Diamond drilling of the leases held by the Hannans Reward Mt. Charlotte Co., at Kalgoorlie, has been started to test these properties in deep ground. This work is being subsidized by the Government and 1500 feet of horing will be done.

The Great Boulder main lode is being further prospected in depth hy diamond drilling from the 1000-foot level of Laue's shaft at Kalgoorlie. The first bore is being put in a northerly direction to determine if the Great Boulder and Horseshoe lodes join at depth in the south end of the former.

BRITISH COLUMBIA.

East Kootenay District.

The Gold River M. & P. Co. will put in a sawmill to cut lumber for a flume at Bull river, near Fort Steele.

Slocan District.

An aerial tram is being built to connect the No. 4 tunnel with the main line on the Ivanhoe mine, near Sandon.

During month of September the Arlington mine at Erie shipped five carloads of ore to the smelter. The net smelter returns were $5341.95, says the News-Advertiser. The expenses were $4322.02 for the month.

From January 1 to October 3, 1903, shipments from the district have been as follows:

	Tons.
American Boy, at Sandon	666
Antoine, McGuigan	212
Arlington, Slocan Lake	40
Bosun, Slocan Lake	975
Blue Bird, Sandon	37
Enterprise, Slocan Lake	615
Fisher Maiden, Slocan Lake	280
Hartney, Slocan Lake	42
Idaho, Sandon	81
Ivanhoe, Sandon	695
Lucky Jim	103
Mercury	41
Monitor, Sandon	640
Meteor	52
Ottawa, Slocan Lake	126
Payne, Sandon	1,778
Queen Bess, Sandon	204
Rambler, McGuigan	1,448
Reco, Sandon	153
Republic	70
Ruth, Sandon	417
Red Fox, McGuigan	119
Slocan Star, Sandon	1,975
Silver Glance, McGuigan	55
Eleven others, a total of	122
Total	10,946

Vancouver Island.

The mule drivers at the coal mines at Extension returned to work last week, their differences with the colliery company having been adjusted.

The fire in the coal mines at Cumberland is still burning, says tho Rossland Miner of last week. A crosscut is being driven to gain access to the seat of the combustion. J. Dunsmuir, owner, and Superintendent Little are at Cumberland supervising the fire-checking operations.

Yale District.

A 300-ton smelter will be built 3 miles below Kamloops, on the Thompson river, says Manager W. E. Wood. It will be so constructed that its capacity can be increased to 500 tons a day whenever required. New York and Montreal men are interested. The company owns copper-gold claims on Coal hill, back of Kamloops. The ore is mostly low grade. The Python mine is in position to supply 100 tons a day and, besides other Coal hill properties, the smelter will draw on Adams Lake and Cherry Creek camps. Placer mining is also going on in that section, as well as dredging. At Tranquille creek an average of forty ounces of gold per week are taken out with a dredger.

MEXICO.

Tho Boletin de Estadistica Fiscal, issued by the Mexican Treasury Department, gives the following statement of Mexico's gold and silver production during the twenty-five fiscal years from 1877–78 to 1901–2, inclusive:

Year.	Gold.	Silver.
1877–78	$ 746,630	$24,836,903
1878–79	881,301	25,135,264
1879–80	941,958	27,555,627
1880–81	1,012,697	29,234,398
1881–82	936,223	29,239,078
1882–83	955,539	29,568,577
1883–84	1,055,184	31,695,841
1884–85	914,179	33,226,211
1885–86	658,020	34,208,214
1886–87	683,153	37,584,104
1887–88	664,365	39,867,983
1888–89	684,480	41,347,626
1889–90	700,909	39,156 687
1890–91	920,702	41,874,411
1891–92	1,074,637	47,096,156
1892–93	1,269,907	55,245,434
1893–94	1,244,621	58,210,150
1894–95	4,744,542	58,204,085
1895–96	6,085,038	61,003,672
1896–97	6,861,126	63,689,112
1897–98	7,584,182	70,149,606
1898–99	9,846,541	72,498,723
1899–1900	7,823,701	70,218,914
1900–1901	9,327,542	74,326,406
1901–1902	9,982,676	72,530,983

The value of the gold is calculated at the rate of $675.416 per kilogram and of silver at $40.915 per kilogram. From these figures it is seen that the depreciation of silver in foreign markets has not prevented an increase in the silver production of Mexico, and has been an impulse to gold production.

Chihuahua.

G. W. Boyce reports work progressing on Shamrock No. 1, Shamrock No. 2 and Burnham mines in Terrazas camp and the Senorita mine at Victorino. He will start work next week on the Cruger, near Bustillos, the Josephina, near Cusihuiriachic, and on the La Cabrisa copper mine, over

the line in Sonora, says the Chihuahua Enterprise.

R. D. Jackson, manager of the Buena Tierra and other mines at Santa Eulalia, has started diamond drill work. Another drill will also be put in operation.

Jalisco.

R. Eames, Jr., manager of La Fortuna M. Co. of New York, is pushing development work on the company's property near Ahualuco. Over 2000 feet of work has been done. Two tunnels are being driven, one of which is in 1095 feet and the other 530 feet. Ore is being blocked out and 1000 tons are on the dump. A reduction plant will be built.

Lower California.

(Special Correspondence). — Recently some newspapers have published accounts of rich placer gold deposits having been found in the district of San Antonio, the truth of which has been investigated by a reliable man. His purpose in contradicting these reports is to dissuade prospectors and miners from spending money to reach that most inhospitable region, where they are certain to meet with disappointment. The district mentioned is 35 miles southeast of the port of La Paz, on the west coast of the peninsula of Lower California, about midway between the Pacific ocean and the Gulf of California. The existence of shallow gold placers in this region has been known since its earliest settlement, and there are records of their having been worked, off and on, since 1780, but never with any measure of profitable success. The country is extremely dry. There are no streams of running water, and very few springs, and the rainfall of that region is limited, so much so that the land is uncultivated and food for man and beast is imported from the mainland of Mexico. Many forms of mechanical appliances called "dry washers" have been tried in efforts to recover the gold from these placers, but without success. Miners who go to that region in search of easily won gold will not find it.

La Paz, Oct. 15.

The H. Johnson gold placer mines and ditch in the Socorro district, 80 miles southeast of Ensenada, have been sold for $100,000 cash to the Lindley-Stevens Co. of Chicago, Ill. Johnson, after obtaining concession from the Mexican government, built a ditch from the San Pedro Martir range to the placers, a distance of 18 miles. The new owners will increase development work on the placers and make the 18-mile ditch more permanent by use of cement.

At the El Sueno mine, owned by San Diego and National City, Cal., men, they are putting in additional machinery and will increase developments. The mine is 12 miles below the California line. This company has been shipping concentrates, and with the new machinery will increase the output.

Puebla.

I. Cahrera and A. Ziegler are exploiting a copper find which they report located in the Higo mountain, district of Teconcingo, owned by A. Mora, governor of Guerrero. The mine has been named 'Gambrinus."

Sonora.

The Gold Treasure mine in the San Jose mountains, near Altar, will have a mill. The company has been reorganized as the Arizoua M. & Dev. Co., and C. G. Jones is president.

In his report to the stockholders of the Greene Con. C. Co., operating at Cananea, President W. C. Greene shows that during the fiscal year ended July 31st last, there were extracted and treated from the mines of the company 333,329 tons of ore, giving product of 43,228,120 pounds, containing 42,310,554 pounds of pure copper, 397,426 ounces of silver, and 2392 ounces of gold, and having a gross value of $5,706,192. Of this product 12,424,696 pounds of copper were sold between August 1, 1902, and January 31, 1903, realizing $1,454,500. For the seven months beginning January 1, 1903, and ending July 31, there were sold 26,819,974 pounds of copper, realizing $3,592,126. The average selling price of copper for the first period was 11.7 cents per pound. For the latter period the average was 13.39 cents a pound. In addition there were sold 295,845 ounces of silver, realizing $149,153, being an average price per ounce of 50.45 cents. During the samo period there were sold 1650 ounces of gold at $19.80 per ounce, realizing $632,684. There remained on hand unsold on August 1st, 1903, 3,065,874 pounds of copper and 101,581 ounces of silver, which on basis of last salos had value of $477,778.

Zacatecas.

At Chalchihuites, in northern Zacatecas, the Compania Beneficedora Metales de Chalchihuites is building a 25-ton concentrator and a 25-ton smelter. The smelter will ho ready for operation hy Feh. 1st.

——The Chalchihuites M. Co. of Newark, N. J., is developing a group of 192 pertenencias. They have put in a 50 H. P. hoist on their San Nicolas mine and have opened up ore, says President E. H. Jones. They also own two copper claims.

SWEDEN.

United States Consul R. S. Bergh at Gothenhurg writes that a large establishment for electric smelting of zinc ores hy a method invented by G. de Laval, of Stockholm, is heing built at the Hallstahammar Works, in Province of Vestmanland. The method is the same as that employed both at Trollhattan and Norway. The power station is at Hallstahammar Bruk, where the Kolhack creek falls 35 feet. The smelter is expected to he finished hefore Jan. 1st.

PERSONAL.

W. A. BOLEY is now assayer of the Spearfish G. M. & R. Co., Cyanide, S. D.

A. D. ARUNDEL of Hill City, S. D., is superintendent of the Gopher mine, near Hill City.

J. BROOKS is superintendeut of the Dewey mill of the Columhia C. Co., at Bingham, Utah.

J. H. HAMMOND, consulting engineer of Stratton's Independence, Ltd., is in Cripple Creek, Colo.

H. R. OGDEN is superintendent of the Federal Loan mine in Willow Valley, near Nevada City, Cal.

RICHARD ADDOMS is superintendent of the Alpine mine, near Sumpter, Or., vice Rearden, resigned.

L. MCDONALD, a mine owner of French Gulch, Shasta county, Cal., is in San Francisco on husiness.

H. J. MEISEL, assayer and chemist for the Rawhide G. M. Co., near Jamestown, Cal., is in San Francisco, Cal.

H. EDDY has resigned as superintendent of the Federal Loan mine in Willow Valley, near Nevada City, Cal.

W. C. MARSHALL has resigned as manager of the Marshall-Russell M. Co., operating near Georgetown, Colo.

J. C. JENS is in southern Mariposa county, Cal., making a report on a copper property for New York people.

C. R. DOWNS, superintendent Bunker Hill mine, near Amador City, Cal., is in San Francisco, Cal., on business.

H. K. WHEELER has returned to Los Angeles, Cal., from an inspection of Encampment, Wyo., mining property.

F. A. MAXWELL is manager of the Marshall-Russell M. Co. at Georgetown, Colo., vice W. C. Marshall, resigned.

A. H. ELFTMAN of the Wabuse mine, Silverton, Colo., is at Hill City and Deadwood, S. D., on professional husiness.

WEBB SMITH is superintendent of the Kennedy M. Co. at Jackson, Amador county, Cal., vice J. F. Parks, deceased.

R. J. KING has resigned as superintendent of the Esperanza Oil Co. at Coalinga, Cal., and has returned to Hanford, Cal.

F. B. CALDWELL of Woodland, Cal., is in San Francisco, Cal., after an extended visit on mining husiness to Durango, Mexico.

W. E. DEFTY of Phœnix, Ariz., is in Cochise county, Ariz., and will go from there to Sonora, Mexico, to examine mines.

I. J. COLE, manager and superintendent of the Pine Hill mine, near Grass Valley, Cal., has gone East on company husiness.

DUNCAN MCVICHIE, of Salt Lake City, Utah, manager of the Bingham Con. C. Co., Bingham, is in Helena, Mont., on husiness.

W. H. CHILD, manager of the Sheba mine, south of Wells, Nev., has returned to Salt Lake City, Utah, from a trip to the mine.

J. A. VEATCH of Napa, Cal., interested in La Mina Espiritu Santo of Darien, Colombia, is in San Francisco, Cal., on mining husiness.

MANAGER P. PORTER of the Keystone group at Cortez, Lander county, Nev., returned to Salt Lake City, Utah, last week from Nevada.

ALEXANDER HILL, consulting engineer of the Le Roi Two C. Co., has returned to London, England, from their mines at Rossland, B. C.

B. E. BURGER of San Jose, Cal., interested in the Fair Play mine in Nevada county, Cal., is in Nevada City, Cal., on mining husiness.

H. ANDERSON of Bakorsfield, Cal., is superintendent of the Esperanza Oil Co. at Coalinga, Fresno county, Cal., vice R. J. King, resigned.

C. C. WARNER, superintendent of the Copper Glance mine, in Warren district, near Bishee, Ariz., is in Marquette, Mich., on company business.

ALLEN C. MASON of Tacoma, Wash., president of the Big Indian mine near Helena, Mont., was in New York last month on a husiness visit.

W. E. THORNE of San Francisco, Cal., has gone to Oroville, Cal., to collect Butte county mineral specimens for the State Mining Bureau exhihit at the St. Louis Exposition.

JOHN M. BECKWITH of London, England, formerly manager of the Silver King, Ltd., of Calico, Cal., is now exploring in the gold regions of Egypt for an English company.

C. C. MALTMAN, formerly in charge of the gold mines at Thompson, Ga., left San Francisco, Cal., this week for the Sahino M. Co.'s mines at Alamos, Sonora, Mexico, of which he is manager.

W. BROADBRIDGE, who has had charge of the Sons of Gwalia, Ltd., mines at Leonora, Western Australia, has been appointed manager of the Vivieu G. M., Ltd., at Lawless, Western Australia.

W. A. PRITCHARD, formerly superintendent of the Keystone mine, Amador City, Cal., now manager for Bewick, Moring & Co. in West Australia, has been elected a vice-president of the Chamher of Mines of Western Australia, and W. J. Loring, formerly of Angels, Cal., is a member of the executive council.

ALBERT T. DE FOREST, who has heen district manager of the American Steel & Wire Co., Cleveland, Ohio, is in San Francisco, Cal., where he will make his future headquarters in the interest of the company. Mr. De Forest has heen prominent in the company's affairs for several years, having general direction and active management of their mills and business in the Cleveland, Ohio, district.

D. H. JACKSON, president of the Ida Mitchell M. & M. Co., Placerville, Cal., was in New York City last month on a purchasing trip. The Ida Mitchell Co., of which he is the head, was incorporated last spring at Lancaster, Pa., and has among its officers W. W. Apple, G. R. Heisey of Lancaster, R. S. Apple of Hamhurg, Pa., and H. K. Fox and A. A. Jackson of Philadelphia. It is proposed to equip the new plant electrically throughout. The company's Philadelphia offices are in the North American building.

Obituary.

LEVI STAPLES, a pioneer of Utah and a merchant and mining operator in Mackay, Idaho, died at Mackay on the 23rd inst., at the age of 76 years.

GORDON ALLEN, a mining operator of Joplin district, Mo., was shot and killed at the Aylor mine, near Prosperity, Mo., on the 16th inst. in a discussion over litigated properties. Deceased was 32 years of age.

GEORGE SIMMONS, a mine owner of southern Nevada and California, and principal owner in the Turquoise mines of the Toltec Gem M. Co., near Searchlight, Nev., was shot and killed on the 15th inst. at Manvel, Cal.

R. E. GOODELL, a pioneer mine operator of Leadville, Colo. died at Denver, Colo., on the 19th inst. Deceased was horn at Pomfret, Conn., in 1827. At age of 15 he was postmaster of Ottawa, Ill. Later, he was elected Secretary of State of Illinois. He enlisted and served through the Mexican War, and at the outhreak of the Civil War was colonel of the Twentieth Illinois Infantry. He is survived hy a widow, four daughters and a son.

J. P. O'BRIEN, pioneer prospector and mining man of Leadville and of Denver, Colo., died at Denver, Colo., on the 21st inst., as result of falling from the eighth floor of the Equitable Building, down the air shaft. Deceased was the discoverer and locator of the O'Sullivan claim at Leadville. He was lately interested in other mining properties, among which were the Bell Mahone group and the Anna Lee group, also in mining properties near Waunita Springs, Gunnison county.

L. DE L. KELLOGG died at Westfield, Mass., on the 24th inst. Deceased was a pioneer miner of Plumas county, Cal., coming to this State in 1852 and engaging in mining at Rich Bar, on the east branch of the north fork of Feather river. Later he went to Trinity and Shasta counties. During the early '60s he owned and worked the surface placer grounds at Round valley, near the present town of Greenville, and, still later, the Kittie mine at Cherokee until 1870. After disposing of his property there, he was employed by Hearst, Haggin, Tevis, et al., to investigate mining properties in Arizona, New Mexico, Utah and Dakota. He hought for them the Father De Smet and Deadwood-Terra mines in the Black Hills, S. D., and was the general superintendent of these for several years. He was 76 years of age.

Commercial Paragraphs.

THE A. Lietz Co., scientific instrument makers, move into new and enlarged quarters, 207 Montgomery St., San Francisco, Cal., Nov. 2.

A COMPANY has been organized to erect and operate the Ferris wheel during the St. Louis Exposition, and the engineering work of the taking down, transportation and erection of the wheel has heen intrusted to Robert W. Hunt & Co. It is estimated that it will involve an outlay of about $125,000. This work will he under the direction of L. V. Rice, who superintended the original erection of the wheel at the Columhian World's Fair, its subsequent taking down and removal and re-erection upon its present site in North Chicago. As this will he the only structure from which the whole Louisiana Exposition can be viewed, and as there will not he any towers or any other high novelties to compete with, it is believed that it will repeat its World's Fair success.

Books Received.

"Electric Railway Economics" is the title of a new volume on this increasingly important subject, by W. C. Gotshall. It deals with the preliminary problems of construction, both in office and field; careful estimates of earnings and expenses; construction; comparison of various systems; power stations; storage hatteries; rolling stock and motors, etc. It also contains many figures and illustrations. VI + 252 pages. Price, $2; McGraw Publishing Co., New York City.

"The Gas Engine," by F. R. Hutton, is the title of a work on this important matter, and is the latest American contrihution on the subject. It deals with the liheration of heat energy and comhustion; mechanical energy from expansion of gas and air; the various types of gas engines, using gas, oil, gasoline, alcohol, etc.; and also goes into a discussion of the mechanism of gas and heat engines generally, including the automobile. The work contains 483 + XVIII pages with 243 figures and half-tone illustrations. Price, cloth, $5. John Wiley & Sons, New York; Chapman & Hall, London.

Catalogues Received.

"The Pinder Concentrator" is the title of an attractive catalogue issued hy the Joshua Hendy Machine Works of San Francisco, Cal. It describes in detail the construction and operation of this newest concentrating device. The catalogue goes into the scientific and practical phases of concentration of ores and contains many valuahle hints and points in the husiness. It contains 32 pages of text and tahles, and is handsomely illustrated.

Latest Market Reports.

SAN FRANCISCO, Octoher 30, 1903.

METALS.

SILVER.—Per oz., Troy: London, 28d (standard ounce, 925 fine); New York, har silver, 60⅝c, refined (1000 fine): San Francisco, 60⅝c; Mexican dollars, 48@50c San Francisco, 46½c New York.

During the past week silver has fallen a fraction in price, heing quoted to-day at 60⅝. The withdrawal of the Government from the market is evidently making an impression. Still, it is helieved the price will not go below 60 cents, and it may advance again.

COPPER.—New York: Standard, $14.00; Lake, 1 to 3 casks, $14.00; Electrolytic, 1 to 3 casks, $13.75; Casting, 1 to 3 casks, $13.50; San Francisco: $15.00. Mill copper plates, $17.00; bars, 18@24c. London: £54 10s spot per ton.

Copper had taken a slight advance during the week, heing quoted at 13.50 to 14 cents. The foreign market is stated to be in hetter shape than for some time past, with a more active inquiry for copper. A pronounced buying movemont, which had been anticipated, is manifest, with a consequent higher price.

LEAD.—New York, $4.50; Salt Lake

City, $3.50; St. Louis, $4.00; San Francisco, $4.50, carload lots; 4¾c 1000 to 4000 lbs.; pipe 6¼, sheet 7, bar 5½c; pig, $4.75. London: £11 5s ℔ long ton.

SPELTER.—New York, $6.12½; St. Louis, $5.10; London, £20 15s ℔ ton; San Francisco, ton lots, 6¾c; 100-lb. lots, 7c.

TIN.—New York, pig, $26.00 @ 26.25; San Francisco, ton lots, 27½c; 500 lbs., 28c; 200 lbs., 28c; less, 28½c; bar tin, ℔ lb., 30@32c. London, £118.

PLATINUM. — San Francisco, crude, $18.00 ℔ oz.; New York, ingot, $19.00 ℔ Troy oz. Platinum ware, 75 @ 80c ℔ gram.

QUICKSILVER. — New York. $46.00@47.00, large lots; London, £8 7s 6d; San Francisco, local, $43@44 ℔ flask of 76½ lbs.; Denver, $49.50. Export, $42.50@43.00.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6¼c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

SOLDER. — Half-and-half, 100-lb. lots, 18.75c; San Francisco, Plumbers', 100-lb. lots, 15.50c.

ZINC.—Metallic, chemically pure, ℔ lb., 50c; dust, ℔ lb., 10c; sulphate, ℔ lb., .04c.

NICKEL.—New York, 50@60c ℔ lb.; ton lots, 40@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30@34c.

ANTIMONY. — New York, Cookson's, 7½c; Hallett's, 6¾c; San Francisco, 1000-lb. lots, 8c; 300@500-lbs., 8½c; 100-lb. lots, 10½c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, $16.35 (@17.10; gray forge, $14.65; San Francisco, bar, 3c ℔ lb., 3½c in small quantities.

STEEL. — Bessemer billets, Pittsburg, $27.00@29.00; open hearth billets, $28.00 (@30.00; San Francisco, bar, 7c to 12c ℔ lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer	$17 00@18 00
Foundry Northern 1	16 50@17 00
Northern 2	16 00@16 50
Northern 3	15 50@16 00
Southern 1	16 10@——
Southern 2	15 60@——
Southern 3	15 10@——
Forge	14 85@——
Charcoal	19 00@20 00
Billets, Bessemer	28 00@29 00
Bars, iron	1 50@——
Bars, steel	1 75@ 1 80
Rails, standard	28 00@30 00
Rails, light	28 00@34 00
Plates, boiler	1 90@ 2 00
Tank	1 75@ 1 80
Sheets, 26 store	2 90@ 3 00
No. 27	2 90@ 3 00
No. 28	3 00@ 3 10
Angles	1 75@——
Beams	1 75@——
Tees	1 80@——
Zees	1 75@——
Channels	1 75@——
Steel melting scrap	13 50@14 00
Relaying rails	23 00@25 00
Dealers forge	12 00@12 50
No. 1 railroad wrought	14 00@14 50
No. 1 cast, net ton	13 00@14 00
Iron rails	17 00@17 50
Car wheels	17 00@18 00
Cast borings	5 25@ 5 50
Turnings	10 00@10 50

LUMBER. — (Retail): Pine, ordinary sizes, $24.00@25.00; extra sizes higher; redwood, $28.00@30.00; lath, 4 feet, $4.50 @5.00; pickets, $21.00; shingles, $2.50 for No. 1 and $2.25 for No. 2; shakes, $13.50 for split and $15.00 for sawed; rustic, $28.00 @35.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, $3.35; Cut, $3.55; 10d to 16d, Wire, $3.45; Cut, $3.35; 8d Wire, $3.50; Cut, $3.50; 6d and 7d, Wire, $3.60; Cut, $3.60; 4 and 5d, Wire, $3.70; Cut, $3.70; 3d, Wire, $3.85; Cut, $3.85; 2d, Wire, $4.10; Cut, $4.10. Special rates for carload lots.

LIME.—Santa Cruz, $2.35; Roche Harbor, $2.35 ℔ bbl.

CEMENT.—Imported, $2.50@2.75 ℔ bbl.; California carload lots, $2.25 f. o. b. at works; small lots, $2.50 ℔ bbl. in sacks, 4 sacks to bbl.

GENERAL SUPPLIES.

OILS.—Linseed, boiled, bbl., 49c; cs., 54c; raw, bbl., 47c; cs., 52c; Lucol oil boiled, bbl., 44c; cs., 49c; raw, bbl., 42c; cs., 47c. Kerosene—Pearl, per gal., 22c; Astral, 22c; Star, 22c; Extra Star, 26c; Eocene, 25c; Elaine, 28c; Water White, in bulk, 15½c; Mineral Seal, iron bbls., 19c; wooden bbls., 21½c; cs., 25c; Mineral Sperm, cs., 26½c.; Deodorized Stove Gasoline, bulk, 17c; do., cs., 23½c; 86° Gasoline, bulk, 21c; do., cs., 27½c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19½c; Lard Oil, E. W. S., bbl., 85c; cs., 90c; Neats-foot Oil, pure, bbl., 75c; cs., 80c; Sperm, crude, 50@60c; Natural White, 70c; Bleached, do., 75c; Whale Oil, cs., 50@55c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2.00 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11c ℔ set; 14 oz., 40s., 10c.

COAL. — San Francisco, coast, yard prices: Wellington, $8.00; Seattle, $6.50; Coos Bay, $5.50; Southfield, $8.00. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8.00; Cumberland, $13.00; Cannel, $8.50; Welsh Anthracite, $13.00; Rock Springs, $8.50, long ton; Colorado Anthracite, $14.00. Coke, $10.50 per ton in bulk, $13.00 in sacks; Sunnyside, $8.50, long ton.

CHEMICALS. — Cyanide of potassium, 98%-99%, jobbing, 23@24c ℔ lb.; carloads, 23@23½c; in tins, 30c: soda ash, $2.00 ℔ 100 lbs.; hyposulphite of soda, 3(@3½c per lb.; caustic soda, in drums, 3@3½c ℔ lb.; Cal. s. soda, bbls., $1.20@1.40 ℔ 100 lbs.; sks., $1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb. tins; roll sulphur, 2¼@2¾c; powdered sulphur, 2@3c; flour sulphur, French, 3½@3½c; alum, $2.00@2.25; California refined, 1¾@2c; sulphide of iron, 8c ℔ lb.; copper sulphate, 5¼@5¾c; chloride of lime, spot, $2.50@2.75; sulphuric acid, in carboys, 66% B, 1¾@2c ℔ lb.; nitric acid, carboys, 8c ℔ lb.

BONE ASH.—Extra No. 1, 5@6c ℔ lb. No. 1, 4@5c.

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails, ½c ℔ lb. above keg price; in 1 and 5-lb tin cans, 100 lbs. per case, ½c. per lb. above keg price. Dry Lead—In bbls., 1 ton and over, 6c; do. in kegs, 6½c.

RED LEAD.—500 lbs. and over at one purchase, ℔ lb., 6½c; less than 500 lbs., 7c.

LITHARGE.—Pure, in 25-lb. bags, 8@9c ℔ lb.

BORAX.—Concentrated, 6@7c ℔ lb; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

MANGANESE.—Pure, ℔ lb., 60c.

SODIUM.—Metal, ℔ lb., $1.00.

BISMUTH.—Subnitrate, ℔ lb., $1.75.

MERCURY.—Bichloride, ℔ lb., 90c.

MOLYBDENUM.—$2.00 ℔ lb.

CHROMIUM.—90% and over, ℔ lb., $1.00.

PHOSPHORUS.—American, ℔ lb., 75c.

SILVER.—Chloride, ℔ oz., 90c@$1.00; nitrate, 55c.

ALUMINUM.—No. 1., 99%, small lots, 37c ℔ lb.; 100 lbs., 35c; 1000 lbs, 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

URANIUM.—Oxide, ℔ lb., $3.50.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

STEP-LADDERS.—No. 741,872. Oct. 20, 1903. J. A. Ashley, Yuba City, Cal. This invention consists in a bolt for securing the parts of step-ladders together consisting of a threaded cylindrical portion adapted to pass through the side of the ladder, a vertical portion to pass through the step, said portion being made segmental in cross section and wider than the cylindrical portion and a transverse head having depressed ends.

DENTAL DAMS.—No. 741,890. Oct. 20, 1903. H. Craigie, San Francisco, Cal. One-half assigned to J. W. Rooch of same place. This invention relates particularly to an improvement in rubber dams as used in dentistry. It consists as a new article of manufacture in a perforated rubber dam having annular embosses upon its surface surrounding the perforations, the walls of said perforations being beveled.

MOWING MACHINE.—No. 741,874. Oct. 20, 1903. J. W. Barnes, San Francisco, Cal. This invention relates to improvements in mowing machines employing an endless cutter in contradistinction to those in which a reciprocating cutter bar is used. Its object is to provide, among other things, a simple, efficient, durable and positively operated device in which the speed of the cutter may be regulated according to the character of the grain and the rate of travel of the team.

SIDEHILL HARVESTING MACHINE.—No. 741,876. Daniel Best, San Leandro, Cal. This invention relates to that class of machinery designed for cutting, threshing and cleaning grain, in which the machine is mounted upon wheels and adapted to travel over the field in which the grain stands, being propelled by either animal or mechanical power. It consists in a means for changing the position of the bearing wheels relative to each other in such manner that the threshing and cleaning mechanism of the apparatus may be maintained substantially level in the direction transverse to the line of travel and when the machine is traveling upon sidehills or inclined ground, which would otherwise throw the said mechanism out of level.

APPARATUS FOR ASSORTING AND DISTRIBUTING FRUIT.—No. 741,928. Oct. 20, 1903. C. Rayburn, Lindsay, Cal. The object of this invention is to provide suitable means for the rapid handling of assorted fruit by affording accommodation for a greater number of packers than it has heretofore been generally possible to employ, at the same time economizing floor space.

WHEELS.—No. 741,877. Oct. 20, 1903. Daniel Best, San Leandro, Cal. This invention relates to the class of vehicle wheels, and especially to those wheels which are to be used with heavy vehicles, such as harvesters, traction engines, road locomotives and the like, and the object is to so construct the wheel hub as to enable the spokes to be readily inserted and removed without bending, and to insure them against accidental displacement or removal from the slots or channels.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific Coast inventors:

FOR THE WEEK ENDING OCTOBER 20, 1903.

741,994.—INSULATOR—Anderson & Bebler, Los Angeles, Cal.
741,872.—STEP LADDER—J. A. Ashley, Yuba City, Cal.
741,874.—MOWING MACHINE—J. W. Barnes, S. F.
741,876.—HARVESTER—D. Best, San Leandro, Cal.
741,877.—WHEEL—D. Best, San Leandro, Cal.
741,764.—HONEY COMB FRAME—J. W. Brown, Los Angeles, Cal.
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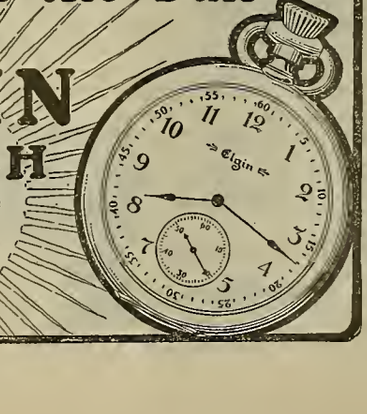
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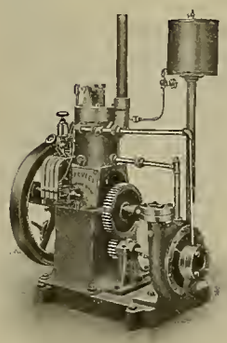
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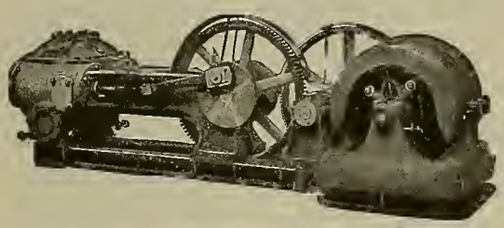
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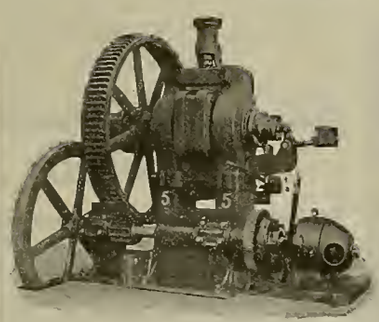
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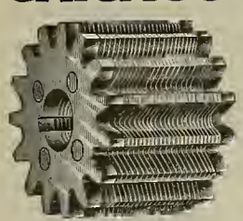


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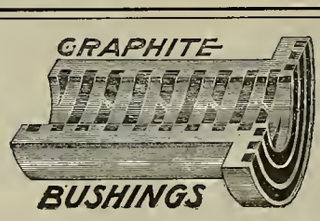
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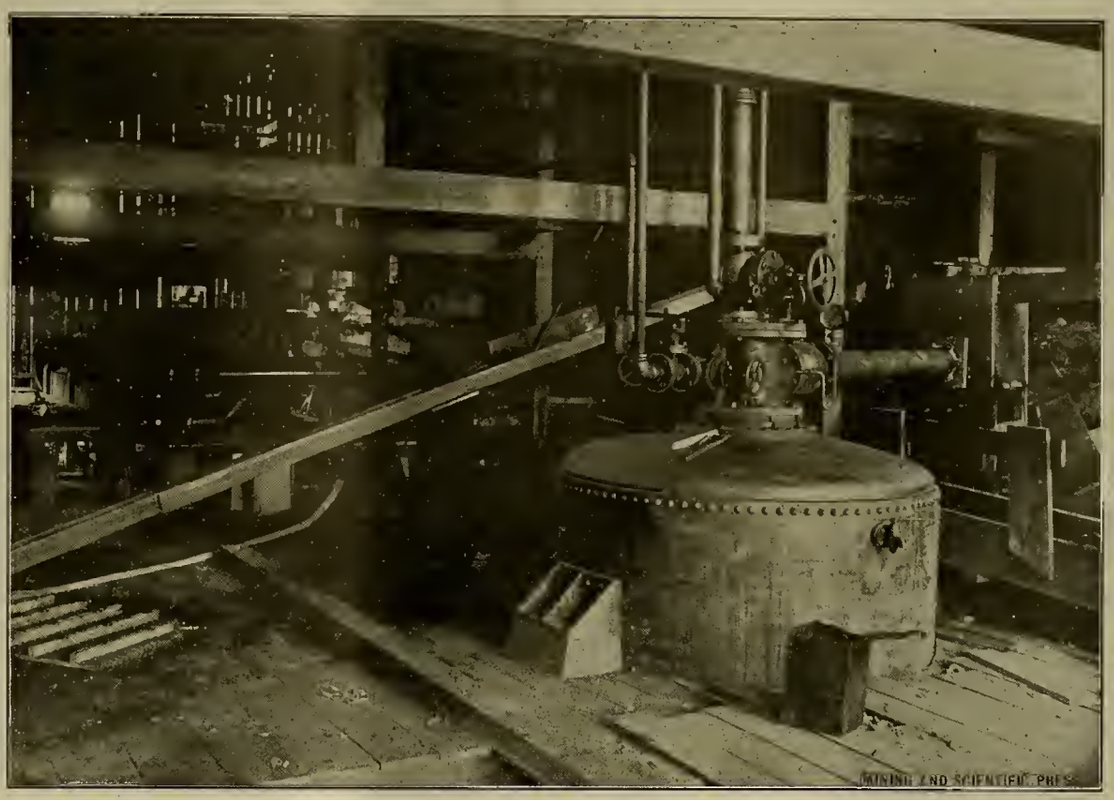
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Mine Investment in Mexico.

Many investors are now looking toward Mexico with a view to acquiring mining property there. While undoubtedly there are many opportunities in that Republic, it should be remembered that good mines—by which is meant mines that can be profitably worked—are probably not more numerous in Mexico than in the United States. The Mexican mining laws, which, on the whole, are good and equable laws, differ materially from our own, and no American citizen should make mining investment in Mexico without being fully informed concerning the Mexican mining code. There is a system of procedure which must be rigidly adhered to, or the concession may be lost to the investor, and it is needless to say that the more valuable his mine proves to be, the greater the danger to his title if every particular be not observed. If a large investment in plant is contemplated, it is the more important that all the formalities of the law be complied with, and that the system of taxation be fully understood and provided for. In former years, before the revision of the mining laws, foreign investment often proved disastrous for other reasons than the lack of value in the mines; but more recently a large amount of English and American capital has gone into Mexico, and some large and successful mining operations are the result. There are many new districts being opened up, but the old districts are still the favorite field for the investor. There are many mines in Mexico which have been successfully worked by native miners in the past—some of them a century or more since—but the encountering of water, or base ores, or some other hardship, usually resulted in a cessation of all operations, while the owner would devote his attention to another vein in the same or some other district. The chief cause of stoppage was generally the working of the vein to the water level. In such mines the new investor doubtless stands the best chance for success, though the equipment would call for a larger investment than would be required if it were a tunnel proposition. Many years of experience has proved that a Mexican miner can work a mine by means of a tunnel as well as anyone else, in his own peculiar way, and he has also demonstrated his ability to successfully operate a dry mine by means of shafts—the ore being carried up hundreds of feet through the workings on the backs of half-nude men who, barefooted, climb the notched posts, called by American miners "chicken ladders," until they reach an adit level, through which they pack ore to daylight.



Montejus, Greenback Cyanide Mill, Oregon. (See page 306).



Stope Worked by Square Set Method in Mexican Mine, Showing Sprags to Roof.

There is no phase of mining in dry, good-standing ground, with which the Mexican miner is not familiar, except timbering by square set method or some of the other more modern schemes for stoping, such as caving and filling, etc. In view of these facts, investors should approach with caution old Mexican mines which are idle, but which are represented as still having fabulous value, for the mine which a Mexican could not make pay with his low costs for labor and methods requiring a minimum of supplies, is likely to prove a financial burden in the hands of American investors, who put into the enterprise large capital with modern equipment and methods. There are doubtless many exceptions to be found, but this word of caution is certainly not misdirected, for the Mexican miner has shown that his judgment of mining property is excellent.

Those mines, which are in operation and profitable under native management, should under a competent American management continue to pay, and those mines which have been good above the water line would doubtless prove valuable below it. It is these two latter classes of mines that form the best class of mine investment in Mexico, possessing fewer elements of failure than untried propositions or those which have failed.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market Street, San Francisco, Cal.
Telephone, Davis 771.

ANNUAL SUBSCRIPTION.

United States, Mexico and Canada.....$3 00
All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

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SAN FRANCISCO, NOVEMBER 7, 1903.

TABLE OF CONTENTS.

ILLUSTRATIONS: Page.

Montejus, Greenhack Cyanide Mill, Oregon.....298
Stope Worked by Square Set Method in Mexican Mine, Showing Sprags to Roof.....298
Dynamos and Motors, Showing the Various Windings and Wire Connections.....301-302
Centrifugal Cone Separator, Continuous Discharge.....304
100-Ton Standard Unit Van Meter-Boss Oil Concentrator.....304
Map of Horsefly Co.'s Property, British Columbia.....305
Dam on Mussel Creek, British Columbia.....305
Pump and Gasoline Engine for Cyanide Plant.....306
Impact Screen for Ores.....306
Mining and Metallurgical Patents.....307

EDITORIAL:

Mine Investment in Mexico.....298
Industrial Conditions and the Gold Miner.....299
The Difficulties of Concentration.....299
Modern Methods in Ancient Mines.....299
Claim and Location.....299
Miners Leaving Butte, Mont.....299
Result of Strike in Cripple Creek.....299

MINING SUMMARY.....308-309-310-311-312

LATEST MARKET REPORTS.....313

MISCELLANEOUS:

Concentrates.....300
Dynamos and Motors, Showing the Various Windings and Wire Connections.....301
Consumption of Zinc in Cyanide Plants.....302
Milling on Douglas Island, Alaska.....303
A System of Continuous Concentration of Ores by Oil.....304
Alluvial Deposits of Horsefly, B. C.....305
A Number Scheme for Mines.....305
Pump for a Cyanide Plant.....306
A Montejus and Filter Press for Cyanidation.....306
Standardizing of Methods of Chemical Analysis.....306
Order of Drop of Stamps.....306
Ammonal, A New Explosive.....306
Mining and Metallurgical Patents.....307
Personal.....313
Commercial Paragraphs.....313
Dividends.....313
Catalogues Received.....313

Industrial Conditions and the Gold Miner.

Eastern iron manufacturers are strenuously endeavoring to readjust, as far as possible, the disorganized condition of the industrial world, of which their operations are the pulse. A further curtailment of output is deemed necessary to restore the pig iron market to a normal condition. On the 2nd inst. a number of the largest merchant blast furnace operators of the East met at Philadelphia, Pa., and decided to reduce production at least 20% further, having already reduced the output materially during October. Something will have to be done in the right direction to re-establish industrial activity. The great trusts formed three or four years ago did much, no doubt, to promote unusual progress in the commercial and industrial world, but some of these great orgauizations have come to grief and investors are becoming timid. This state of affairs, coupled with the demands of organized labor, have so unsettled industrial conditions that careful men are seeking some way to re-establish confidence and bring about a reaction in the right direction. The past four years have afforded unprecedented opportunities for a few men to show what can be done by skillful manipulation of millions of dollars of other people's money, in building great fortunes and reputatious for themselves.

Of all the industries affected by the present condition of the industrial world mining feels it most heavily, particularly iron, copper and coal mining. Gold mining, however, continues in its even course almost unaffected by either the prosperity or the reverses of the country. If industrial couditions generally are sluggish, and times are hard, the gold miuer profits by it; if he is already established in business, he can then buy machinery aud supplies at a comparatively low figure. If, however, he desires to secure money to equip and develop a new euterprise, he usually finds difficulty in raising the uecessary funds. When the country is prosperous, as it has been since the recent Spanish war, all supplies are high, and machinery particularly is much more expensive than a few years ago. So heavy have been the demands for structural iron and steel that the iron mines have until lately scarcely been able to keep up with the constantly increasing demand. In view of this condition much old machinery has been remodeled into new, or has been melted in the furuaces to supply material for constructing new machinery designed on modern lines. Gold always finds a ready market at a uniform price, and no matter what the condition of the times, the gold miner feels secure.

The Difficulties of Concentration.

It has been the constant aim of the inventors of concentratiug machines to plan a device which will effect a complete separation of the valuable mineral particles of high specific gravity from the lighter gangue of relatively small value. The various kinds of conceutrating devices are not numberless, but certainly numerous. They comprise inclined tables, with riffles and without. Some are stationary, others have a vibratory movement imparted in a variety of ways on the various machines. There are circular concentrators and rectangular ones, triangular and rhomboidal, flat and coue shaped, and other forms. The variety of shape, size and mechanism is almost as great as the number of men who have schemed, aud thought, and experimented to reach perfection in this class of metallurgical machinery. Some are simple, self-contained machines, and others comprise several devices which work together, to accomplish the same purpose.

All concentrating devices, of whatever type, from the bullock skins of the old Braziliau miners, to the most refined moderu mechanism, depend upon the same uatural law—the attraction of gravitatiou for success, and all, except a few of special design, which are pueumatic iu operatiou, employ water as a concentratiug medium.

Mineral particles discharged from a stamp battery, or other crushing or pulverizing machines, have a great relative difference in size and shape as well as of gravity, and it is not reasonable to pre-suppose that a single coucentrating device will be capable of effecting a complete separation of both the coarsest and finest particles of sulphide ore, or other valuable mineral, of high specific gravity, from the particles of gangue, which also vary greatly in size, though uudoubtedly some machines perform work of this class with which little fault can be found. The efficiency of auy conceutrating machine cau be increased by sizing the pulp sent to it from the mill. The hydraulic sizing devices are also various in shape, mostly patterned after the spitzkasten or spitzlutte, but all, when properly proportioned and adjusted to the volume of material being treated, bring about a division of the particles of the pulp, which, to a great extent, is regardless of specific gravity. The coarse material passes out at the bottom of the siziug machiue, the fine overflowing at the top. These two streams may then be divertcd to a separate machine, each adjusted to the particular sort of pulp, and a much more satisfactory saving of values results, although the same condition as to relative size of particles still exists, but in a lesser degree.

The sizing and concentration may be carried to a limit approaching perfection, but when this condition is reached the limit of economic commercial success has geuerally been passed. In concentrating ores on vibrating tables, or on belt machines, the persoual equation is often a large one. The best work is not always done on the best machine, for the reason that two men will often get very different results on the same machine treating the same class of pulp. A slight change of speed of travel or in the number of vibrations of a machine adjusted to do its best work with the material under consideration, or the addition to or diminution of the supply of clear water will at once have a noticeable effect on the product, but the man in charge is not always alert, and when he is not either tailings run up in value or dirty coucentrates result. Constant vigilance is one of the first essentials in running coucentrating machines. The man in charge may have the necessary knowledge derived from experience, but he must also be vigilant and quickly detect and correct iu the result of his work by the prompt application of the proper remedy.

Modern Methods in Ancient Mines.

The silver mines of Cerro de Pasco, Peru, have loug been famous in the mining annals of the world. A hundred years ago Humboldt reported the output of those miues to exceed $5,000,000 in gold aud silver annually. The mines continued to produce large amounts of the precious metals for mauy years after Humboldt's visit, but of receut years, until within the past decade, the mines have beeu worked in a somewhat desultory manner. Within this latter period, however, American capital has been reopening thees mines and it is uow stated that a great reduction plant, costing $3,000,000, is to be built there to treat the great quantity of ores left by the former workers, as well as that opened by the recent more extensive and deeper development. The principal metal now sought is copper, the gold and silver once constitutiug the main output of the mines now beiug secondary and becoming a by-product of the operatious. These mines are all located uear the summit of the Andes, at au altitude of 15,000 to 16,000 feet above the sea—several thousand feet higher than the highest mining town iu the United States. The Americans employed iu supervising positions do little manual labor, that being a physical impossibility with the greater number, but the natives of those high plateaus and ranges are said to be efficieut workmeu under competent direction, apparently sufferiug uo iuconvenience at that great altitude. This rejuvenated enterprise simply forms another evideuce of the progressive American spirit and the possibilities where modern science is applied in mining. The miues of Peru are the oldest worked by white men on the American continent, being operated by the Spaniards about 1534, during the conquest of Pizarro. Prior to this some of them had beeu extensivcly opened under the reign of the Incas.

Claim and Location.

As the seasou of the year has arrived when much assessment work must of necessity be done on mining locations, to secure possessory right through the year 1904, it may be of iuterest to note the meaning in the law of the words claim and location. There is an essential difference between claim aud location—at least in a legal sense, as applied to miuing property, prior to patent. The word claim, as used in the Federal statutes, is applicable to a single location or to a group of contiguous locations. If the miner makes a single location, it constitutes his "claim," and in this case there is no essential difference between location and claim; but if he subsequently buys an adjoining unpateuted location, on either side of his original discovery location, the three locations then constitute his claim; but in such case he assumes the responsibilities of the locators of the two adjoining locations, and he must perform the annual assessment work for the three claims as though they were still separate, though it is optional whether he do the work on a siugle locatiou for the benefit of all, or do the uecessary amount on each location.

IDLE miners are leaving Butte City, Mout., by hundreds. It is statcd that 3000 men are expected to leave Butte for other mining regions, the greater number going to Utah, Nevada, California and Colorado. What effect the influx of this large uumber of unemployed men will have on labor conditions in these States, where all the men required are already at work, except where strikes prevail, will form an interesting study. Although the greater number of the idle Montana miners are union men, idle men who really want work are inclined to cast their affiliations with labor organizations aside in the search for employment. It may have a direct influence in settling some of the long continued strikes.

AS a reactionary result of the recent strike in the Cripple Creek mining district, Colo., the owners of mines, who are members of the Mine Owners' Association, have determined that all lessees shall employ no miners who are members of the Western Federatiou of Miuers, and if this conditiou, which is inserted iu every lease, is not strictly adhered to, the lease will be declared forfeited. The result of this actiou ou the part of the mine owners is the withdrawal of many men from the Western Federation.

CONCENTRATES.

THE rock specimen from Denver, Colo., contains sulphides of iron, copper, zinc, cadmium and lead; no bismuth present; not tested for precious metals.

✣✣✣✣

THE only gold mining district, and probably the only gold mine in the world profitably producing quicksilver, is the Sacramento mine at Mercur, Utah.

✣✣✣✣

A HEAVY SCREEN of one-half inch mesh placed over the inside copper plate of a battery will prevent scouring. In some mills a perforated cast iron shield is used for this purpose.

✣✣✣✣

EARTH DAMS should be provided with a sheeting of planks on both the inner and outer face, to prevent washing out. Masonry and concrete dams do not require sheeting.

✣✣✣✣

THE Almaden mines of Spain are in the province of Ciudad Real. They are large producers of quicksilver, producing in 1902 about 1245 tons of 2000 pounds or about 32,500 flasks.

✣✣✣✣

SPRINKLING of crude oil on ditch banks and other embankments will keep gophers and other burrowing animals from cutting into the earth, which in some localities is a source of expense from leakage.

✣✣✣✣

STEAM at various pressures has varying temperatures. At 10 pounds pressure the temperature of steam is 192.4°; at 60 pounds it is 295.6°; at 100 pounds it is 332°, and at 180 pounds pressure the temperature is 378.4° F.

✣✣✣✣

THE series of articles on mining methods at Broken Hill, New South Wales, were published in the issues of July 18 and 25 and August 1, 1903. That on the methods at the Homestake, which are similar, appeared in the issue of July 4, 1903.

✣✣✣✣

THERE are copper deposits in St. Genevieve county, Mo., which were discovered in 1863. The ore deposits lie nearly flat and occur in limestone. They have been worked extensively and are equipped with smelters, etc., but they have been idle for some time.

✣✣✣✣

THE Occidental Lode at Virginia City, Nev., is a fissure approximately parallel to the Comstock lode and east of it at a distance of about 7500 feet. It conforms with the sinuous course of the Comstock in a remarkable way, though at so great a distance from it.

✣✣✣✣

PURE uranium is worth about $2 per gram, referring to the pure fused article only. Uranium oxide is worth about $2.50 to $3 per pound, or about $500 per ton (wholesale selling price) for a 10% ore. Uranium ores are valued according to their content of uranium oxide.

✣✣✣✣

TO attempt to run a rope transmission drive with a manila or hemp rope on grooves intended for a wire rope will not do. Grooves for wire ropes are "V" shaped and those for fibre ropes are turned in the form of the letter "U." The rope, whether wire or fibre, must be suited to the size of the groove.

✣✣✣✣

NEARLY all the asbestos which is spun into threads and woven into fabrics is of the variety known as chrysotile, which usually occurs in serpentine. Asbestos, having a harsh "feel," and brittle to the touch, cannot be spun or woven, though for other purposes it may be as valuable as the more silky chrysotile.

✣✣✣✣

THE approximate weight of a conical pile of ore may be determined in the following manner: Square the diameter (in feet) of the base of the pile (presumed to lie on a level base); multiply by 0.7854. Multiply ⅓ of this product by the height of the pile in feet, and (if quartz ore) divide by 20 = tons of ore in the pile.

✣✣✣✣

BY "short circuit" in electrical engineering is meant the metallic or other connection formed accidentally between a positive and a negative wire, by means of which the current may take a short cut, instead of completing its journey through motor, lamp or other contrivance, as originally designed. A "switch" is an arrangement for either closing or breaking an electric current.

✣✣✣✣

A CIRCULAR SAW is a useful adjunct to a mine where timbering is necessary, if power be available to run it. All the scrap timber can be sawed into wedges, which are better and cheaper than band-made wedges. The saw requires to be set on a table made of 6x6-inch timbers carefully framed and solidly bolted together, as the high velocity of the saw when in operation renders this necessary.

✣✣✣✣

IN the Siemens-Halske process, the action of the electric current on a solution of gold is taken advantage of. The electric current decomposes a solution of a metallic salt, the metal being deposited on the negative pole while the metalloid is liberated at the positive pole of the electrolytic cell. In a stated time a uniform current of given strength will deposit a given quantity of metal, and this quantity varies in different metals, just in proportion to their electro-chemical equivalents. This holds good only for strong solutions. Weak solutions like those used in the cyanide process require to be kept in motion, and to accomplish this the solution is passed through the precipitation boxes.

✣✣✣✣

RUSSIA produces about 90% of the platinum mined in the world, a large portion of the remainder coming from Colombia, South America. In 1902 the United States produced only ninety-four ounces, and in 1901 about 1408 ounces. With the production of platinum in 1902, there were also produced twenty ounces of iridium, which greatly resembles platinum in its physical and chemical properties.

✣✣✣✣

THE steam injector takes the place of a pump in forcing water into a boiler. The water and steam mingle at the combining tube, the steam jet is condensed to a water jet. The water jet has a much smaller cross section than the steam jet had, and as the energy of the steam jet is retained a greatly increased velocity results, and the pressure of the water on the delivery pipe causes the water to flow into the boiler.

✣✣✣✣

WHEN gold ore is crushed in a battery, the finest particles produced—the slimes—are usually the richest. After the extraction of the gold by amalgamation, the coarsest grains generally contain the highest values, due to the fact that the grains of sand still contain gold, which can only be freed from its matrix by finer crushing. In considering the advisability of adopting finer crushing, the economic problem must be given consideration.

✣✣✣✣

BY contact metamorphism is meant a change in a rock due to contact with some other rock of later and eruptive origin. Shales are altered to dense hard jasper; slates are indurated, and a development of crystals is a common phase of contact metamorphism. Garnets and chiastolite develop in slates and schists; limestone becomes crystalline marble; sandstone is altered to quartzite and impregnated with feldspar crystals as a result of contact with intrusive rocks.

✣✣✣✣

MALACHITE is green copper carbonate, and azurite is blue copper carbonate. Of these two ores of copper, malachite is the more common. The composition of malachite is carbon dioxide 19.9; cupric oxide, 71.9; water, 8.2 ($2CuO, CO_2, H_2O$). Azurite contains carbon dioxide, 25.6; cupric oxide, 69.2; water, 5.2 ($3CuO, 2CO_2, H_2O$). The difference is mostly in amount of carbon dioxide contained in the two minerals. The cause of the difference of color is not known.

✣✣✣✣

BY "recession of cliffs" is meant the backward movement of the face of cliffs, due to erosion. It was first applied by J. W. Powell to the cliffs of the Grand Canyon of the Colorado river, in Arizona. The wind and rain, heat and frost, each attack the rocks exposed in the face of a cliff and gradually wear it away. Many larger pieces sprawl off and fall to the bottom where they form with smaller fragments and sand a talus. The rate of recession in cliffs depends upon the character of the rocks and upon climatic conditions.

✣✣✣✣

HOT acid waters will decompose and kaolinize feldspars. Large deposits of kaolin and calcium carbonate, resulting from alteration of andesites, may be seen at the hot springs and solfataras about the Lasson peak region of California. Many of the hot springs contain free sulphuric acid, and crystals of sulphur are being deposited around many steam vents. This sulphur is so mixed with earthy materials as to be of little commercial value, as it would have to be refined before shipping to the markets.

✣✣✣✣

PLATINUM and associated metals may be separated from the gravel and sands of placer mines by placing a grizzly in the sluice way, permitting the fine material to pass through onto an inclined table, called an "undercurrent," this table being covered with burlap or canvas. The heavy minerals collect on the table, the greater portion of the lighter passing over into the tailings. To clean up, shut off the water from the sluice and sweep the concentrated material into a launder placed at the foot of the table. When collected, the platinum may be separated from the sands by careful panning or on a concentrating machine.

✣✣✣✣

IN low-lying, flat countries, but little elevated above sea level, the rate of erosion is slow. Large areas of land result from sediment being deposited from rivers, as the country along the lower Mississippi river or near the mouths of the river Nile. Such land is generally being built up by means of freshets, which deposit additional material on land already formed; but when a hilly region has been eroded to a low, flat region, and erosion ceases almost entirely, it is said to have reached a "base level of erosion." Western Australia, although elevated about 1500 feet above the sea, is believed to have been a region of base level of erosion and subsequently elevated. For nearly 1000 miles square the western part of Australia is almost level, there being no mountains anywhere, though low rolling hills are found throughout the region. These hills are supposed to be due to recent erosion.

✣✣✣✣

ON a concentrating table where ores contain several kinds of metallic sulphides these will be found arranged in bands or zones, according to their relative specific gravity, which is approximately as follows: Galena, 7.4 to 7.6; mispickel (arsenical pyrite), 5.9 to 6; pyrite, 4.95 to 5; chalcopyrite (yellow copper sulphides) 4.1; zinc blende (black jack), 4. These several sulphides will be found occupying positions as indicated by their gravity if the table is working properly, but the occurrence of considerable values in gold in any one of them may produce other results. If the blende contains high values in gold when the other sulphides carry only small amounts, the blende will be found at the highest place, with the galena possibly next. Lead carbonate and copper carbonates concentrate with difficulty, owing to their tendency to slime.

✣✣✣✣

A DIAMOND drill hole seldom maintains absolutely the direction in which it is started. If started horizontally it soon takes a slightly upward inclination, and as distance from the machine increases the bit rides higher and higher. This is known as the "drift" of the diamond drill. In drilling through different kinds of material the amount of drift will vary somewhat, and it also varies with the relation of the dip of the strata to the direction of the drill hole. In a hole driven in any direction other than vertical the drill will drift, and even in holes started vertically a slight influence will turn the drill aside, and once having started away from the true vertical line the drift will continue with increasingly greater angle of departure with greater distance from the machine. This tendency of the diamond drill bit to drift is due to the fact that the bit is slightly larger than the connecting pipes, which permits the pipe line to sag slightly, giving the drill hole the direction of an indefinite transition curve.

✣✣✣✣

THE vertical depth at which a tunnel will strike below a given point (vein cropping) on the surface may be determined in the following manner: Measure the slope distance on the surface as accurately as possible from the beginning of the open cut to the point up the hill, at the croppings. By use of a clinometer ascertain the angle of the slope above the horizon, and make a sketch on a piece of paper illustrating the result. The figure will be a right-angled triangle, the right angle being on the tunnel level immediately below the point on the surface. Then as the sine of the angle opposite the given side (in this case sine of 90° = 1) is to the sine of the angle opposite the required side, so is the given side to the required side. Assume the given side (slope distance) to be 1000 feet, and the angle of slope to be 30°. The sine of 30° is 0.5. Then 1:.5::1000: (the required side) = 500 feet. In almost any engineering book will be found a table of natural sines, tangents, co-sines, etc., to a radius 1, by the use of which such problems may be solved.

✣✣✣✣

THE treatment of base ores such as that described by the Downieville, Cal., correspondent is always experimental until the proper course has been ascertained. The permanganate process may work, extracting some of the gold remaining after amalgamation, and also the copper. The chlorination process would also recover a large percentage of gold remaining after amalgamation; the antimony and bismuth would be vaporized in the roasting, and if the silver and lead remaining in the tailings justified the expense, these could be recovered by the hyposulphite process of lixiviation. The lead present is first precipitated by use of sodium carbonate, the precipitate being a merchantable white carbonate of lead. The solution is decanted off and the silver precipitated in the next tank below. The lead could be removed weekly or less frequently as required. The copper could be recovered by passing the solution from the gold precipitation tank over scrap tin or iron. To carry on all of these metallurgical processes would require a plant covering a large area, and it should be arranged to work by gravity.

✣✣✣✣

DRILL STEEL should be tempered dark straw color for hard rock. The drills should be first heated and forged to the proper shape and size and allowed to cool. Later, when the sharpening has been completed, they should be reheated to redness and then quickly plunged and tempered. The temper may also be drawn by first plunging the reheated drill about an inch and withdrawing it and scouring the bit on a sanded board, watching the color slowly descend toward the bit until it has assumed a straw color, due to formation of iron oxide, when it should be plunged several inches and held and stirred about under the water until cool enough to prevent destroying the temper. Picks should be tempered a deep blue. Drills tempered to straw color are very hard and brittle. If the corners check and break off, make the color a little darker, until they will stand. Avoid overheating, both in forging and in reheating to temper. The amount of carbon contained in a steel has a direct influence on its "hardening" properties. A steel containing 1% carbon can be made as hard and as nearly as brittle as glass. The reheating of the steel is probably the most important point. If steel of 1.10% carbon be heated to 700° C. and plunged suddenly into cold water, it is not hardened; but if it be heated much higher, say, 880° or 900° C., then cooled slowly to 700° C. and plunged in cold water, it is hardened. This accounts for the fact that often plunged drills are not properly tempered, having been overheated. Poor steel can not be made good by heating and hardening processes, but good steel can be easily spoiled by improper heating. Iced brine (20% solution) cools and hardens steel more rapidly than pure water, but is not recommended in tempering steel drills.

Dynamos and Motors, Showing the Various Windings and Wire Connections.

Written for the MINING AND SCIENTIFIC PRESS, by WM. H. KRITZER, E. E.

A "dynamo" is a device for converting energy in the form of mechanical power into energy in the form of electric currents by the operatiou of setting conductors to rotate in a magnetic field.

Any dyuamo will run as a motor, aud a current directed currents developed in the armature flow in one and the same direction through the external circuit. In alteruating-current machines the commutator is dispensed with, and collector rings used instead.

Brushes, or collectors of metal or carbon, rest on the commutator to take off the currents from the "segments" generated by the difference of potential iu the armature coils. In a multipolar machine there are as many brushes as there are pole-pieces, if the armature coils are connected in multiple; but if "in series," two brushes may auswer for two or more poles.

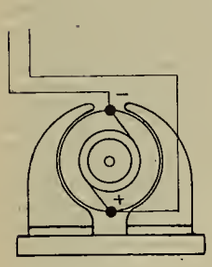


FIG. 1.

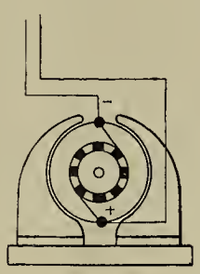


FIG. 2.

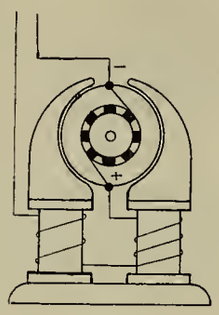


FIG. 3.

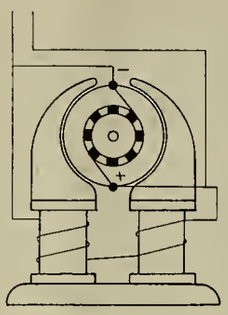


FIG. 4.

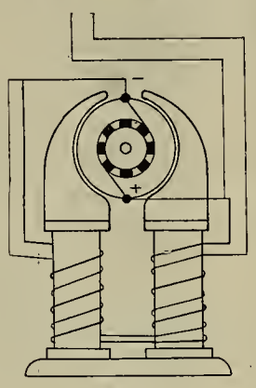


FIG. 5.

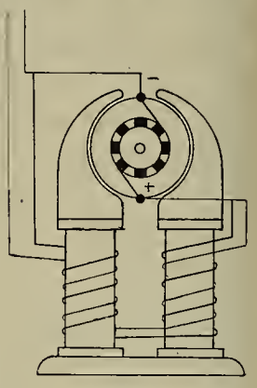


FIG. 6.

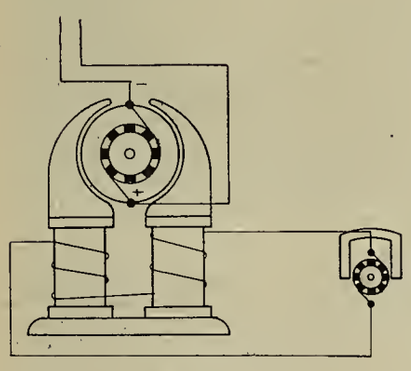


FIG. 7.

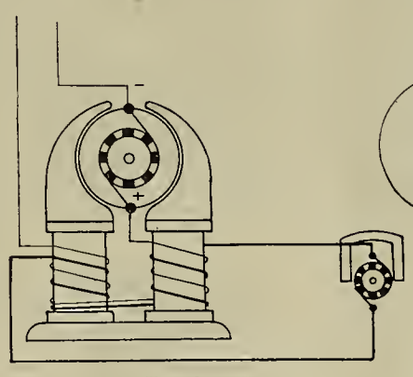


FIG. 8.

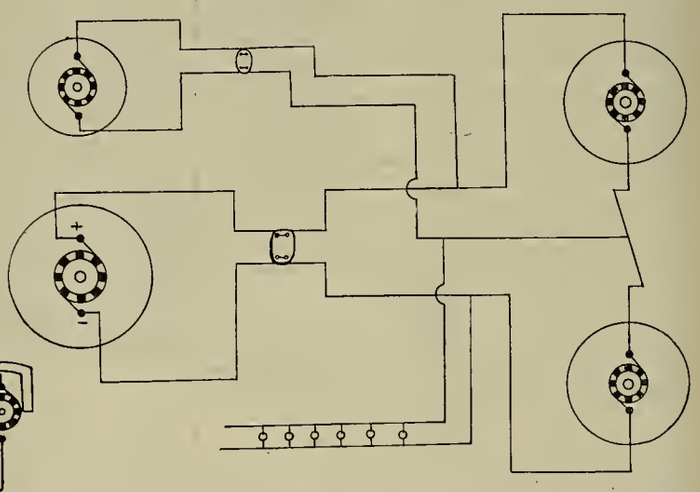


FIG. 11.

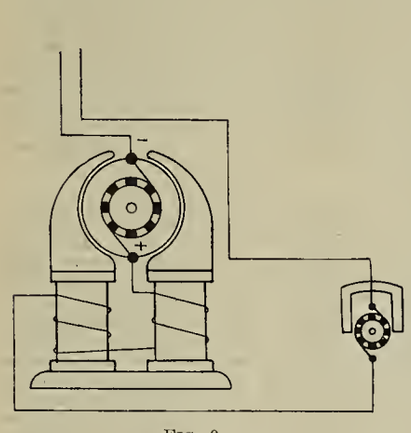


FIG. 9.

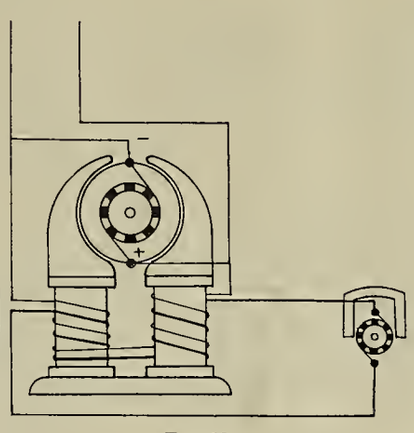


FIG. 10.

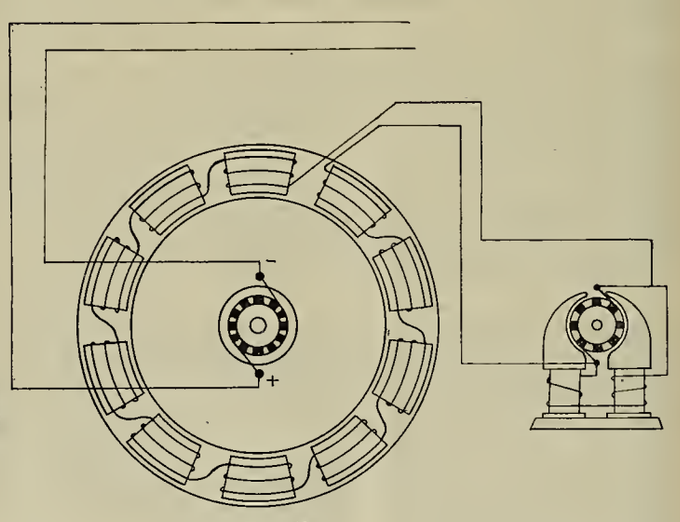


FIG. 12.

from a dynamo seut into a shunt-wound motor drives it in the same direction as that which it would have if it were being driven as a dynamo to produce electricity.

An electric motor is the converse of the dynamo, and is a machine for converting electrical energy into mechanical energy, and the fact of their reversibility was probably as important a discovery as the nineteenth century furnished. The armature is the revolving portion of the dynamo in which the electro motive force is developed which produces the current. It consists of many turns of insulated wire wound around an iron core, which is mounted to revolve in a magnetic field.

The "field magnets" consist of a suitable frame or core, ou which are any number of pairs of pole-pieces containing the field maguet coils.

In direct-current machines a commutator is employed in order to have the successive oppositely

It makes no difference, electrically, whether the field is statiouary and the armature rotates, or the armature is stationary and the field magnets rotate, for only a small amount of current is required to overcome the frictional losses in the machiue itself (which are practically constant), and the amount of curreut taken from the mains is directly proportional to and varies with the external load. If this outside load is increased the current which has been flowing in the armature cannot furnish sufficient "torque" (twistiug or rotary force) for this extra load, so the machine slows dowu; the slowing down decreases the counter electro-motive force which allows more current to flow through the armature, increasing the torque to the proper amount. If the outside load decreases the current furnishes an excess of torque which causes the speed to be accelerated and increases the couuter electromotive force, and this decreases the current until it again furnishes only the required amount of torque.

The most important systems, suitable for mining plants, comprise:

First—Direct current for lighting, power and railway work. This system is adapted for short distances, and has a low voltage and high amperage, and can be connected according to either the two-wire or three-wire system. Generators are now built, which with the last named system of wiring, supply direct current at two voltages, which does away with having two machines always in operation, or some other form of balanciug apparatus.

Second—Alternating current for lighting and power, aud direct current for railways. The alternating current is adapted to long distances, and has a high voltage and low amperage, and with the motors beiug manufactured of the iuduction type that have neither brushes, commutator, collector rings uor other moving contacts, makes it preferable, especially if the motors are exposed to dust and dirt, for they have the advantage of being entirely sparkless, with an absolute safety of danger from explosion or fire. In this system if a direct-current dynamo is not wanted for the railway or haulage system, and the amount of current required is small, a rotary converter can be used in connection with alternatiug-current generators, or it may be advautageous to install a double-current generator, furnishing both direct aud alteruatiug curreut.

Third—Alternating current of high voltage for power distribution to sub-stations, where it is trans-

formed into either a direct current or to a low voltage alternating current, or both. This system is preferable for localities where a large number of

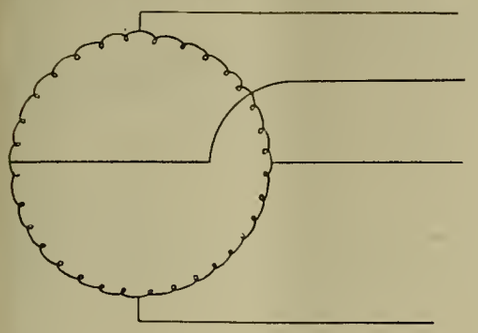


FIG. 13.

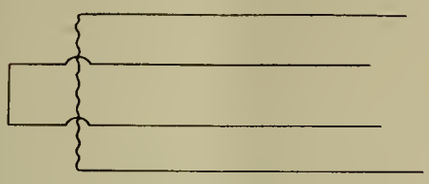


FIG. 14.

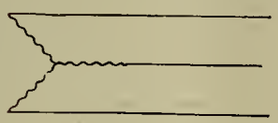


FIG. 15.

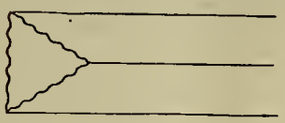


FIG. 16.

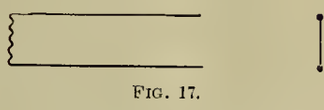


FIG. 17.

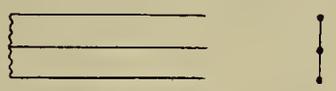


FIG. 18.



FIG. 19.

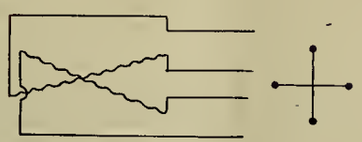


FIG. 20.

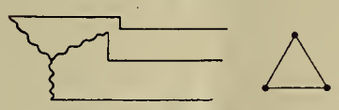


FIG. 21.



FIG. 22.

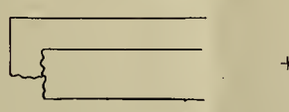


FIG. 23.

mines can be operated from one central power station, as the high-voltage alternating currents may be transmitted to the various mines, and there transformed into a direct or alternating current of suitable voltage for safely lighting the plant or operating the machinery.

Fig. 1 illustrates an alternating current dynamo or motor, having collector rings in place of a commutator, brushes and other attachments.

Fig. 2 shows a direct current dynamo or motor, showing commutator, brushes and other attachments.

Fig. 3 is a direct current dynamo or motor, series wound. It has but one circuit, and all the current generated in the armature is sent through the field magnet coils, which are connected in series with the armature, thence to the line and back to the armature. It is used in places where heavy starting torque is required and frequent and wide variations of speed are desirable, such as hoisting and haulage motors, arc lighting, etc. This type is of no value where the voltage is desired to remain nearly constant.

Fig. 4 represents a direct current dynamo, shunt wound. It has a small portion of the whole current generated by the armature directed through the field magnets, which are wound with many turns of fine wire. These coils are connected to the brushes of the machine and constitute a shunt, by-pass, or a derived circuit, the remainder of the current passing through the line by a different path. Used for central stations, railway generators and where a constant speed is desired.

Fig. 5 illustrates a direct current dynamo or motor, compound wound. This has both series and shunt windings. The field magnets are wound with two sizes of wire, the coarse wire being connected in the main circuit and the fine wire in the shunt circuit, across the terminals of the dynamo. Used where a self-regulating machine is desired, as the series winding keeps up the field strength while the load is being increased in sufficient measure to make up for certain losses, and keeps the voltage at the machine terminals constant.

Fig. 6 shows a direct current dynamo or motor, shunt and series wound. A long shunt is one connected across the machine terminals, while a short shunt is connected directly across the armature. There is no measurable difference in performance between these two connections, but the latter may give a slightly higher effect to the shunt winding.

Fig. 7 is a direct current dynamo or motor, separately excited. Having the machine separately excited saves the reactions due to the armature current, keeping its magnetism in the field, and the electromotive force independent of changes of resistance going on in the working or main circuit.

Fig. 8 illustrates a direct current dynamo or motor, series and separately excited.

Fig. 9 represents a direct current dynamo or motor, series and magneto excited.

Figure 10 shows a direct-current dynamo or motor, shunt wound and separately excited.

Fig. 11 is that of a direct-current Edison three-wire system, not much employed except for large installations for central supply.

Fig. 12 shows an alternating current dynamo or motor, single phase, separately excited in field circuit. These have the advantage that, with the same weight of materials, an output can be secured from it nearly twice that of the direct current type, and the ability to transform its potential into any desirable voltage by means of transformers. Then the simplicity and durability of the collector rings in place of the commutator adds much to its value.

Fig. 13 is an alternating current dynamo or motor, two phase, ring connection. Fig. 14: Alternating current dynamo or motor, two phase, star connection. Fig. 15: Alternating current dynamo or motor, tri-phase, star connection. Fig. 16: Alternating current dynamo or motor, tri-phase, triangular connection. Fig. 17: Single phase 2-wire. Fig. 18: Single phase 3-wire. Fig. 19: Two phase 3-wire. Fig. 20: Two phase 4-wire. Fig. 21: Three phase 3-wire. Fig. 22: Three phase 4-wire. Fig. 23: Monocyclic or direct-current 2-wire.

Ordinary, simple, alternating current is called a single-phase current, but by taking current from connections at different points around the armature of an alternator, it is possible to obtain a number of currents differing from one another in phase. We thus get what we call single-phase, two phase, three phase, and monocyclic, the latter being a combination of a single-phase and polyphase arrangement. It matters not whether the coils are interlinked, or separately grouped, ring or star connected, the principles of action are similar, and the characteristic polyphase results are equally present. The supply of power is continuous and uniform and is used to operate the induction motors. The principal objection to this system of power transmission is the increased number of main circuit conductors which are required.

Figs. 17–23 show the standard systems of alternating-current distribution and the various combinations of conductors in general use.

It will be seen that the direct current system requires only 50% of the copper in the single-phase system when used in long distance transmission of power. The conductivity of aluminum is about 60% that of copper, so that for continuous current circuits the proper size of wire may be easily ascertained. In alternating current circuits, however, its substitution for copper is by no means so simple an operation.

(TO BE CONTINUED.)

Consumption of Zinc in Cyanide Plants.*

NUMBER II.

Written by WALTER H. VIRGOE.

On the sands plant 151.9 kilos of metallics were obtained and 458.5 kilos from the slimes plant. The reduction of these metallics produced 7.876 kilos of gold and silver, and from the comparative values of the two classes of metallics it may be assumed that 4.284 kilos of this amount were produced from the sands plant and 3.592 kilos from the slimes plant.

The analysis of these metallics is not known, except in so far as their gold and silver contents go; but it can be assumed, for the sake of argument, that the balance of the material is metallic zinc; consequently, we perceive that 151.9 kilos of metallics were removed from the sands plant boxes containing 4.28 kilos of gold and silver; hence, the removal of these metallics involved a mechanical waste of 147.6 kilos of zinc. An analysis of the sands plant "fines" showed that this material contained 25% of zinc, and, therefore, since 191.3 kilos of fines were removed, this removal involved a further loss of 47.8 kilos of zinc. Hence, the total mechanical loss of zinc on the sands plant for the period mentioned appears to be approximately 195.4 kilos of zinc. The chemical loss is that represented by the difference between the total consumption, or, in other words, by the amount of zinc added to the boxes during the period covered, viz., 1397.3 kilos, and the mechanical loss of 195.4 kilos, which is about 1201.9 kilos.

Table "B" shows these results in tabulated form.

Considering the consumption of zinc on the slimes plant, 458.5 kilos of metallics were obtained, representing 3.592 kilos of fine gold and silver bullion; therefore, it may be assumed that the removal of the metallics involved a mechanical loss of 454.9 kilos of zinc. Again, 260.4 kilos of fines were removed from the boxes, an analysis of a general sample of which showed the presence of 15.8% of zinc; hence, this removal of fines entails a mechanical loss of 41.1 kilos of zinc.

The total mechanical loss on the slimes plant is about 496 kilos of zinc and the chemical loss is about 288.7 kilos. The results may be thus tabulated:

	Sands Plant.	Slimes Plant.
Chemical loss	1,202.00 kilos	288.7 kilos
Mechanical loss	195.4 "	496.0 "
LOSSES PER TON OF ORE TREATED.		
Chemical loss	0.45 kilo	0.19 kilo
Mechanical loss	0.07 "	0.33 "
LOSSES PER TON OF SOLUTION FLOWING THROUGH THE BOXES.		
Chemical loss	0.254 kilo	0.032 kilo
Mechanical loss	0.0413 "	0.055 "

From these data it will be observed that there are causes at work on the sands plant tending to produce a high chemical consumption of zinc, and causes at work on the slimes plant that tend to produce a low chemical consumption, but a high mechanical consumption of zinc.

The respective conditions on the two plants are as follows:

The sands plant extractors consist of four boxes with eight compartments.

The zinc capacity of the four boxes is 40.64 cubic feet.

One cubic foot of zinc pressed into the boxes weighs 13.5 pounds, the shavings being cut from No. 9 zinc by hand labor; consequently the zinc capacity is 40.64 cubic feet = 584.64 pounds.

Each ton of solution per hour has allotted to it 25.4 cubic feet of zinc.

The slimes plant extractors consist of four boxes with five compartments.

The zinc capacity of the four boxes is 60 cubic feet = 810 pounds.

Each ton of solution per hour has allotted to it 20.0 cubic feet of zinc.

The precipitation is practically perfect on both plants, and strength of solution flowing through the sands boxes averages about .32% KCy, while the strength on the slimes plant is about .04% KCy. The statistics with reference to the zinc boxes would indicate that those on the sands plant are of somewhat larger capacity than necessary; 20 cubic feet should be ample per ton per hour.

During the four months 2646.4 tons of sands were treated and 1481 tons of slimes, both classes of material being practically the same value in gold and silver per ton, and the extractions obtained on both plants were about equal. Therefore, the principal differences lie in these features: On the sands plant comparatively small amounts of strong solutions flow through the zinc, and on the slimes plant comparatively large amounts of very weak solution flow through a relatively large amount of zinc, and containing and depositing a little more than half the values deposited by the sands plant solutions.

It appears that strong solutions depositing considerable product tend to cause a heavy chemical consumption of zinc, and weak solutions depositing a comparatively small amount of product cause a heavy mechanical loss and a light chemical one.

At one period lead acetate was used to coat the zinc shavings in the slimes boxes, and it was thought that some of the consumption might be attributed to

*Jour. Chem. Met. and Min. Soc., S. A. (Condensed.)

this cause, but a discontinuance of the use was not attendant with any apparent lowering of the consumption, either chemical or mechanical.

No doubt the heavy mechanical consumption is to some extent due to the use of hand-cut zinc. Upon a neighboring plant, treating the same class of ore from the same vein, and having a capacity of about 9500 tons per month, the consumption is reported as being .34 kilo, or .74 pound per ton of material cyanided, the zinc used being cut by mechanically fed lathes from sheet zinc.

As both plants are under excellent management, there is no doubt but that the consumption of zinc, although it appears high in comparison with Rand records, is normal under the conditions of plant treatment necessary for the ore in question. Upon the Rand there is some variation in the different plants, but the average consumption may generally be taken to be about .3 pound per ton.

One feature will be observed: A cubic foot of zinc, according to Mexican practice, weighs about twelve to thirteen pounds. The weight of a cubic foot of cut zinc, as used on the Rand, weighs about seven pounds; the reason for this is that coarse zinc can be compressed more compactly into the boxes on account of the greater strength of the thicker threads. The thickness of the thread must be determiued by the character of the plant; but where much metallics are produced a fine thread is to be advocated; where very few metallics are produced and the chemical consumption is somewhat high, coarsely cut zinc should be used. The character of the thread used must be determined by the judgment and experience of the operator; there is no fixed rule.

When the effect of this mechanical and chemical consumption of zinc is cousidered, the cost involved in the reduction of metallics and the effect upon the plant solution of the presence of zinc is an important item.

The nature and causes of the consumption of zinc, as evidenced by practical plant operations, are not to be lost sight of; there is no doubt as to the value of records of consumption kept in this way; to the observant operator they convey a great deal of information, tending to assist in the elucidatiou of problems that present themselves in practical work. The chemistry involved in the solutiou of zinc has not been discussed, because so much has beeu writteu upon that point, and accepted formulæ seem perfectly clear and satisfactory.

In considering the effect of the loss of zinc, undoubtedly heavy mechanical losses involve the cost of the refining of the metallics. Plants running with light mechanical zinc losses have invariably lower costs in the reduction of their bullion. The costs involved in the treatment of product ou the plant alluded to for the period of four months, to which the zinc consumption records refer, may be briefly considered.

610.49 kilos of metallics were produced ou the slimes and sands plants. The reduction of these metallics cost, exclusive of labor, fuel and crucibles, as follows:

943	kilos of acid @ 13c per kilo		$122 59
7.41	"	soda (carb.) @ 55c per kilo	4 07
7.41	"	sand	
19.77	"	borax glass @ $1 36	26 88
			$153 54

The weight of pure bullion produced was 7.876 kilos = 253.29 troy ounces; hence, the cost per ounce of pure bullion is 60 cents (Mexican). Exclusive of acid, the treatment costs would be about 12 cents.

The acid-treated material represeuted 10%—11% of the weight of the raw metallics—and had a fineness of 12% to 13%.

The bars produced ranged in fineness from 931 to 962 parts in 1000.

The cost of the reduction of the fines was as follows:

SANDS PLANT.—191.3 kilos of fines were produced (material passing a 40-mesh), cost of reduction being as follows:

20.64	kilos of soda (carb.) at 55c per kilo		$11 35
55.01	"	borax (glass) @ $1 36 per kilo	74 81
20.64	"	sand	
			$86 16

The weight of fine bullion produced was 81.456 kilos = 2618.86 troy ounces; hence the cost per ounce of pure bullion is $3.28 (Mexican), exclusive of labor, fuel and crucibles.

The sands plant fines were 42% fine before reduction, and the fineness of the bars produced rauged from 932 to 950 parts in 1000.

SLIMES PLANT.—260.4 kilos of fines were produced, cost of reductiou being as follows:

28.00	kilos of soda (carb.) @ 55c per kilo		$15 40
90.07	"	borax (glass) @ $1 36 per kilo	122 50
28.00	"	sand	
			$137 90

The weight of fine bullion produced was 37.446 kilos = 1203.91 troy ounces; hence the cost per ounce of pure bullion is $11.4 (Mexicau), exclusive of labor, fuel and crucibles.

The slimes plant fines were 14% fine before reduction, and the fineness of the bars produced ranged from 913 to 965 parts in 1000.

The fines from the sands plant are 42% fine as they come from the boxes, whereas the fines from the slimes plant, which has a high consumption of zinc, are only 14% fine, a little finer thau the acid-treated metallics of the two plants, and the cost of reducing these latter fines is about the same as the cost of reducing the acid-treated material.

The preceding figures serve to show how mechanical ziuc losses affect the cost of the reductiou of the product.

(TO BE CONTINUED.)

Milling on Douglas Island, Alaska.*

NUMBER III—CONCLUDED.

Written by R. A. KINZIE.

Cleauup in the various mills is conducted in the same fashion and so regulated that all will be finished by the 15th of each month.

The first day of the cleanup is devoted to the amalgam traps and the tank in the amalgamating room.

To clean a trap, five stamps are hung up and the feed water shut off. When the pulp has ceased to flow through the trap, the wedge that holds the wooden center piece is loosened and the center piece removed, first being washed to cleanse it of any adhering amalgam. Theu the tap in the lower end is opened and the couteuts of the trap allowed to flow out into a smaller launder, which conveys the material to a central tank. The trap is then carefully washed out, the tap and center piece replaced, and it is ready for use. It takes an average of five minutes to clean each trap. When all the traps have been cleaned, the contents of the receiving tanks, after being roughly washed, are collected and taken to the amalgamatiug barrel for further treatment. In the meantime the conteuts of the tank in the amalgamating room have beeu removed. This is added to the product from the mercury traps, and the total charged into the amalgamating barrel.

This barrel is made of cast iron, 20 inches in diameter and 4 feet long. It is supported in a horizontal position by irou trunnions cast in the head, and is driven at the rate of fifteen revolutions per minute by a belt leading to one of the vanner countershafts.

The barrel is charged through a handhole in the top, which cau be hermetically sealed; from 300 to 500 pounds of ore constituting a charge. From 75 to 125 ounces of mercury is then added, six iron cannon balls put iu to act as grinders, and the barrel filled with water. The handhole cover is then put on, and the barrel started revolving. The charge is left in the rotating barrel twelve hours; the barrel is then opened, and the charge allowed to run out into the amalgamating pan. This pan is made of cast irou, 4 feet in diameter. Around the edge, with the exception of a space 8 inches wide to serve as an outlet, is a rim 2.5 inches high. The bottom is made slightly concave to resemble a Mexican batea. The concentratiug motion of a batea is imitated as closely as possible. This is obtained by means of au eccentric, belt-driven from oue of the counter shafts of the mill. When the barrel is stopped, the canuon balls are taken out and put in the pan, which is immediately started. By the motion of the pan the heavy contents are concentrated in the middle while the lighter are washed off by means of a stream of water flowing through it, the concentrated product being kept in motion, and at the same time, ground by means of the cannon balls.

When the concentrate is cleaned of all light material, the pan is stopped and the pieces of iron, etc., removed. The amalgam is then put in a pan, the finer particles of irou removed by means of a magnet, and the other foreign material by a sponge or other means. Wheu the amalgam is clean, it is put in small cloth bags aud the quicksilver pressed out by means of a hydraulic ram, designed by one of the mill foremen. The pressed cakes of amalgam are weighed and sent to the assay office to be retorted aud melted into bullion.

The second and succeeding days are devoted to the cleaning of the batteries and amalgamating plates. These are cleaned at the rate of four batteries of five stamps per day. (In the Treadwell 300-stamp mill five batteries are cleaned per day.)

To clean up a battery the feed is shut off and the stamps allowed to drop until they begin to pound on iron, then they are hung up. The water is theu shut off, and the splash boards, curtains, screens and chuck blocks are removed. The water remaining in the mortar is dipped out, and the coarse sand around the top of the dies shoveled into buckets to be put back into the mortar when the cleanup is over. The lip of the mortar and the plates are then carefully hosed off (a trough beiug first put in the tail box to catch any loose amalgam) and the entire surface of the plate covered by a wooden cover for steamiug. A space of ¾ inch is left betweeu the cover and the plate by means of three slats ¾-inch thick nailed to the bottom of the cover. Sacks or other coverings are placed over the ends aud edges to prevent the escape of steam; the end of a steam hose is then introduced through a hole in the cover, the steam turued on and allowed to remain so from twenty to thirty minutes. Iu the meantime a second battery is prepared, and any renewals made ready, so that no time will be lost when the mortar is cleaned out. While the plate is being steamed the chuck block is cleaned of any adhering amalgam, recoated with quicksilver, and is ready to be replaced; while the sand-distributing box on the vanners, corresponding to the batteries shut down, are taken off and the amalgam removed from the copper plate by means of chisels. This amalgam is collected, the plates dressed in the usual manner, the distributing box replaced, and the vanner is ready for starting. Wheu the plate has beeu sufficiently steamed, the steam is shut off and the cover removed and taken to the next plate that has already been prepared for its reception. The steamed plate is then allowed to cool for a few seconds, when the operation of removing the amalgam commences. This is done by scraping the plates with sharp chisels, and as much amalgam as possible is removed without exposing the copper. The amalgam is then collected, taken to the amalgamating room aud locked up for further treatment.

Two men now begin work on the mortar, and to protect the plates a wooden platform is placed at the head for the men to staud on. If there are no renewals necessary (but this is unusual) only a portion of the sand is taken out. If necessary, the shoes are removed by driving a wedge through the eye left in the boss head just above the end of the shank of the shoe and forcing it out. The saud is then dug out of the mortar by means of sharp-pointed hand picks and scoops, the die and liners removed, and the mortar thoroughly cleaned. All pieces of iron, together with the worn-out shoes and dies and liners, are taken to the amalgamating room to be thoroughly cleaned, aud the heavy sand taken to the cleanup barrel.

The liners and false bottoms are then put in and the die set on the false bottom, while the fine sand first removed from the mortar is tamped around the die to hold it in place. The shoe is theu set on the top of the die with a collar of wooden shims around its neck. A 3¼-inch block is then placed on the top of the neck of the shoe, and the stamp lowered until the boss head rests on the block. The keys of the tappets are loosened and the tappet is allowed to fall down to the finger, where the keys are tightened. If the shoe has not been removed, a 9¼-inch block is placed on top of the die and the tappets set as above. Each shoe is then successively dropped and hung up, when the shoe is firmly fixed in the boss head. The recesses for the chuck block, screens,

TABLE IV.—MILL LABOR.

TITLE.	Treadwell Mills. 300-Mill. No. of Men.	Length of Shift.	(a) Rate of Wages.	240-Mill. No. of Men.	Length of Shift.	(a) Rate of Wages.	Mexican. Number of Men.	Length of Shift.	(a) Rate of Wages.	Ready Bullion. Number of Men.	Length of Shift.	(a) Rate of Wages.	700-Foot. Number of Men.	Length of Shift.	(a) Rate of Wages.
		Hrs			Hrs	Operating		Hrs			Hrs			Hrs	
Foreman	1	12	$150.00	1	12	$150.00	1	12	$150.00	1	12	$150.00	....	12	.....
Amalgamator	4	12	90.00	4	12	90.00	2	12	90.00	2	12	90.00	2	12	$90.00
Feeders	8	12	70.00	8	12	70.00	4	12	70.00	4	12	70.00	4	12	70.00
Vannermen	4	12	65.00	4	12	65.00	2	12	65.00	2	12	65.00	2	12	65.00
Oilers	2	12	65.00	2	12	65.00	2	12	65.00	2	12	65.00	2	12	65.00
Sulph. Pullers	2	10	2.00	2	10	2.00	1	10	2.00	1	10	2.00	1	10	2.00
Sulph. Shovelers	2	10	2.00	2	10	2.00	1	10	2.00	1	10	2.00	1	10	2.00
Engineers	....	....	2.50	2	12	2.50	2	12	2.50	2	12	2.50	....	....	.....
Firemen	....	....	2.50	2	12	2.50	2	12	2.50	2	12	2.50	....	....	.....
Coal-passers	....	....	2.00	2	10	2.00	2	10	2.00	2	10	2.00	....	....	.....
Crusher-men	4	10	2.25	4	10	2.25	2	10	2.25	2	10	2.25	2	10	2.25
REPAIRS.															
Vanners	1	12	$100.00	1	12	$100.00	....	....	.....	1	12	3.00	....	....	.....
Carpenters	1	10	4.00	....	10	4.00	½	10	$4.00	....	....	.....	....	....	.....
Laborers	1	10	2.00	½	10	2.00	....	....	.....	½	10	2.00	....	....	.....
Total	30			34½			21½			22½			14		

NOTE.—The above wages include board and lodging. Engineers, firemen and coal passers are only employed part of the time by the mills.
(a) Amounts of $65, or greater, refer to monthly wages, and those of $4 or less refer to daily wages.

*Abstract Trans. Amer. Inst. Min. Engrs.

etc., are washed out, and the chuck block, screens and dash boards put in place. The plate is then washed with a weak solution of cyanide, when quicksilver is sprinkled over its surface and thoroughly rubbed in with whisk brooms. The quicksilver is evenly distributed by rubbing with cloths moistened with a weak solution of cyanide. Some ore is now fed into the mortar, working the feeder by hand, the water turned on, the small cleanup trough removed from the tail box and the stamps allowed to drop. Particular care is paid to the feeding of ore when the stamps are started, as the mortar is empty of all ground material.

The heavy sands from the mortar are treated in the cleanup barrel in the manner described above, while the amalgam removed from the plates and chuck blocks is simply ground in the cleanup pan and the amalgam cleaned in the usual manner.

A System of Continuous Concentration of Ores by Oil.

Written for the MINING AND SCIENTIFIC PRESS by J. W. VAN METER.

The adoption of oil concentration at the Hacienda of La Victoria by the Sociedad Minero Alpimina of Lima, Peru, for the concentration of the ores from the famous Carahuacra silver mine, starts the operation of their large reduction works at Yauli, and opens again one of the greatest silver-producing mines of South America, after more than $1,500,000 had been spent on the property by a Peruvian capitalist, Carlos Gildemeister.

The encountering of large quantities of zinc in the ore interfered to such an extent with the lixiviation treatment that the property had to be closed down in 1893 and has remained idle since, until recently, there being no successful method of treatment discovered. During the last nine months, repeated concentration tests of the Carahuacra ores have been made at the Santa Barbara oil concentration plant at Yauli, which have proven highly successful, and it has been practically demonstrated that the rebellious element of the ores could be successfully separated by oil concentration.

The separation of the concentrates, whereby two different products are obtained, is based on the principle that a highly charged aluminated hydro-carbon oil, under different temperatures, has the exceptional properties of selecting and retaining certain minerals from a pulp to the exclusion of others.

The concentration plant of La Victoria will consist of two 100-ton unit Van Meter - Boss concentrators (continuous system) arranged in tandem, the tailings of the first discharging into that of the second. From the first concentrator will be obtained the rich silver concentrates, from which the zinc has been separated, and from the second a zinc concentrate low in silver. The silver concentrates will be treated by the present lixiviation plant, while the zinc concentrates will be treated separately for a zinc product.

Having erected and operated the first oil concentrating plant in America, which proved financially successful in the concentration of the silver and copper ores of Peru, and the subsequent adoption of this system for the concentration of tin ores in Bolivia, a few ideas relative to the selection of the oils and mechanical conveniences necessary to obtain the best results may be of interest to those contemplating oil concentration.

The selection of the oil is the most important feature of all, and requires the skill of a chemist, who should be an expert on oils. The selective action of a petroleum residuum oil for mineral particles of pulp is well known; but to obtain an oil whose selective properties are such as to select one mineral from the pulp while leaving another, requires much skill, and can only be accomplished by one experienced and thoroughly acquainted with the metallic combination of ores and the chemical combinations of oils.

An oil may be compounded whose selective action proves perfect in the laboratory, and at the same time would not be a commercial success in the working plant, owing to lack of practical experience and knowledge on part of the operator.

The oil which I have employed in concentrating operations for the past eighteen months, treating the silver-tin ores of Bolivia and the silver-copper ores of Yauli, Peru, has proven highly successful. It is specially treated, aluminated hydro-carbon oil, the manufacture of the same necessitating a considerable outlay for special machinery at Lima. The acidulated, aluminated salts and products are difficult to handle successfully in commercial quantities, the manufacturing of same involving great care and an expensive manufacturing plant.

The writer has the best success with the Pennsylvania oils, and also the oils from Piura, Department of Tumbas, Peru. These oils all have a paraffine base. Laboratory experiments with certain California oils were perfect, but gave indifferent success in the working plant. The most satisfactory oil heretofore produced is compounded by the W. P. Fuller Co. of San Francisco, owing to their having special machinery for its manufacture. Many unsatisfactory results in oil concentration have followed where the experimenters have labored under the impression that it was essential for the pulp to pass through the body of oil, and that by so doing better results would be secured.

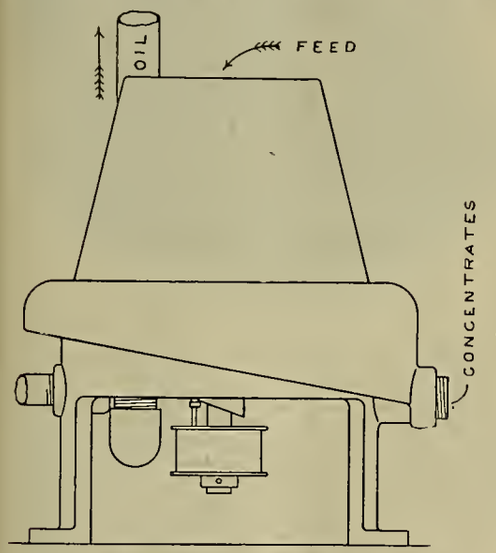
The selective action of oil for the metallic particles of the pulp depends upon the surface contact of the pulp and oil, selective action rarely taking place when the pulp is within the body of oil, the commingling, of mixing or agitating of the same to obtain the surface contact being useless and detrimental to the process.

Upon examination of a body of mineral-charged oil, the mineral particles are found adhering only to the surface, leaving the interior free from mineral. Therefore, in a body of oil the more surface exposed to a mineral pulp the greater the extraction of the mineral by the oil. This has been clearly demonstrated by a series of experiments, conducted with two hollow cylinders about 12 inches in diameter, but of different height, arranged in a vertical position, the first cylinder being about 20 feet in height and stationary, the second being about 2 feet in height and arranged to rotate at a speed of about 200 revolutions per minute, and provided with a brake, by the application of which it can be brought to an abrupt stop, allowing the contents to rotate within. The two cylinders being filled with oil, a quart of mineral pulp was poured into the larger so as to pass through the center of the body of oil. Upon examination of the pulp afterwards, it was found to have lost 2% of metallic mineral and 7½% of gangue. The same experiment was conducted with the second cylinder while its contents were in rotation and upon examination the pulp was found to have lost all the mineral and none of the gangue, the centrifugal action of the oil discharging the gangue and at the same time bringing the surface of the oil in contact with the pulp.

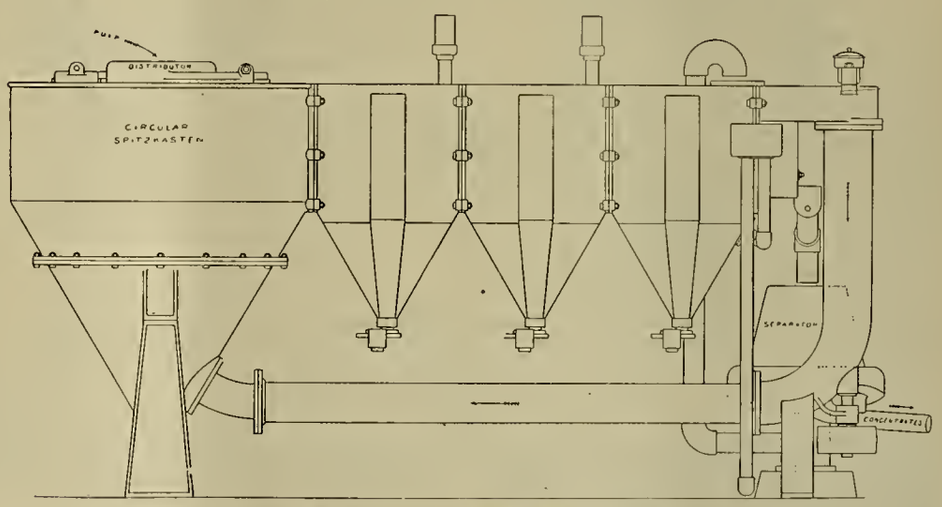
Upon this experiment the fundamental principle of the Van Meter-Boss continuous system of oil concentration is based.

The centrifugal action of the body of rotating oil in the spitzkasten produces the contact between the oil and pulp, at the same time passing the mineral-charged surface at the rate of 900 square feet per minute, from the body of oil, allowing a new surface to be presented at the same rate. As only the mineral surface so discharged passes through the separator (the main body of oil being used as a circulating medium within the concentrator), it greatly increases the capacity of the separator and dispenses with the bulky spitzkasten, vats, etc. It will be seen by this method that the commingling, mixing or agitation of the oil and pulp is entirely eliminated, which has been the cause of failures in oil concentrating devices. The separation of the concentrates from the oil has been brought to a high state of perfection. Instead of using the cumbersome hydro extractors, or centrifugal drums, which have to be stopped at intervals for the removal of the concentrates, only to pass through a similar process of cleaning, a small centrifugal separator has been adopted, which carries out the whole process of separation and cleaning, the concentrates being discharged continuously, free from oil without stoppage of the separators. One of the above separators, with 26-inch cone (weight 1200 pounds), running at a speed of 1000 revolutions per minute, has a capacity of separating sixteen tons of mineral-charged oil in twenty-four hours.

During the month of June, 1902, at the Santa Barbara oil concentration plant, Yauli, Peru, the following run was made for the purpose of ascertaining the selective action of aluminated hydro-carbon oil, under different temperatures. Two concentrators were arranged so that the tailings from the first discharged into the second. The oil in the first was kept at a temperature of 140° F., and in the second at 60° F. Two hundred and eighty-five tons of silver-copper ore was selected from the mines of Julio, Celia, and Santa Teresa, the average assay value being about $35 per ton.



Centrifugal Cone Separator, Continuous Discharge.



100-Ton Standard Unit Van Meter-Boss Oil Concentrator.

STATEMENT.

Mine.	Number tons	Temperature of Oil. Concentrator No. 1	Temperature of Oil. Concentrator No. 2	Amount in Pounds Concentrates. Concentrator No. 1	Amount in Pounds Concentrates. Concentrator No. 2	Assay Value Concentrates per Ton. Concentrator No. 1	Assay Value Concentrates per Ton. Concentrator No. 2	Assay value per ton tailings	Number gallons oil	Remarks.
Celia	165	140	60	4,250	14,020	$1,112 00	$346 00	$1 22	110	Cost of labor.....$71 00
Julio	80	140	60	1,500	3,500	1,540 00	215 00	1 60	58	Cost of oil per gallon.....8c
Santa Teresa	40	140	60	425	1,600	905 00	245 00	1 45	29	

From the foregoing it will be seen that oil does not only act as a concentrator, but under different temperatures will act as a separator. The quick success of concentrating by oil in South America is largely due to the enterprise and liberality of Dr. Octavio Valentine, a wealthy mine owner of Peru, on whose property, at Yauli, the first successful oil concentration plant in America was erected.

The value of oil concentration is rapidly coming to be recognized, and I know of no other field in the metallurgical line more promising for research than the concentration and separation of minerals by means of oil.

Alluvial Deposits of Horsefly, B. C.

NUMBER II—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by W. M. BREWER.

At the time of the writer's visit to this property active operations had been suspended aud during the past season a sample mill run only had beeu made. It would appear that the owners of the property would be justified in prosecuting development in order to determine whether the extent of the deposit of cemeut in this ancient channel is sufficiently large to warrant the erection of a stamp mill of much greater capacity thau the present one; because it does uot seem as though a 10-stamp mill, being operated on material of such low average grade as this is shown to be, could result in commercial success, even though the duty of each stamp was to crush 5½ tons of this cement per day, which, according to the manager's reports, has been about the average.

In accordance with this view, the writer finds that in the last report of Manager Hobsou to the shareholders he recommeuds the expenditure of $200,000 as the total cost of the necessary development work and installation of an 80-stamp mill, which he estimates will place the mine on a dividend-paying basis.

The cost for miuing aud milling he estimates at $1.12 per ton, and the lowest average tests which had been obtained at any time from drifting and milling were $1.12 per tou, and seven tests of selected gravels, the first four of which were made in 1897 and the others in 1898, are reported to have resulted as follows:

		Quantity Milled.	Product Per Ton.
1897	No. 1	100 tons	$3 42
"	No. 2	100 "	4 13
"	No. 3	100 "	2 18
"	No. 4	100 "	4 13
1898	No. 5	50 "	5 02
"	No. 6	100 "	3 07
"	No. 7	100 "	4 31

Some idea of the gravel deposited in this aucieut chanuel cau be formed when the extent already exploited is considered. Iu addition to the area which has been washed over by the hydraulic process, where the bedrock is exposed over an area of four or five acres, the main tunnel, which is really run to crosscut the channel, has been driveu 1200 feet from the northerly rim and has apparently uot yet reached the center of the channel; therefore, the positiou of the opposite rimrock, as well as the distance from rimrock to rimrock, is as yet undetermiued, as is also the length of the chanuel.

The thickness of the high-grade cement varies from 2 to 6 feet, while the thickness of the eutire deposit from the present surface to bedrock averages about 150 feet; this is made up of about 20 feet of boulder clay from the surface down, the remainder being free and cemented gravel, of which the highest grade is the stratum already referred to, which immediately overlays the bedrock.

On the Ward claim, 5 miles farther up the river, all the work which has been done has been by hydraulic process and elevating the tailings. The material washed is piped from the face of the bank to the foot of the elevator, which is of the suction pattern, elevated 50 feet, discharged onto a grizzly aud dumped into sluice boxes, the discharge eud of which reaches to the tailings dump.

Mr. Ward, the manager, informed the writer that about 80% of the values contained in the gravel were saved before the material was elevated; but of this amount it appeared to the writer that a considerable proportion was lost between the face of the cut aud the bottom of the elevator, because the material is washed over the gravel floor of the cut, instead of beiug piped into a flume furnished with riffles.

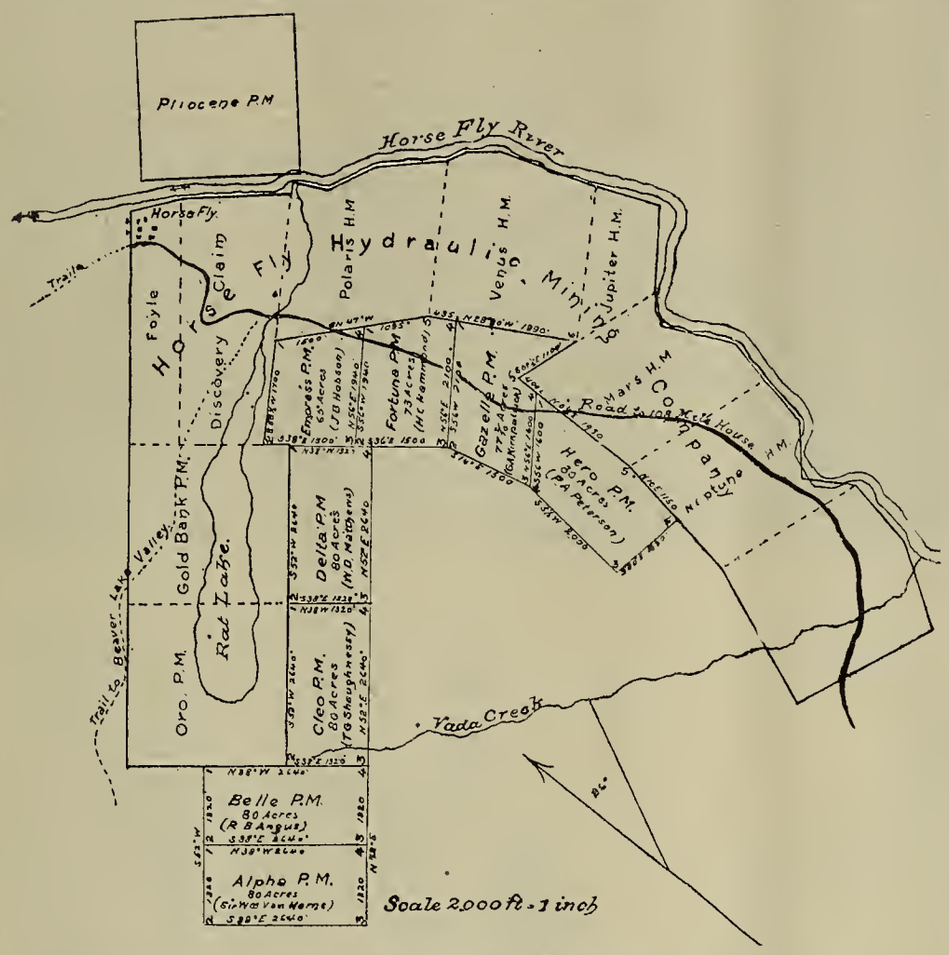
The material in that portion of the channel on which Ward's claim is located, although showiug that some cemeuting process had been at work, has uot become as compact and hard as at the Horsefly mine; consequently, drift mining has not been resorted to, the material still being sufficiently free for piping.

The writer during his visit witnessed a somewhat unusual condition which characterized a stratum of boulder clay, almost black in color, which Mr. Ward had previously considered as beiug barreu of values. From motives of curiosity, more thau the hope of finding values in this material, he panned some, with the result that it yielded nearly 50 cents to the pan; he then started to prospect the material with sluice boxes, and as a result of two days' work by five men, shoveling into sluice boxes, cleaued up $90, and demoustrated that the pay stratum averaged between 3 aud 4 feet in thickuess.

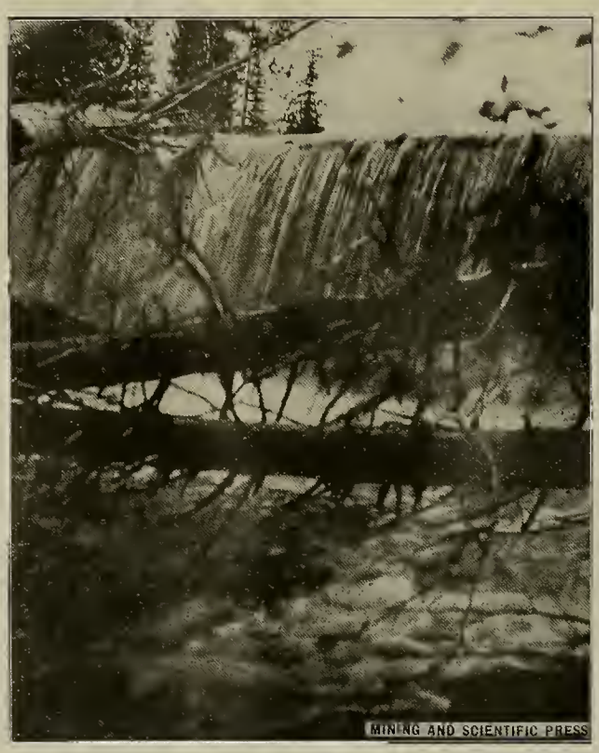
The depth from the present surface to bedrock varies in this portion of the chauuel, the maximum being 150 feet; but, owing to the liftiug capacity of the elevator, 60 feet is the greatest depth to which work can be carried.

This property has beeu worked siuce 1876, and, when couditions are favorable, often yields as high as $1000 per day, the quautity of water used being about 2000 miner's inches. This supply is furnished from Mussel creek, being taken out just above the falls, aud about 2 miles uearer the mouth than the location of the dam coustructed by the Horsefly Hydraulic M. Co.

On Mussel creek, which is a tributary of the Horsefly river, the rock formation changes from shale to basalt, and it is near the falls that the stratum of white quartz gravel underlies the basalt. On the same creek, and about 4 miles above its mouth, the eruptive rocks contain impreguations of native copper. Particles from the size of the head of a pin to a coffee bean are fouud disseminated through the basalt with greater or less regularity, probably averaging 1% or 2%. The extent of the mineralized zoue has never beeu determined, principally for the reason that lack of transportatiou prohibits the attempt to work any but placer, hydraulic or free-milliug gold-bearing rock in this portion of the Province.



Map of Horsefly Co.'s Property, British Columbia.



Dam on Mussel Creek, British Columbia.

A Number Scheme for Mines.

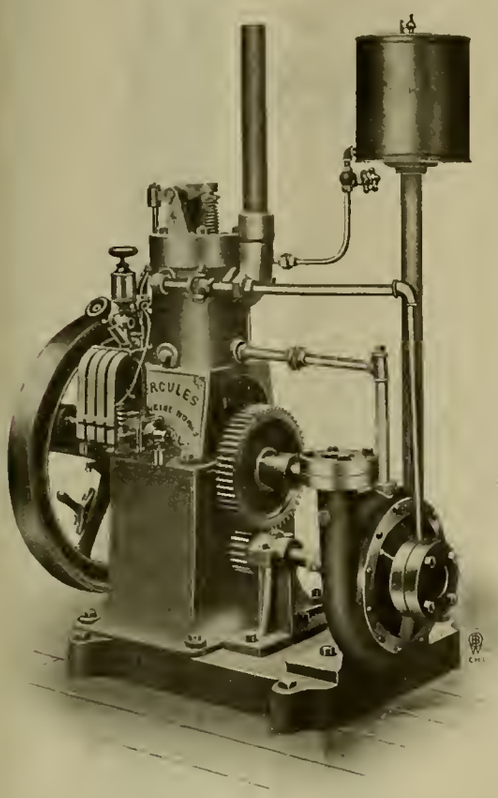
TO THE EDITOR:—I have read with interest the suggestion of Mr. Alderson, appeariug in your issue of October 24, eutitled "A Number Scheme for Mines." It is a good idea and one capable of application iu many large mines where no system of numbering is in use, but where it could be introduced to advantage. I would suggest, however, that mill holes, each 20 feet, are unnecessarily close—30 feet being the usual distance of chutes from ceuter to center. This leaves a distance for the shovelers of only 12½ feet on either side of the center of that block of the stope. It also seems au unnecessary expeuse to put up raises every 20 or eveu every 30 feet. Ordinarily a raise at each end of a shoot of ore of moderate length is sufficient, and in very long shoots every 100 feet is a sufficiently short interval. If the mine is being operated by the block system, then a raise at either end of each block will be necessary, or a double compartment raise at the center. By placing the first chute 30 feet from the shaft on the 100 level it would be proper, according to Mr. Aldersou's scheme, to number it 103, aud thereafter the numbers would run 106, 109, 112, etc. This admits of the numbers running up to 199, which would indicate a point 990 feet from the shaft. It is seldom that drifts are driven a greater distance from a shaft without making connections with workings from a second shaft. The raises should be designated as such and may be given each its appropriate number, as, for instance, the first raise and the first chute may be put up together—in double compartmeut, and called "raise 103," and the next at 120 feet (also double compartment), called "raise 112" which indicates that this raise is on the 100-foot level at a point 120 feet from the shaft, with 90 feet between No. 103 and No. 112.

In working both ways from the shaft the system could be carried out by calling one side arbitrarily north or south, east or west, as the case may be. No. 522 N. indicates the chute 220 feet north of the shaft on the 500 level. Crosscuts should be indicated by the letter X, as suggested by Mr. Alderson, and there is not much likelihood of the letters of the alphabet

being exhausted by multiplicity of veins worked by this system. The plan is merely suggestive and may be elaborated as much as the necessity of the case or the ingenuity of the superintendent may determine. MINE SUPERINTENDENT.

Pump for a Cyanide Plant.

In a cyanide plant is used a circulating pump to carry the cyanide solutions, after passing through the zinc boxes, back to a level above the charging tanks. The accompanying illustration shows a centrifugal pump arranged for such work. It is connected to a gas engine by machine-cut gears, the whole being self-



Pump and Gasoline Engine for Cyanide Plant.

contained on a cast iron base. The engine will develop 2¼ H. P. (1¾ H. P. guaranteed) and can be run with either gasoline or distillate. It is equipped with magneto sparking dynamo, oilers and wrenches.

The pump is a 2-inch centrifugal, having a capacity of from 75 to 150 gallons per minute, depending on the height to which the solution is raised. The cut shows the circulating water pipes from the engine cylinder, connected with the pump (this is where clear water is pumped.) When cyanide solutions are handled these pipes are connected with the water main, and the pump outlets for such plugged. Further information as to shipping weight, prices, etc., may be had from the Hercules Gas Engine Co., 163-167 First street, San Francisco, Cal.

A Montejus and Filter Press for Cyanidation.

Written for the MINING AND SCIENTIFIC PRESS by DENNIS H. STOVALL.

In recent years there has been quite an innovation in methods of extracting gold from pulverized base ores or tailings. This innovation has largely been in the nature of filter presses, as a valuable and additional agent in the treatment of pulp and slimes by the cyanide or other processes of extraction. At the Greenback mine, southern Oregon, Superintendent C. W. Thompson has placed in commission a cyanide plant that goes one step farther than any other process used in the mines of this part of the West. This is a montejus and filter press. Through the agency of this plant Mr. Thompson is able to save at least 95% of the assay values of the ore.

The montejus and filter press were manufactured in Germany and set up at the Greenback mine at a considerable cost, but it is proving a good investment. The filter press feature of the plant is but little unlike other filter presses that have been introduced in the mines of America, Australia and New Zealand, but as far as the writer is informed no other mine in America has yet introduced the montejus. This latter machine, in its single piece, weighed five tons, and resembles a huge boiler. It was set on end and buried in the ground till but a small part of its upper portion remains above the floor of the mill. (See illustration frout page). The route of the tailings, after leaving the concentrators, is first to the sump tanks, thence to the montejus, whence they are forced to the filter press.

The large pipe shown in the illustration, running from the top of the montejus to the right, connects with the sump or slimes tanks, and another running out of the tank higher up connects with sand tanks. The arrangement for filling and discharging is automatic, being operated by compressed air.

In the cyanide plant of the Greenback mine there are three sand tanks and four slime tanks. The tailings are conveyed from the concentrators, being first separated from the slimes, to the sand tanks. Each sand tank has a capacity of 150 tons, and are so arranged that while one is filling one of the other two are being discharged. The montejus and filter press treat not only the tailings sands, but the slimes also, and each are conveyed by gravity to the montejus, entering it near the top through a large valve. When the montejus is full this valve closes, and the method of emptying it and forcing the pulp to the press is by compressed air supplied by the air compressors in the stamp mill. The air enters through one of two valves, one that has a pipe leading nearly to the bottom of the montejus, and the other only into the top. The pipe leading to the bottom is for agitation, such being necessary at times when the pulp cakes, or becomes too solidly packed. The air under pressure forces the contents of the montejus out through a large pipe that also leads nearly to the bottom of the tank, and through this pipe the tailings and slimes are forced to the filter press, under a pressure of from a few pounds up to eighty pounds per square inch.

The filter press is made up of a series of filter frames, set side by side, and each cored internally with slots, with perforated steel plates between them. Each of these frames set and revolve on a common axis or shaft, and each are provided with convenient handles or hand holds, making it an easy matter to manipulate them. The corings of each filter frame snugly coincide, thus allowing a common passage for the flushing fluid, for charging the chambers, and for the compressed air.

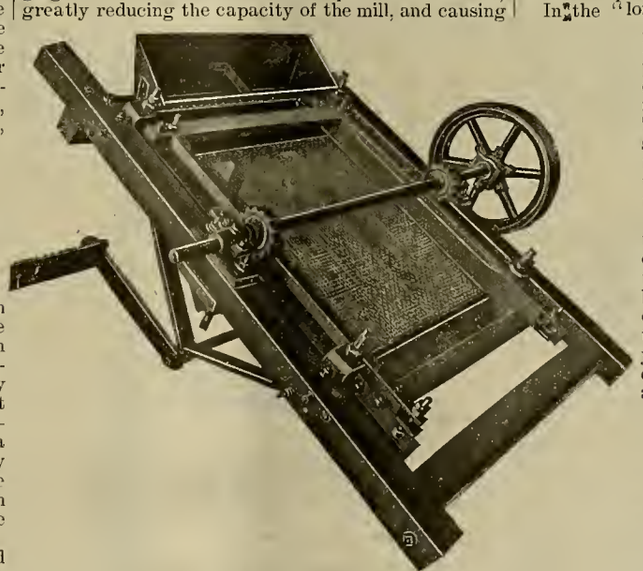
At one end of the frame is arranged a ratchet and wheel lever, with a powerful fulcrum by which a man can easily apply the pressure necessary to operate the press.

The method of treating the wash fluids after they have passed through the tailings cakes in the filter frames is identical to that followed in any cyanide plant.

Impact Screen for Ores.

One of the difficulties which is frequent in ore reduction is the screening of the ore after crushing, and particularly is this the case if the ore be wet and of a clayey nature. In the use of tromme ls this is often the case. When the ore is screened dry a large amount of dust is created, which in some ores is not only disagreeble, but dangerous, as in the case of lead ores. In this class of ores when they are wet, the clogging of the screen is of frequent occurrence, greatly reducing the capacity of the mill, and causing much loss of time. When a screen does not properly perform its function, that of sizing the crushed ore, the under size which should have passed through the screen is returned to the rolls overloading them, causing additional loss of capacity and consequent expense. A revolving screen finer than ten-mesh requires much attention and is a source of much annoyance.

To overcome this difficulty with clogging of scrense the Colorado Iron Works of Denver, Colo., has devised a flat screen, designed to work on any class of ores. This screen has a vertical motion at right angles to the plane of the screen surface, the motion in other screens being horizontal, or practically in the same plane as that in which the material is traveling. The vertical motion is designed to keep the screen free, and to permit the largest possible capacity. The construction and operation of the screen is illustrated in the accompanying engraving.



Impact Screen for Ores.

Standardizing of Methods of Chemical Analysis.

In a paper read at the recent meeting of the British Association at Belfast, B. Blount enters a protest against the present tendency toward standardization of methods of chemical analysis, on the grounds that the conscientious chemist seeks any way to employ the methods that are most nearly accurate, that the employment of various methods that are equally good furnishes a valuable check on the results, that the adoption of standard methods not known to be absolutely correct will simply perpetuate imperfections and discourage investigations toward improvements, and finally that independent consulting chemists, who may refuse to submit to dictation even from a committee of their peers as to the methods they are to employ, will be put at an unfair advantage before the public, and especially before courts of law. Mr. Blount admits, however, the desirability of revision of analytical methods, and considers it a proper function of a committee, acting under some central body, to examine and report on old methods and recommend new ones; but the reports of such committees should merely be critical and advisory, and no attempt should be made to erect a standard method. The object aimed at would be to insure that the methods examined and finally approved should be both reliable and practicable. In that way real analytical progress would be effected.

Order of Drop of Stamps.

TO THE EDITOR:—The order of drop of stamps is of great importance. Thirty years ago we used to hear it said that five stamps in a battery was the proper thing, because this number could be so arranged that no two adjacent stamps would drop consecutively. Accordingly the cams were generally so placed on the shaft that the order of drop was 1, 3, 5, 2, 4; but with this order of drop the pulp has always banked up under Nos. 1 and 2, and no arrangement of feeding or increase of drop of one or two stamps or distribution of water will entirely remedy the difficulty. But this order still continues in some places because the theory is correct. The order 1, 4, 2, 3, 5, or 1, 5, 2, 4, 3 is better, though not perfect. With dies much worn, and discharge correspondingly higher, the difficulty becomes more pronounced, and I have repeatedly found that by holding a square-edged receptacle before the screen frame, and drying and weighing the result, that No. 5, with 6 inches drop, forced more pulp through the screen than Nos. 1 and 2 together, having 8 and 7 inches drop respectively.

In the "long ago" I ran a 3-stamp mill on the American mine. The order of drop was 1, 2, 3. It could not be otherwise. The pulp banked up under No. 1. In later days, I operated a 4-stamp prospecting mill—light stamps, but rapid drop. The order was 1, 3, 2, 4. The pulp seemed to distribute itself uniformly through the battery and the discharge was uniform. There was nothing more to be desired in this behalf.

I believe, but am not able to prove, that a 4-stamp battery with this order of drop will crush more ore, other conditions being the same, than a 5-stamp battery with any order of drop that can be given it, and I predict that those who build mills, say twenty-five years hence, will find that a change has occurred, and that 4-stamp batteries are the rule. MILL MAN.

Ammonal, a New Explosive.

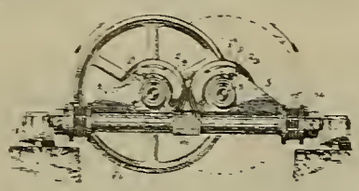
The latest in explosives, according to Metal Industry, is powdered aluminum, mixed with nitrate of ammonia, and put upon the market under the name of "ammonal." This explosive is said to be one of the surest and safest known, as it can not be exploded by friction or blow, while otherwise containing all requisites of an explosive. The fact that aluminum is not affected by nitric acid gives the important property to ammonal of not being subject to disintegration. As it is not affected by frosts, accidents which so often occur when thawing out frozen dynamite are not to be feared. The explosion is caused by an ordinary cap. Another important property claimed for ammonal is that it is not affected by moisture.

Mining and Metallurgical Patents.

PATENTS ISSUED OCTOBER 27, 1903.

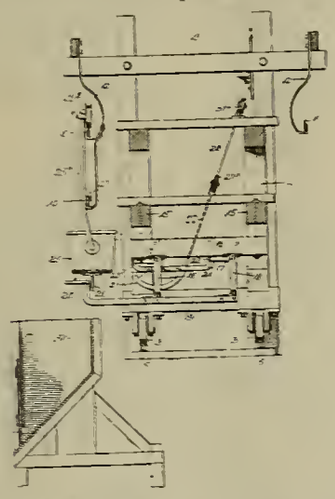
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

CRUSHING ROLLS.—No. 741,592; W. G. Dodd, San Francisco, Cal.



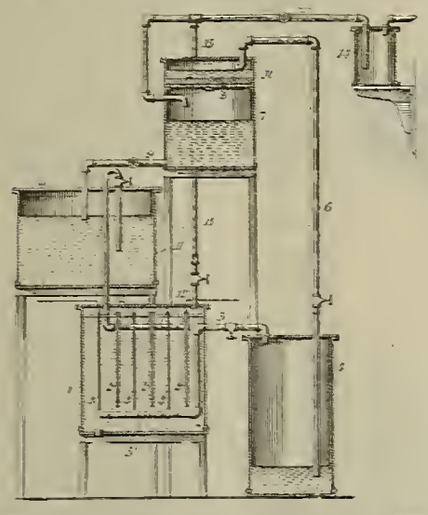
In roller crusher, combination with grinding rolls, of separated rods arranged in same horizontal plane at each side of rolls and between which rolls work, means at respective ends of rods for supporting same, pair of slidable bearing brackets for each crushing roll, each of brackets being sleeved upon pair of rods, means for exerting inward pressure upon bearing brackets, and universal bearings carried by brackets upon which crushing rolls are suspended.

DISCHARGE TERMINAL FOR WIRE ROPE TRAMWAYS.—No. 742,235; B. C. Riblet, Spokane, Wash.



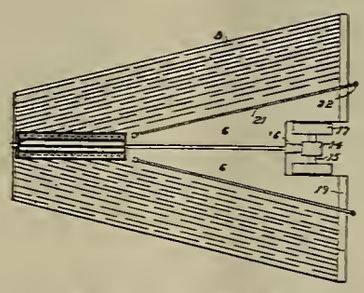
In discharging terminal for wire rope tramways, combination with running and stationary ropes, of movable truck having bucket dumper arranged thereon, bucket guiding rails located below running rope; second movable truck in alinement with first mentioned truck, having sheave mounted thereon, round which running rope passes; semi-circular track, ends of which are extended and have telescopic connection with tracks forming continuations of stationary rope; semi-circular guide rail having extended ends which telescope with guide rails of above mentioned trip mechanism for operating bucket dumper; cable connecting mechanism with dumper, and means for operating trip mechanism.

PROCESS OF ELECTRO-DEPOSITING METALS.—No. 742,442; W. M. Johnson, Hartford, Conn.



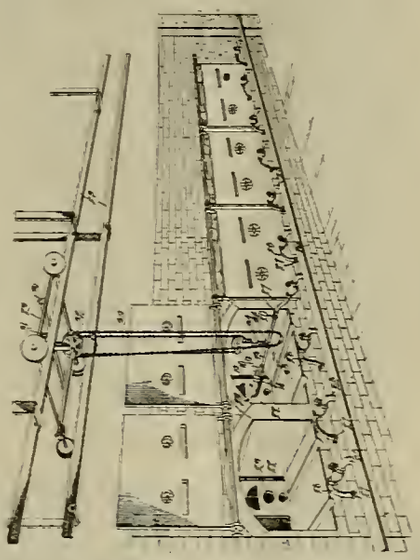
Method in subjecting electrolyte in neighborhood of cathode to such pressure as will remove contained gases, and electro-depositing metal therefrom in reguline form.

CONCENTRATOR.—No. 742,510; C. H. Snow, Stockton, Cal.



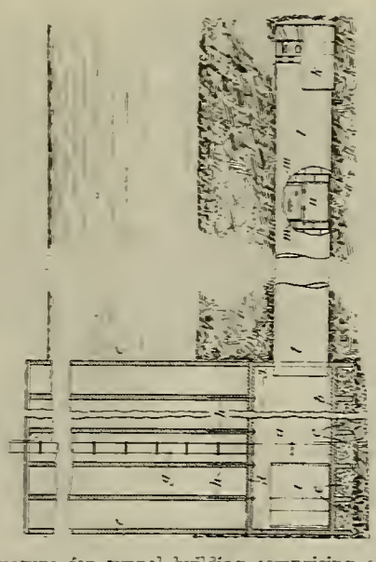
Concentrating apparatus consisting of pair of divergent tables having inner edges hinged contiguous to each other, and outer edges declining therefrom, longitudinal riffles parallel with outer edges of tables, means for independently adjusting transverse angles of tables, mechanism by which longitudinal inclination of tables is simultaneously adjusted, mechanism by which longitudinal concussive movement of tables is effected, pulp-distributing box, means contained therein whereby pulp of different gravity is delivered upon respective tables to be independently treated.

APPARATUS FOR CHARGING AND CLEANING FURNACES.—No. 742,196; T. Jones, Iola, Kans.



An apparatus for charging retort, comprising holder for containing material to be treated and means for forcing charge from holder without altering position of holder in so doing.

TUNNEL CONSTRUCTION.—No. 742,222; J. F. O'Rourke, New York, N. Y.

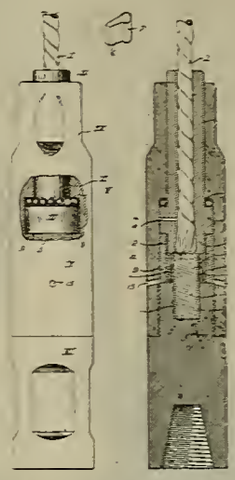


Structure for tunnel building comprising crib or upper portion, working chamber, and intermediate air pressure chamber from which work of excavation can be carried on, air pressure chamber and working chamber forming permanent structure and crib or upper portion being removable from permanent structure.

PROCESS OF TREATING LEAD, SILVER OR ZINC ORES.—No. 741,653; S. Ganelin, Berlin, Germany.

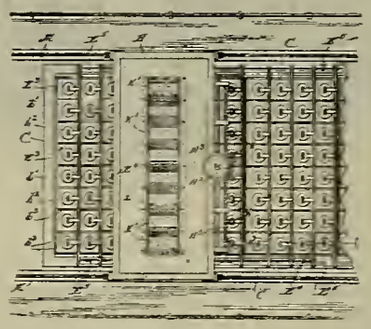
Process for treatment of ores and substances containing metallic oxides, of silver, lead or zinc, which consists in mixing them with molten salt capable of dissolving oxides from the rest of the ore and then separating metallic substances from salt and rest of ore.

RATCHET CLUTCH FOR DRILLING SWIVELS.—No. 742,332; J. Kunny, H. G. Arundell and P. R. Kunny, Los Angeles, Cal.



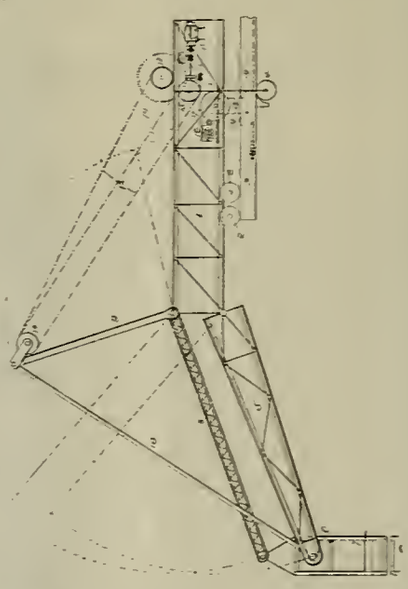
Drilling spindle comprising swivel rod, cable secured thereto, head on rod, casing inclosing rod and head, antifriction means located between rod and casing, ratchet barrel secured to rod and turning therewith, tool rod secured to casing beneath ratchet barrel, pawl hub secured to tool rod, and means carried by pawl hub adapted to intermittently engage ratchet barrel.

SMELTING FURNACE.—No. 742,406; O. H. Eliel, Lasalle, Ill.



In smelting furnace retort construction which consists in tube having bore open at both ends in combination with stopper adapted to pass into and close bore at distance from end and having cup-shaped flange projecting laterally over bore and provided with annular well adapted to close over end of tube.

SUPPORTING AND CONVEYING APPARATUS FOR ORE SCRAPERS.—No. 742,436; G. H. Hulett, Cleveland, Ohio.



Combination with girder and scraper frame or leg of boom hinged to forward end of girder and hinged at other end to scraper frame and equalizing bar disposed parallel with boom and hinged at its respective ends to girder and scraper frame.

Mining Summary.

SPECIALLY COMPILED AND REPORTED FOR THE MINING AND SCIENTIFIC PRESS.

The annual report of the Director of the Mint shows the following is approximate distribution by producing States and Territories of gold and silver in the United States for calendar year 1902:

	Gold, Value.	Silver, Coining Value.
Alabama	$2,500	$125
Alaska	8,315,800	118,950
Arizona	4,112,300	2,931,513
California	16,792,100	1,164,671
Colorado	28,468,700	20,267,960
Georgia	97,800	5,517
Idaho	1,457,000	7,569,842
Maryland	2,500	.....
Michigan	.....	257
Montana	4,347,000	17,123,297
Nevada	2,895,300	4,843,572
New Mexico	531,131	591,137
North Carolina	90,700	27,022
Oregon	1,816,700	120,630
South Carolina	121,900	338
South Dakota	6,965,400	439,855
Tennessee	.....	15,905
Texas	.....	576,905
Utah	3,594,500	11,004,922
Virginia	3,100	7,208
Washington	272,200	800,323
Wyoming	38,800	0,484
Totals	$79,956,031	$71,757,575

The number of fine ounces of gold is given at 3,870,000, and of silver 55,500,000. This is an increase of 64,500 ounces of gold as compared with 1901, and an increase of 286,000 ounces of silver. The total value of the silver produced is $29,415,000, as against $71,757,575, its coinage value.

The estimate of the Director of the Mint of the world's production of gold and silver for the calendar year 1902 is: Gold, total value, $295,889,000; silver, coining value, $215,861,800. Follow are the figures for some of the leading countries:

	Gold, Value.	Silver, Coining Value.
United States	$80,000,000	$71,757,600
Mexico	10,153,100	77,804,100
Canada	20,741,200	5,564,500
Africa	39,023,700	.....
Australia	81,578,800	10,377,100
Russia	22,533,400	265,200
Austria-Hungary	2,171,300	2,432,200
Italy	5,300	1,246,800
Spain	10,200	4,784,100
Greece	.....	1,409,500
Bolivia	4,700	16,798,600
Chile	575,200	4,611,600
Colombia	2,522,600	2,297,000
Brazil	9,994,600	.....
Guiana (British)	1,808,600	.....
Guiana (French)	2,420,200	.....
Peru	2,226,100	5,313,700
Central America	2,001,900	1,255,800
Japan	1,287,000	505,000
China	8,731,800	.....
Corea	3,500,000	.....
British India	9,588,100	.....
British East Indies	1,027,100	.....

As compared with 1901, these figures show an increase in the production of gold of 1,557,914 ounces and a decreaso of 8,042,934 ounces in the production of silver. During the year Africa increased her gold production from 429,704 ounces to 1,887,773 ounces, and Australia increased her gold production to $81,578,000, which is over $1,500,000 in excess of the production of the United States, which again takes second place.

ALASKA.

(Special Correspondence).—The Miocene Ditch Co. of Nome has its water system in operation. The main ditch, which is over 30 miles long, and taps Nome river, is 8 to 12 feet in width and has a capacity of 3000 miner's inches. This, with the branch lines, comprises over 40 miles of diteb. This system covers the district of Dexter, Anvil, Glacier and Snow Gulch creeks, and the adjoining bench mines. A number of these mines require hydraulic gravel elevators to work them. The Miocene Co. installed four elevators on Anvil and Glacier creeks this season, and will take in six of a larger pattern next year.

In the Council district there has been much activity. C. D. Lane & Co. completed one ditch system on Ophir creek, and several gravel elevators were put in operation there. These older districts are getting into shape for successful mining, while the outlying districts are also becoming active. It has been shown that the gold-bearing gravels of the Seward peninsula require construction of ditches to make them producers.

Nome, October 10.

The Alaska Mine Owners and Operators have organized at Juneau, with J. MacDonald, F. C. Hammond, B. M. Behrends, G. E. Bent and W. B. Hoggatt as officers, to promote the mining interests of Alaska.

The plant of the Rodman bay mines at Rodman bay, near Juneau, has been shut down. It is reported the money has given out. A wharf was erected, a sawmill built, 7 miles of railroad laid from the dock to the mine and a 120-stamp mill built, and 800 feet of tunnel driven.

So much rain has fallen during the last of October that the Treadwell M. Co.'s ditch, near Douglas, has overflowed, making it necessary to open the flood gates and fire hydrants to relieve the pressure, says the Juneau Dispatch. The mines, too, are feeling it, the 220-foot level having 3 feet of water. The flood has not greatly retarded work, however.

ARIZONA.

Gila County.

The consolidation of the United Globe mines, owned by Phelps, Dodge & Co., with the Old Dominion C. M. Co. is reported closed. In consideration of the issue to them of 130,000 shares of stock Phelps, Dodge & Co. transfer their Globe mining property to the Old Dominion Co. and also pay $350,000 in cash. The agreement carries with it control and the Old Dominion will be known as a Phelps-Dodge company. The president of the consolidated company is J. Douglas, with C. S. Smith vice-president and C. H. Altmiller treasurer. The offices of the company will remain in Boston. One smelting plant will be erected for both properties at Globe.

Graham County.

The New England C. Co. and the Clifton Con. C. Co. at Clifton have been consolidated under the name of the New England & Clifton Con. C. Co.

Maricopa County.

(Special Correspondence). — The Gila Gold Lode Co. has men doing development work on the group in the White Tank mountains north of Buckeye. The ore is free milling, and a stamp mill will be built. Water available for mill use has been struck in sinking a shaft on one of the claims.——J. G. Hardin says he has put on more men at his gold and copper mine near New river to increase development work.——The Mormon Girl mill at Cave creek is being put in shape for operating. There are twenty-five men at work in the Mormon Girl mine taking out ore.

Donofrio & Eddie are working on their property near Frog Tanks and are considering reduction works.——H. Welch and W. Dunn are supplying the mill at Buckeye with ore from their claims in the White Tank mountains.——At the Fleming mine, near Cave creek, it is proposed to build a stamp mill, as considerable high grade free milling ore is on the dump and development is progressing.

The lessees of the Vulture dump near Wickenburg expect to have their cyanide plant in operation this week. These tailings have been cyanided before.

G. Hamlin, of the Relief mine, 15 miles north of Peoria, says they are preparing to put in a 10-stamp mill.——The Pike's Peak G. M. Co. will resume operations on its group west of Frog Tanks. E. Hewins is superintendent. A pump will be put in to unwater the deepest shaft.

J. H. McCabe has bought the Wickenburg smelter and removed it to his property north of Phœnix. This is not the smelter built at Wickenburg this summer, which is in operation.

The Arizona M. & Dev. Co. expects to begin work near Morristown this week. They have bought the Ryland, or Black Jack mine. This was formerly a producer of silver-lead ores.

The La Gloria Co. is operating in the White Tank mountains south and west of Beardsley. They have built a wagon road from their property to Beardsley, the railroad station.——It is reported that J. L. Slusher, of St. Louis, Mo., has bought the Anglesite mine near Hot Springs Junction.——G. Carguile is working his claims in the Cave creek district. The ore is free milling.

Wickenburg, Nov. 2.

Mohave County.

At Mineral Park, Superintendent J. Detar of the Queen Bee mine, says the Keystone group of mines has been taken over by the Queen Bee M. Co., who will put in a hoisting plant on the White Copper mine, covering the copper outcrop near the Mineral Park mill, and a shaft will be sunk to depth of several hundred feet. The company will also start work on the Keystone mine.

The hoisting plant for the Treasure Hill M. Co., near Kingman, is being set up. The shaft is down 140 feet and it is proposed to sink it to 200 feet, and then crosscut the Dictionary and Time Check veins. One of the veins on the surface carries high values in silver.

Pinal County.

W. S. Fletcher, having bought the Weedin-Bouvielle lead-silver mines at Mineral Hill, known as the Golden Quiver group, will build a 60-ton smelting plant on the Gila river, near Florence, for the treatment of ores of said group and also for treatment of gold concentrates and gold ores, which he will ship from his gold mines in Mohave county, says the Florence Blade. There is a 5-stamp mill on one of the gold claims and this will be converted into a concentrating plant.

Yavapai County.

The United Verde C. Co. of Jerome will build coke bins of capacity of 100 standard gauge cars at Jerome Junction. Material for an oil tank is on the ground. The tank will have a capacity of 178,000 gallons.

H. B. Fowler, of Mayer, of the Rigby Reduction Co., says the plant to be of capacity of 100 tons per day will be ready to reduce ore by Jan. 1st. He expects to save all the gold and silver, and 95% of the copper.

CALIFORNIA.

Amador County.

The last annual report of the Oneida mine, near Jackson, shows that the mine has been operated at a profit the past year.

Calaveras County.

At the Forty-nine mine at Douglas Flat a steam plant has been put in, and is in operation, as they had only water enough to keep the pumps running.

El Dorado County.

The El Dorado Republican says the Sierra M. Co. of Arizona has bought the Mt. Hope group of mines near Grizzly Flat.

F. B. Norton of Auburn, Placer county, owning asbestos deposits in El Dorado county, proposes to make firebricks by grinding up the fiber and then moulding it under pressure.

Fresno County.

The Pennsylvania Oil M. & Dev. Co., Commercial Petroleum Co.. and Section Seven Oil Co., each began drilling additional wells last week at Coalinga.——The Pleasant Valley S. F. Co. spudded in its No. 2 last week. No. 1 well is in the sand.——The Giant Oil Co. has been reorganized as the Coalinga-Banner Oil Co.

Kern County.

The California-Kern Oil Co. last week broke ground for its refinery at Kern river, near Bakersfield. The plant will be on the property leased from the Grace, adjoining the Petroleum Dev. Co. and the Junction. The property has several completed wells.

At Sunset the Monarch Oil Co. has two strings of tools in operation, and is arranging to put in machinery for five more rigs.

The Pinmore 5-stamp mill at Johannesburg was destroyed by fire on the 31st ult. The fire is thought to have been of incendiary origin. The property was owned by the Crœsus M. Co., and was leased to W. F. Earnst and A. C. Nelson, who were operating it.

Madera County.

The plant at the Gambetta mine, at Grub Gulch, is being increased by addition of machinery from the Garibaldi mine on Bull creek, Mariposa county. When completed, the change will give the Gambetta twenty stamps and two Huntington mills. The working force is to be increased. Sinking below the 800-foot level is progressing. The property includes the Josephine mine, worked to a depth of 300 feet. J. E. Porter is superintendent.

Mariposa County.

The Armstrong mine, near Indian gulch, will be opened. This mine is owned by R. M. Hotaling of San Francisco and U. Roy of Merced. They will repair the 56-foot shaft, and put in a hoisting plant.

W. M. Darling of Alameda says operations are being resumed at his Copper Hill mine, near the Armstrong mine, near Indian gulch. He has a shaft down 60 feet and will sink to 100 feet.

The Pocahontas mine at Whiterock, owned by J. Waller of Le Grand, is being worked by C. and S. Wilcox of Whiterock. They are shipping high-grade ore.

A strike is reported on the Barley Field mine, near Mariposa.

The discovery of copper ore, carrying gold and silver, is reported made near the Hotaling ranch, near Indian Gulch.

Mono County.

The New Bodie M. Co. has been incorporated at Provo, Utah, by C. E., W. D. & W. A. R. Loose, R. Smoot and J. R. Twelves. C. E. Loose is president. The company owns a group near Bodie, including the Cluff, Arthur, Sunshine, Eva, Hillside, Coarse gold mining claims and the Miners' millsite and water rights.

Nevada County.

The Huron and Red Cross mines, near Omega, which have been consolidated and have arranged to use electricity for power and lighting, will be supplied by the Central California Electric Power Co. from Alta. About 200 H. P. will be required. The line will he 9 miles long.

Plumas County.

W. D. Lawton, superintendent of the Plumas Mines, Ltd., in North canyon, near Greenville, says he has seventy-five men at work, and he expects to have the mill in operation this week. The mine is on north side of North canyon, below the Round Valley reservoir.

San Diego County.

In the Superior Court on the 2nd inst., R. O. Butterfield began action against the American Lithia and Chemical Co., of New York, et al. for annullment of certain deeds and transfers to the lepidolite and amblygonite mines at Pala. It is claimed by Butterfield that W. H. Crane has received transfer for property, has formed the corporation and has deeded the property to the corporation without doing any of the other things promised and without making returns to the original owners.

The mill at Cuyamaca on the Stonewall mine has been started up after several years of idleness. The mine is opened to a depth of 600 feet, though it has been flooded for ten years. It is intended to unwater the mine and prospect it to greater depth. The quartz occurs as lenses in schist. H. S. Lucas is manager. The mine was a large producer in the past.

The gold mines near Banner are being developed.——The main shaft of the Rancbita mine, near Banner, is being retimbered.——The Helvetia mine, near Julian, is sinking a new shaft—now down 165 feet.——It is reported that lithia mica (lapidolite) has been discovered near the San Felipe on the border of the Colorado desert, about 10 miles from Banner.

Santa Clara County.

The Watsonville Oil Co. have perforated two strata of sand at well No. 3 on the Sargent ranch, near Sargents, striking oil, which gushed to height of 60 feet. It is estimated the well will furnish 200 barrels per day.

Shasta County.

The Mountain Copper Co. at Keswick will send to the St. Louis Exposition a mass of copper ore which weighs 1000 pounds. It was taken from the mine this week and shows native copper. An iron stand is being made on which the specimen will he set.

Shipments of gold-bearing quartzose ore for treatment at the Keswick smelter are being made by mines in Salt Creek district. A train, consisting of twenty-two standard-gauge cars, was hauled by the Southern Pacific from the Middle Creek station, 2 miles north of Redding, last week. This shipment included ore from the Mountain Lion mine, the Paulsen, Hiatt and Kembler mines, the Connor and the Muchmore mines. Seven cars of assorted ore remained on the platform awaiting shipment. Fifty cars of ore were shipped during the week.

Sierra County.

Superintendent Finney of the Telegraph mine at Fir Cap says, owing to the improvement in the values of the ledge, the 10-stamp mill will be increased.

Siskiyou County.

(Special Correspondence).—The mining suit of Music vs. Tetherow has been compromised for $1000 cash and $2000 without interest, payable September, 1904. At the Knownothing mine, Superintendent Roberts has opened up ore and repaired one battery of four stamps. He intends to begin crushing this week. Later both 4-stamp batteries will be put in operation.

C. P. Richards has leased part of J. D. Hubbard's cyanide plant at Rollin and is setting it up at the Black Bear mine to work up a dump of mill tailings below the mill. Superintendent J. Daggett of Black Bear will resume operations at the mine next week.

The Yreka M. & M. Co. has shut down its mine and plant indefinitely. The company has annually lost part of its property through lawsuits and has little left to operate on.

Superintendent W. H. Young of the King Solomon mine has let contracts for several hundred feet of tunnel to open up new ground. After this is done, they will put in a milling plant.

Rollins, Nov. 2.

The Van Brunt (Ah Ock) mines, near Happy Camp, near Yreka, are yielding returns, says Superintendent D. J. Jackson, and development work will he increased. —— The McKean quartz mine, near Callahans, has been shut down for the season, and work will be resumed in the spring.

Trinity County.

The work of running the tunnel from Bear creek through the mountains to the Globe mines, near Weaverville, is progressing. There is still 1000 feet to run before it will he completed. The tunnel is being run to work the Globe from the Bear creek side, fuel and water being easily obtainable at that point.

The Enterprise mines on east fork of Trinity river, near Weaverville, are being developed. The lower tunnel on the Lone Jack mine is in 1200 feet, says the Journal, with an ore shoot 700 feet long. The vein is from 2 to 3 feet wide, and averages $8 per ton. In the Enterprise a vein 6 feet wide runs $15 per ton. A recent test

run during a month returned $4500 in the 10-stamp mill. M. Mauley is superintendent.

The dredger on Weaver creek, near Weaverville, is to resume operations, under direction of E. A. Wakeman.

Tuolumne County.

The mill at the Golden Era mine, near Columbia, has been repaired and put in operation. —— Sinking on the vein continues at the Altadena mine.

Operations have been resumed at the Doyle gravel mine, near Columbia.—— O. M. Rising has bought the Rising Sun, New Discovery and Senorita quartz claims near Arastraville, near Soulsbyville.

The Providence mine, 3 miles from Carters, is working steadily, employing forty men.

The Doyle drift mine, near Columbia, is working, says the Sonora Banner, twelve men being employed on contract.——A shortage in the water supply has tied up a number of mines in this county and others are running on short time.—— O. M. Rising has bought the Rising Sun and Senorita quartz mines at Arrastraville.——It is reported the Nichol Bros. are to resume work on their mine on the Yost ranch, 1 mile south of Soulsbyville.

COLORADO.

(Special Correspondence). —The machinery and supply houses of Denver report an increase in business. A large portion of their trade is coming from outside of the State, but matters are looking better in Colorado than for some time. The strike has not been settled and there is no likelihood of the operators making or receiving any overtures for settlement, as they seem to be able to run without aid of the Western Federation. A considerable number of the striking miners have left Cripple Creek district and their places are being filled by others coming in. The mills throughout the district are starting up.

Denver, Nov. 3.

For the month of October the gold receipts at the Denver branch mint aggregated $783,550.72, as compared with $1,300,806.05 for October, 1902. The decline is traceable to the closing down of the mills at Colorado City, Florence and Telluride.

Boulder County.

The Anchor mine, on Bald mountain, northwest of Caribou, has been shipping ore all summer. The ore is a copper-lead sulphide carrying gold and silver. The vein is 5 feet wide, with a pay streak 18 inches wide. The company last week shipped nine tons, which netted $1030. The property is under the management of C. R. Wolff of Boulder. They are planning to put in additional machinery.

The addition of Otero No. 5 to the list of oil wells sunk in the Boulder belt near Boulder raises the output to 200 barrels per day, says the Eldora Record. The Otero No. 5 is pumping sixty-seven barrels per day. This company is shipping 110 barrels daily; the Savannah 40 barrels, Boulder-Valmont 10 barrels, McKenzie 2 barrels, Boulder Valley and Two Ten 5 barrels, and the McAfee, Wellington and others are pumping occasionally. One dollar per barrel is received from the United Oil Co. The cost of pumping is nominal. The last Otero well is 1780 feet deep and cost $3000.

J. P. Clark, manager of the Corona M. Co., which operates the Black Cloud mine, near Salina, says they propose to build a mill to treat its ore at the mine instead of sorting and shipping to the smelters.

Clear Creek County.

C. H. Fogg of Boston, Mass., has resumed work on the Gomez mine, on Soda creek, near Idaho Springs. The shaft is down 220 feet and levels have been driven. The shaft will be deepened.

It is reported the Hyland M. & M. Co. will build a mill on the site of the old Humphrey mill near Idaho Springs. Nothing remains of the Humphrey mill but the building, which will be torn down. The Hyland M. & M. Co. owns a group of claims, including placer and mill sites and water right. The work under way for the Hyland consists of building a dam and headgate below the Stanley power house. The spillway will be 56 feet across the creek. A steel pipe line will be substituted for the open flume formerly used. The flume is to be 2500 feet in length and will have a head of 30 feet.

The Con. G. & S. M. Co. has its Consolidated Alpine mill, near Idaho Springs, running full time. This is said to be the only mill in the district in which Frue vanners are used. Manager Crow says tables will also be put in.

Superintendent Babcock of the Southern M., M. & D. Co. says operations on the group recently acquired near Argentine are being started. In addition to the Poor Man's Relief, Evening Star and four other claims, the company has an option on a number of claims contiguous to these. A tunnel 1000 feet in length will cut the Evening Star and Poor Man's Relief at depth.

Connections have been made by the raise from the tunnel level on the Wide West mine, near Georgetown, with the upper workings of that property. The raise is 300 feet in length and connects with a drift driven from the bottom of the 85-foot shaft. The mine is owned by H. Seifried of Georgetown. It is understood the mine will hereafter be operated under the leasing system, says the Courier.

C. H. Morris is resuming operations on the Mexico group of claims, near Silver Plume. Considerable development work has been done. As the tunnels and drifts are in some distance, ventilation will be obtained by making connection with a shaft sunk on one of the veins from surface.

Manager Stevens has men at work at the Stevens mine, near Silver Plume, on construction of concentrating mill. The mill will be operated by steam, as water is not available during greater part of year for power purposes. The mine is equipped with steam machinery. The mill will differ from the Terrible and Mendota mills, in same district, as no jigs will be used, concentration being effected by use of tables.

Custer County.

Superintendent J. Fitzgerald of the P. & O. mine, near Westcliffe, reports at 500-foot depth, in drifting, a lead has been struck 4 feet in width, carrying tellurides with gold and silver values. Free gold is also shown.

El Paso County.

The directors of the Golden Cycle M. Co. of St. Louis, Mo., operating at Cripple Creek, have decided to build a reduction works at Colorado City to cost $300,000. The cyanide process will be used. Manager L. E. Hill is prospecting the mill site for a water supply. The Telluride mill adjoining has been able to develop all the water needed by the plant on its own ground. The site for the reduction works comprises ninety-six acres south of the Telluride mill, between the Colorado Midland tracks and the Short Line spur. The plans are being drawn for the plant, and the initial capacity will be 300 tons per day. The present production from the Golden Cycle mine is 150 tons a day. The mill will employ about 125 men a day, and when completed Colorado City will have five reduction works.

Fremont County.

Twenty-six carloads of machinery have been shipped from the Metallic mill, north of Florence, to Utah, where the mill will be rebuilt by the United States R. & R. Co., near its DeLamar group of low-grade copper mines at Bingham. There remains but a few carloads of the dismantled mill to ship.

Gilpin County.

The concentrating plant of the Franklin Extraction Co., on North Clear creek, east of the Black Hawk depot, is in operation. The main building is 54x90 feet, and equipment includes a 40 H. P. engine and 70 H. P. boiler, with twelve concentrating tables, sizing and settling tanks.

Colorado parties have a lease and bond on the Pozo property in Nevada gulch, near Central City, and A. W. Rucker, superintendent, is unwatering the workings. The ores carry zinc and lead values.

McLeod & Brown, of Central City, have a lease and bond on the Quartz Mill lode, in Leavenworth gulch, near Central City, and have started sinking, the shaft being down 80 feet. They report a streak of copper-iron and lead ore coming in on the hanging wall side. They have a whim for hoisting.

The Avon M. Co. is building a tramway from its Avon mill to the mouth of the Boston tunnel on Quartz hill, near Central City, and the ores from the San Juan mine of this company will be taken out through the tunnel and trammed to the mill.

Larimer County.

The interests of the Big Creek M. Co., the Big Horn M. Co., the Round Top M. Co., the Pearl Townsite Co., and other interests in and around Pearl, near the Wyoming line, have been consolidated under one management. C. G. Knapp and G. W. Beck of Chicago, Ill., are at the head of the merger and propose to build a smelter at Pearl.

Mineral County.

The Del Monte Leasing Co., which is working the New York-Chance and Del Monte mines near Creede, is shipping 3000 tons of silver ore to the smelters per month. ——The Commodore mine, which adjoins the New York on the south, is a silver producer, and they are putting on additional men and will increase its output.

At the mines operated by the Del Monte Leasing Co. near Creede, Superintendent H. Lees says he will increase the output. This company shipped 3000 tons of ore in September, and has ore reserves which will enable it to mine from 4000 to 5000 tons per month.

C. Miller, manager of the Amethyst mine near Creede, says Superintendent Ulman will increase the shipments. Creede ores are said to be in demand for fluxing sulphide ores and copper matte, and the smelters have reduced the working charges until, with silver at 60 cents an ounce or better, 25-ounce silver can be mined at a profit.

Ouray County.

The Camp Bird M. & M. Co., at Camp Bird, has 300 men at work. This number will be increased when the shaft being sunk on the vein some distance from the portal of the tunnel to add to the stoping ground is completed.

San Juan County.

The Gold Prince M. Co., of Maine, has started operations at its group in Mastodon gulch. They will build tram lines and a 500-ton mill at Animas Forks, near Silverton. The Gold Prince tunnel, to cut the Sunnyside Extension, Mastodon and other veins at depths varying from 500 to 1000 feet, is expected to be producing ore by next June.

Magnetic separators are being put in by Manager Warner at the Silver Ledge mill at Chattanooga.

San Miguel County.

The Keystone Hydraulic Co. proposes additional improvements this winter, after the water supply for washing purposes becomes exhausted. In several places above the gravel pit, where the principal work is done, during high water the river overflows its banks and fills the pit. A flume will be built to carry the water past these places, and the sluice line from the pit down to the river will be remodeled. Water which is used for hydraulicking is drawn from storage reservoirs. As soon as this source of supply diminishes the sluices will be cleaned up.

Summit County.

At the Monte Cristo group on Mount Quandary, 10 miles from Breckenridge, Manager Cooper of the Quandary Mountain M. & M. Co. says they will put up a milling plant. Much of the upper wall of the Monte Cristo vein has been scored off and the ore has been left so that it can be quarried out. The ore is complex and contains gold, silver, iron, lead, copper, zinc and some antimony. The mill will have capacity for treating fifty to seventy-five tons per day.

G. C. Smith of Breckenridge has a bond on the Northern Star lode in McCullough gulch section. The property is on McCullough mountain, 2 miles from the mouth of the gulch, near the Bondy lode. An adit tunnel is being driven in on a 2-foot pay streak. When roughly sorted, the ore, which is an auriferous iron sulphide, with some copper, is reported to run $60 per ton. A main working tunnel will be started from a flat 500 feet below the present tunnel.

The Senator M. & M. Co.'s group on North Star mountain, in upper Blue River district, near Breckenridge, will be developed by a tunnel, which will start on right bank of Blue river. The tunnel will be a crosscut for several hundred feet until the vein which was opened in the tunnel above is cut, and will follow the vein. The ore is an iron sulphide. M. M. Howe is superintendent.

The Morning Star and Young America lodes, above timber line on Mount Baldy, near Breckenridge, have been leased for three years to Mitchell, Slingerland & Case, who are working the Double Extension group, which contains extensions of veins to southwest of Young America and Morning Star lodes. Present operations are confined to driving the 110-foot tunnel of the Double Extension on the 2-foot pay streak. The vein is 3½ feet between the walls, which are trachyte. It is estimated that when tunnel enters the end line of Young America or of Morning Star it will be 300 feet below surface. The ore is said to run $40 per ton.

Teller County.

The Sunset-Eclipse mine, near Cripple Creek, is shipping ore from the shoot recently struck. The strike was made 1200 feet from the main shaft.

Near Gillett, there are three cyanide mills in operation, two in course of construction and others being planned, says the Cripple Creek Times. The Bedford M. Co., which owns property on Cow mountain, will build a plant. The ores of Trachyte, Cow and Sheep mountains are amenable to cyanide treatment.

The October output of Cripple Creek district was 35,050 tons, valued at $964,000. The following figures obtained from the mills and smelters show a net gain over the preceding month of 12,900 tons, with an increased valuation of $362,800. During month of September the production of the district was 22,150 tons at total valuation of $601,200. The output of October is over one-half of the amount produced during July, when all the mines in the district were running with full crews and there was no labor trouble to disturb them. The following is October output:

Plants.	Tons.	Total.
U. S. R. & R. Co.	12,000	$300,000
Portland	9,300	255,750
Smelters	3,500	210,000
Dorcas	2,500	93,750
Telluride	2,000	50,000
Economic	1,500	37,500
Globe	2,600	10,400
Smaller plants, including cyanide mills	1,650	6,600
Totals	35,050	$964,000

The Stratton mining properties at Cripple Creek will be reopened for leasing this week, says the Gazette. This is regarded as an indication that the executors consider the Cripple Creek strike over, inasmuch as the executors withdrew all lands from leasing with the beginning of the labor troubles. When leasing was suspended the executors were letting out the Globe hill properties and had allotted half a dozen blocks of ground near Poverty gulch. The remaining territory on Globe and Gold hills was divided into 150 blocks. The plan announced was that the executors would lease out the Globe and Gold hill holdings before opening the Bull hill holdings for leasing.

It is reported the El Paso mine at Cripple Creek has made a strike in the 500-foot level. Four feet of ore averaging $50 per ton has been opened in the vein near its junction with the C. K. & N. vein, which comes into the main workings from the west. The El Paso Co. shipped 1000 tons of ore in October, half of which was sent out in the last ten days. The drainage tunnel is being advanced to penetrate the eruptive area of the district as quickly as possible in order to open a larger flow of water. At present the tunnel is making 300 gallons a minute, and the several workings of the El Paso 1600 gallons. By the terms of the drilling contract the El Paso Co. has to drive the northeast lateral of the tunnel beyond the El Paso shaft until 1000 gallons of water are made, or until 1500 feet in distance have been accomplished. This lateral has been driven 955 feet and is progressing at the rate of 8 feet a day. The tunnel is lowering the water at the rate of 1 foot a week in the Elkton and Mary McKinney mines.

The manager of the Eagle sampler says he is receiving more ore than he can handle with one shift. This sampler is crushing at rate of 225 tons a day. Another shift will be started next week.—— There is employed on the Stratton's Independence, Ltd., on Battle mountain, 400 men, who are working in two shifts.—— Increased shipments are going out from the district, and it is thought that by Dec. 1 the production of the camp will be back to its old figures. A number of new leases are being granted by members of the Mine Owners' Association, and in every case they contain a clause to the effect that miners employed on the property shall not be members of the W. F. M. If this clause is not adhered to the lease will be canceled.

IDAHO.

Bear Lake County.

J. Richardson of Salt Lake City, Utah, reports developing a group of copper-bearing prospects near Montpelier.

Custer County.

P. L. Fearn, manager of the White Knob C. Co., reports the smelter running steadily, handling 300 to 350 tons of ore a day. It is turning out 15,000 pounds of copper daily, 800 ounces of silver and 20 ounces of gold.

Idaho County.

A. C. Jamieson, of Spokane, Wash., has bought for Eastern and Seattle parties the Tip Top and Solo mining claims in Buffalo Hump district. Men have been put on development work.

L. Schissler reports cleaning up $280 in gold bullion, the result of a two days' run with a prospecting mill on the N. P. mine at Newsome creek, near Stites. The cleanup came from six tons of ore.

The Jumbo mill, at Buffalo Hump, is in steady operation with satisfactory results. The clean-up at the end of thirty days' run is reported to have yielded $14,000 in gold, being $1000 for each stamp.

The Granite M. & M. Co., Ltd., has been incorporated at Lewiston by C. R. Osmers, E. and J. N. Mounce, T. Parks, C. C. Phillips, J. F. Atkinson and W. J. White. The company owns three claims in Buffalo Hump district. The ground is near the Big Buffalo mine. Development will begin this week.

Lemhi County.

H. G. King, president of the Winnie M. Co., reports work progressing on the Winnie mine in Spring mountain district, south of Fort Lemhi. He is blocking the ore body which carries galena. An aerial tramway has been built.

Owyhee County.

The shaft of the Afterthought mine, near Silver City, has reached the 450-foot mark, and they are cutting a station preparatory to drifting on the ledge.

Shoshone County.

A strike is reported made in the shaft of the King mine, near Murray, last week. The ledge is 1 foot wide, carrying free gold and auriferous sulphides.

It is reported a mill is proposed for the O. K. mine, near Wardner, owned by E. O'Neill of Wallace and A. Burch of Spokane, Wash. Over 3200 feet of development has been done. On the 225-foot level the ore shoot was opened for 300 feet and a raise of 187 feet made through ore to an upper tunnel. The company then sank to the 400-foot level, crosscut to the ledge, and oponed an ore shoot 60 feet long. Drifting is under way.

The Frisco mine and mill at Gem are closed down indefinitely.

A company has been organized at Wallace by F. F. Johnson, C. C. Titus, H. J. Rossi, J. C. McDairmid, C. D. Jones, H. E. Howes, J. W. Tabor and J. L. Batterson to take over the Douglas group in Pino Creek district. Preparations are being made for development during the winter. The Douglas has 1000 feet of tunnels opening it to depth of 400 feet. The lowest tunnel was driven 600 feet on the ledge and the ore shoot averaged 3 feet wide. Assays show 25 ounces in silver and 28% lead. The company plans to sink 200 feet at 200 feet from the mouth. There are seven claims in the group.

The option held by G. Turner on an undivided three-eights interest in all the mining claims constituting the Mammoth group, near Wallace, together with water rights and concentrators, for $1,500,000, was closed last week and a deed of transfer of the property from Turner to the Federal M. & S. Co. was filed. This conveys the interests in the Mammoth, not originally owned by the Standard M. Co., and makes the Federal company sole owner.

Washington County.

The cyanide plant near Bear, owned by the Salzer-Ford M. Co., is reported to have been destroyed by fire on the 31st ult. The mill had been running at full capacity.

The American S. & R. Co. has taken over a group of five claims on Iron mountain, 26 miles from Weiser. The ores carry gold and copper values. The price is reported at $150,000. The group is well developed.

MICHIGAN.

Houghton County.

Workmen digging in a water pipe trench in West Hancock last week uncovered an amygdaloid lode, with copper values. As this is west of the Hancock M. Co. property the find is thought to be a new lode.

The Calumet & Hecla has the diamond drill in operation on the Kearsarge lode, 1500 feet south of the exploratory shaft started by the company on that lode near Calumet. An extensive system of ditching is being put in by the Calumet & Hecla management to drain the swamp overlying the Kearsarge lode, in the eastern part of the Calumet & Hecla territory. The ditches were started at the north boundary, near the Centennial and Old Colony, and are 3100 feet southward, near the site of the second shaft to be started on this lode. Tho men who were laid off through the accident in the Red Jacket shaft are engaged in this work. ——The Kraus pneumatic head, set up at the Mass mill, Keweenaw Bay, is being tested by the Calumet & Hecla management.

Keweenaw County.

The management of the Phœnix mine at Phœnix is arranging for additional ore cars with the Mineral Rango railroad. The west vein rock house is finished. Double shift began at the Phœnix mill this week, day shipments being from the stock pile and night shipments from the rock house. The stock pile shipments will be kept up until the rock house on the St. Clair vein is completed (Feb. 1st).

Ontonagan County.

The extension of the Mineral Range railroad to the Michigan mine at Rockland has been completed and the shipment of Michigan rock to the Mass mill began.

MISSOURI.

Jasper County.

The injunction granted in the Springfield Federal court restraining the Big Six M. Co. from operating their plants on the S. Duffield Mitchell tract near Duenweg, is in effect and tho six mills are shut down, throwing 200 men out of employment. They will be idle till after Jan. 4, when the case will be argued. The Big Six Co. is composed of J. W. Allen of Joplin, S. A. Stuckey and S. Chitwood of Carthage.

The Gee M. & M. Co., of Joplin, has been incorporated hy W. P. Groth, of St Louis, H. W. & H. E. Gerhe, of Joplin.

The Miguonette mine, northwest of Carthage, is accumulating its ore in the bins.

The Hayseed mines near Joplin, under management of F. M. Webber, are turning out seven tons of oro per nine-hour shift. They have high-grade dirt, ten tons of jack having been obtained in ono shift from thirty-six tons of dirt. They are shipping. A 100-ton mill will he built at this mine.

F. Sponablo has a lease on six lots at Alba and will put down a 5x7 shaft on a drill holo in which a 30-foot body of ore was found. He proposes to build a mill.

Newton County.

Eighty acres of mineral land, 2 miles north of Ritchie, has been leased to R. A. Mooneyham, J. F. Kompor, C. L. Pulver, W. Baker and C. W. Bowman of Carthage, who will begin development this week. It is half a mile west of the Naulty mine aud mill, owned by J. A. Mitchell, H. M. Cornoll et al.

A boiler, crusher and rolls have been added to the Seven Devils M. Co. mill at Carl Junction. The output from this mine is increasing.

MONTANA.

Granite County.

Kaiser Bros. & C. Williams, in thoir mine on Red Hill, near Phillipsburg, report striking ore carrying silver and copper.

The mill of the Good Hope M. Co., at Phillipshurg has resumed operations. The uumber of men in the mine will be increased.

Jefferson County.

J. Wasson & P. Gruner, lessees of the Independent mine in Cataract district, near Basin, report striking a streak of high grade ore carrying gold, silver and lead. The sboot is 6 inches wide, and assays average $800 in gold and 8 ounces in silver. The Independent adjoins the Mantle mine. Wasson & Gruner have in the past six months sunk a shaft 50 feet, drifted 100 feet on hoth sides, and are stoping oro on the 50-foot level.

Madison County.

The Revenue M. Co., operating at Norris, will build a cyanide plant of capacity of 100 tons daily at its mines and water will be piped to it from a well sunk 2½ miles distant, says Manager Knox. The high grade ores are providing means for developing the mine at present, returns from the last shipment showing 8.9 ounces of gold and 6.1 ounces silver.

Silver Bow County.

Large numhers of miners, who have been thrown out of work hy the shut down of the Amalgamated properties, are leaving Butte and other camps for Colorado, Utah, Idaho and Washington.—— The Supreme Court has put forward on its docket the date for hearing the appealed cases awarded to F. A. Heinze. They will come up for roview this week.

NEVADA.

Elko County.

The Aura King G. M. Co. has been incorporated with principal place of husiness at Ogden, Utah, to operate near Elko. The officers are R. P. Hunter, J. J. Carmichael, O. A. Kennedy, J. R. Hunter and V. Gideon. The company owns the Aura King, Delmonte, Tecumseh and Humholdt claims in Centennial mining district, at Elko, also the Gold Bug placer mining claim.

Esmeralda County.

Tonopah has for more than two years been a center of interest to the entire country. The camp has been systematically studied during the past summer hy J. E. Spurr of the United States Geological Survey, who had already made investigations and studies in Tonopah in the latter part of the season of 1902 and during the succeeding winter. The work of the Geological Survey in this camp is of especial interest on account of the complicated geologic conditious, which render an exposition of the geological principles controlling the occurrence of the ores of great practical economic value. On this account the examination has been drawn to a conclusion as soon as possible, and an attempt has heen made to render the information immediately available to the public. Since the mining public is anxious to ohtain information concerning this district hefore the final report can be published, the director of the survey has authorized Mr. Spurr to issue a preliminary report embodying in a few pages the gist of his conclusions up to the present time and including a copy of the geological map, reproduced in black and white for the sake of quick publication. It is believed that by the use of this map aud the accompanying text great help will be afforded to those who are prospecting and mining in the Tonopah district. This preliminary bulletin, it is expected, will be ready for distribution in a few weeks. The outcropping veins of the region occur in a small rectangular area, bounded on all sides by faults. Within this area the veins lie in a volcanic rock—andesite. After the veins were formed (during a period of volcanic activity) the andesite and the veins were covered by later volcanic flows, among them othor andesites. Theso latter rocks occupy nearly all the district except the small area above noted and another close by. Wherevor the surface exposes them alone the existence or amount of underground wealth can hardly be ascertained without exhaustivo exploration. But there are certain important favorable and unfavorahle circumstances, certain recommondations and discouragements laid down hy Mr. Spurr that may assist in the prosecution of exploration. The later volcanic rocks, including most of the hills of the district, are classed as unfavorable: a certain andesito as favorahle; the vicinity of faults as undesirable, etc. The maps accompanying the report make these recommendations intelligihle and enable property owners and prospective investors to gain some idea of the relative probahilities in different parts of tho field. The position of tho early andesite away from the outcrops can be foretold to only a limited and uncertain extent, for in dealing with a complex of volcanic flows and dikes like that in Tonopah there is no rule which governs their distrihution and hy which their position in an unknown locality can always he defined with certainty. On account of the lack of certainty of results in this work, in many cases it would probahly he more economical, both of time and money, to explore with a diamond drill rather than with shafts.

The Manhattan-Tonopah M. Co., of Now Jersey, under management of H. C. Jones, is preparing to develop its group of five claims adjoining the Pennsylvania-Tonopah on the west and near the Repuhlic-Tonopah mine at Tonopah. Sinking has hegun. A double compartment shaft will go to depth of 1000 feet. A power plant will be in place by the time the shaft is down 50 feet.

Superintendent H. W. Nolson of the Esmeralda Con., near Hawthorne, says work on the mill is under way.

Eureka County.

(Special Correspondence). — Hooper Bros., lessees in the Jackson mines, took out twenty tons of silver-lead ore last week; and ten tons additional were shipped from the Jackson by other lessees.—— Harris Bros., lessees in the Bullwhacker mine, have twenty-three tons of ore at the E. & P. depot for shipment to Salt Lake. The Bullwhacker is on Adams hill, in a quartz-porphyry formation. Development work has opened additional ore bodies.

The Keystone mine, north of Eureka, is reported to have uncovered an ore hody for 400 feet that has average width of 4 feet, carrying 12% copper, twenty-three ounces silver and 15% lead. —— A rich strike is reported in the Retecski mine at Reveille.

The find reported from the northern portion of Eureka county in the foothills of Little Pole creek, from sixteen assays is reported averaging 40% iron with traces of silver and gold.

Eureka, Nov. 3.

Ormsby County.

The owners of the Cowing-Day mine, on the Carson river, near Carson, intend to reopen the mine and will have men at work during the wintor, says tho Carson Appeal.

Washoe County.

A. F. Price of Ninth Crossing says he has men at work on his mine in Rainbow district, near Reno.—— Pritchett & Merklinger have opened a 6-foot ledge showing free gold. —— N. Petersen, R. Nelsen and M. Lund are putting up huildings at their mine. They will use a whim. —— Kolster & Urhan are shipping ore which is reported to net $60 a ton.

Covelite is reported in G. W. Perkins' mine at Dogskin, near Reno, carrying 50% copper.

White Pine County.

Manager P. C. Weber of the Sapho M. Co. at Ely reports striking a shoot of black oxide of copper, showing values in gold as well as copper. Shaft sinking continues.

NEW MEXICO.

Grant County.

A mill is heing built by the National G. & S. M. Co. at Steins Pass. The mill is a concentrator, and the ore will he broken, run through rolls and then over tahles. If this does not recover all of the values a cyanide plant will be added.

The Shamrock M. & M. Co. at Pinos Altos has a new furnace in operation at its smelter, with a capacity of forty tons daily.

There are 300 miners at work in the Burro Mountain mining district, 100 of them doing annual assessment work.

San Miguel County.

G. L. Rhodes reports working a prospect near Ribera, which carries tungsten ore.

H. L. Allen aud F. J. Buck report having found tin in paying quantities near Las Vegas.

Sierra County.

Tho pumping station of the Hillsboro G. M. & M. Co. at Hillsboro has started up.

H. R. Taylor of Cincinnati, Ohio, general superintendent of the South Percha G. M. & M. Co., near Hillshoro, says the work of building the mill is under way.

The Philipsburg mill at Fairview is in operation.

Socorro County.

The Graphic mine at Magdalena last week shipped a carload of ore that ran 15% in copper, says tho New Mexican. Since April 1, 1903, tbis mine has shipped 3000 tons of zinc carhonate ore. The Graphic was formerly a lead producer.

J. Dohbin has his mill at Water canyon, near Magdalena, in operation.——A strike of gold and silver ore is reported made on Socorro mountain.

Taos County.

Concentrates are being shipped to tho smelter from the Jayhawk mill at Red River.

OREGON.

Baker County.

At tho Western Union mine, on Rock creek, near Sumpter, operations will be resumed. The crosscut on north side of the stream cut the vein at 150 feet, and the drift will be extended, says Manager Hillicker.

H. B. Wolking and J. Meadows are developing their White Point group of claims, 19 miles south of Baker City. The group consists of four claims. Tho crosscut tunnel is continued 300 feet farther, and will cut the vein at depth of 200 feet below surface.

O. C. Wright, president and general manager of the Blue BirdM. Co., operating near Sumpter, says work is progressing on the 100-ton concentrating plant. The concrete foundations have been completed and the framing for the buildings is under way.

Clackamas County.

The Ogle Mountain M. Co., with headquarters in Oregon City, has been incorporated hy P. A. and J. B. Fairclough, F. D. Kepkey, and J. V. Harless. The company will operate on Ogle Mountain, near Molalla. They propose to build a stamp mill and to get out ore during the coming winter. There is already considerable ore on the dumps. The quartz is free milling.

Douglas County.

At Golden Slipper group, near Bohemia, President W. W. Ogleshy reports work progressing. The group consists of nine full claims on east side of Grouse mountain, running down to and across Horse Heaven creek. The main tunnel on the Sampson claim is in on the ledge 150 feet, showing a body of concentrating ore. Tunnel No. 2, at 100 feet lower, is in 80 feet on the vein. At upper end of this claim a shaft has heen sunk 12 feet on the ledge, which is 4½ feet wide, and shows a hody of ore, carrying percentage of copper. The Dewey tunnel, at the lower end of the group, is in 200 feet on a parallel ledge. The group is well timhered and watered and has a mill site.

At the Levens Ledge mine, at Riddles, 2000 feet of tunneling has heen done, which shows ledges of gold-bearing quartz, 8 to 12 feet wide. T. T. Burkhart, of Portland, part owner, says they propose to build a 10-stamp mill. The company is composed mainly of Portland men.

Grant County.

Prospecting with the churn drill that has been in progress on Crane Flat, near Granite, for two months was completed last week. Several prospect shafts have also heen sunk to hedrock. This work has been done as preliminary to putting in a dredger for working the gravel, says Superintendent Burch. Bedrock was found to be soft, and tho gravel contained few large boulders.

Josephine County.

C. J. Howard has men at work extending the survey of the Gold Hill highline ditch. Under the old survey the ditch was 80 miles in length, but the new survey will nearly douhlo it. It was formerly intonded to carry the water of the ditch across Elk and Trail creeks by a pipe line. It has been decided this would not be practical, and instead the ditch will be carried around the head of the two streams mentioned. At the head of Elk and Trail creeks thoro are bodies of pine and fir timber, and the ditch will make this availahle for milling and lumbering purposes. The water will also be used by the mines around Gold Hill.

The American G. Fields Co., of Chi-

cago, Ill., which owns the Granite Hill mines on Louse creek, near Grant's Pass, has added to its holdings the Ida aud Golden Terry mines, which claims adjoin the Granite Hill. This gives the company 1000 acres of mineral lands on Louse creek. The Ida and Golden Terry mines will he developed in connection with the Granite Hill properties. The Ida is equipped with a small mill. Both mines aro at a highor altitude than the Granite Hill, and the ore will be conveyed by a gravity tramway.

J. F. Wickham, J. H. Fisk, P. S. Bates and J. H. Wehcr of Portland, owners of the Almeda minc, near Grant's Pass, propose building a 100-ton reduction plant. The Almeda mine contains a body of ore carrying copper, gold and silver. Power will he supplied hy utilizing water of the Rogue river. Mon are at work blocking out ore.

SOUTH DAKOTA.

Lawrence County.

The Tinton M. Co., developing tin mines at Tinton, has completed the tramway from mino to mill; the track is laid and machinery is being set up. Rolls will do the crushiug in tho mill. Several smaller buildings are also going up.

The Anaconda G. M. Co. is preparing to resume work on its group on Elk creek, 8 miles southeast of Deadwood. This is near the Clover Leaf mine.

The Hidden Fortune mill, near Deadwood, has been completed and accepted and is ready for operation. A new strike is reported in ono of tho company's mines near Central City.

The Ruhy G. M. Co. at Galena is building a mill, which will be running by Jan. 1. The plant will have Chilean mills for fine crushing. The process will be amalgamating, followed by tailings treatment. The Ruby Co. has made tests on its ores which show that Chilean mills are adapted to this class of ore. The Ruby Co. has opened up a large body of free milling ore near Galena and can supply 100 or more tons a day. J. Conzette is manager.

UTAH.

Beaver County.

The smelter of the Majestic C. Co. at Milford was blown in Oct. 31st.

Iron County.

Superintendent T. P. Rigney of the Summit Placer Co., which is oporating the ozokerite mines at Soldier Summit, reports development work being increased. The location of the permanent mining shaft is not yet determined.

Juab County.

The Black Jack M. Co. has been incorporated under Wyoming laws to operate tho South Mammoth, West Mammoth, Black Jack, Trail and Phœnix claims near Eureka. The incorporators are J. Knight, D. and J. Evans, R. E. Allen and L. Holbrook. The principal placo of business is Evanston, Wyo.

The underground fire that caused the Centennial-Eureka, Eureka Hill, Bullion Beck and Gemini mines at Eureka to close down, has been located and extinguished by Superintendent Earls of the Bullion-Beck in the Gom stope in the Eureka Hill mine. To reach this stope they were compelled to use scaling ladders, and to cross a narrow ledge through dense smoke and gas. Water is being piped in. The Centennial-Eureka mine is in full operation.

The Manhattan ground, north of the Bullion-Beck mine, is heing worked by a tunnel to crosscut the iron ledge opened up on the surface last month.

The shaft, with which the east ledge on La Reine mine of Tintic, near Eureka, was opened up to depth of 80 feet, has been retimbered and will he sunk to 600 foot, where prospecting of the vein will begin, says Superintendent Driscoll.

Salt Lake County.

Superintendent Janney, of the Utah C. Co. at Bingham reports work progressing on the 500-ton concentrator being huilt. It is expected to be ready for operation Jan. 1.

The Clyde M. Co. has boen incorporated at Salt Lake City, Utah, by G. and E. C. Tucker, J. B. Burbridge, B. D. Siegfus and J. P. Park. The property of the company consists of the Clyde Nos. 1, 2, 3 and 4 mining claims in Big Cottonwood mining district, near Alta.

The properties of the Toledo & Utah Co. at Alta have been sold to A. H. Boyd, J. A. Campion et al. of Leadvillo, Colo. The group consists of the Fuller, Relief and Michigan mines. Dovelopment work will begin this month.

Summit County.

At the Alice mine, in Woodside canyon, noar Park City, they arc proparing to increase devclopment. A blower was placed last week near tho mouth of the tunnel and operated by water power. Heretofore the blower was worked by hand. An air compressor and machine drills will be put in later. The tunnel and incline are in 225 feet, the ore being hauled to the dump by a whim. P. McPhereson is manager of the company.

The payrolls of Park City's mines show an increase of 25% during the last few months, says the Tribune. At the Silver King and at the Daly-West the output has heen increased. The plant at the Daly-Judge has heen enlarged. The Kearns-Keith mines have been equipped with a concentrator. The total numher of men is given at 2000.

Tooele County.

Preparations are being made to reopen the Buckhorn mine near Ophir, which is under hond and lease to the Western Exploration Co. of Salt Lake City.

A. Murphy has an option on holdings of the Daisy M. Co., consisting of a group of gold-hearing locations and a cyanide plant at West Dip, near Mercur. Murphy will reopen and retimber the workings. The gold ores formerly taken out average $3.40 per ton.

Manager G. H. Dern of the Con. Mercur mines, at Mercur, reports the slimes plant at their mill in successful operation. The tailings have heen reduced to an average of 42 cents per ton, as against $1.22, the average for the last fiscal year. The mill is handling 1000 tons of ore per day.

Washington County.

Tho capacity of the copper smelter of the Dixie group of mines near St. George will be increased hy addition of a second furnace. This will afford it a capacity of 100 tons daily, says Manager Doolittle. In addition to doubling the capacity of the smeltor, the company will build a road to the loading station on the line of the San Pedro Railroad.

WASHINGTON.

Ferry County.

(Special Correspondence.)—The output of Republic district was partially restricted last month due to inability of smelters to handle as large a quantity as usual, but it is thought this will be only temporary. Last week the Quilp sent out its usual quota of seventy tons daily. Explorations show the ledge to be 30 feet in width, containing a shoot 2 feet in width assaying $100 per ton in gold and silver. This seam has heen proven for 100 feet in depth, and has beon drifted on for 100 feet. The policy of the management is to keep development so that there will be a year or two's supply in sight.——The Mountain Lion mine has reduced its shipments to 100 tons daily, but work is going ahead underground. The Knob Hill continues turning out soveral cars of ore per week.

Last week the lower tunnel in the Belcher mine reached the ore body which was first cut in the tunnel above, at which point it was 80 feet in width. It shows that this ore hody is at least 250 feet in length. The ores of Republic camp are not self-fluxing, and it is claimed the Belcher mine carries the ores which are essential as flux in the treatment of other ores of the Republic mines. The Belcher ore carries an excess of iron and runs high in sulphur. While the ore is hard it breaks easily and can be mined at minimum cost as soon as machine drills are used. The manager says a gasoline engine and blower are heing set up to be used in ventilating the mine. An air compressor will also be put in.——A smelter is needed in the camp. Rail transportation is convenient and cheap; fuel, timber and water are also ahundant.

The Bodie M. Co., at Bodie, reports development work progressing. The mine is opened by four tunnels to a depth of 450 feet. These are connected with raises and winzes giving ventilation throughout. The vein is 5 feet in width at the surface. At the lowest level it is 20 feet in width. The ore is gold-silver, carrying an average of two ounces of the latter to one of the former. A 50-ton combination mill is in course of erection. Machinery is on the ground.——The Zala M. mine at Sheridan is preparing to begin production. The ore has values principally in silver. It ships sixty tons per week. The output is restricted on account of the condition of tho wagon road from the mine to the railroad.

Republic, Nov. 1.

It is proposed to add a cyanide plant to the mill of the Mountain Lion mine at Republic.

Liucoln County.

Sinco the advance in silver there is renewed activity in Cedar canyon minos, near Davenport, says the Spokesman-Review. The Turk M. Co. is shipping ore through Springdale, which nets $70 a ton. At depth of 450 feet they are drifting on an ore hody 6½ feet wide. The values are in gold, copper and silver. The company will put in an amalgamation plant to cost $75,000. —— J. Young has leased the Door Trail mine from the Deer Trail Co. and he is shipping ore. The company gets as royalty 20% of the ore laid down at the smelter. —— The Silver Seal, the Silver Queen and the Providence are shipping. The Seal is owned hy Van Horn Bros. of Deer Trail. The Queen is owned hy the Queen M. Co. and the Providence is owned hy C. C. May, F. H. Luce and A. W. Turner of Davenport.—— The Legal Tender is making regular shipments. It is owned hy the Deer Trail Co. and Yarwood Bros., and is working under a lease by Huffaker & Yarwood on a 20% royalty.——Tipton & Shifler of Spokano, who own the Evergreen, which joins the Turk, are sinking on the ledge and are working at 70 feet depth. They report having a 4-foot vein.

Okanogan County.

A. E. Williams and J. B. Metcalfe, of Seattle, have bought the Pinnacle gold mine, near Loomis, and will increase development work.

Stevens County.

A diamond drill outfit will be put in at the Hill iron properties, near Valley, says W. D. Dickman of Chicago, Ill., consulting engineer. There are twelve men at work and he will increase this to twenty mon when the drill plant arrives. J. H. Davey is superintendent.——W. S. Rodgers of Spokane, who owns iron-bearing ground near the Hill mine, has men at work.

WYOMING.

The reports in regard to the coal miners' strike in Colorado extending to tho Wyoming coal fields are without foundation, says E. S. Emery, manager of the water plant at Rock Springs. "There is not a single union in the coal fields of Wyoming. The Mine Workers' have had four or five men in the State for the past three months and they have not succeeded in forming one union. There are so many different nationalities working in the coal mines of Wyoming that the labor leaders have so far failed to do anything toward organizing the men. Rock Springs has a population of 6000 and 2000 of these work in the coal mines."

Albany County.

S. A. Walker of St. Louis, Mo., manager of the Acmo Cement & Plaster Co., which has a plant at Laramie, says the company will huild a mill for the manufacture of plaster of paris.

Bighorn County.

The Wyoming Coal & Fuel Co. has been organized to develop a tract of coal land near Garland, hy J. Bird, F. McGregor, H. Hickock, J. Gettier, C. A. Sharver and D. McCullough. The company has started sinking a shaft. Air shafts and other improvements will be made.

Carbon County.

The Ferris-Haggerty mine of the North American C. Co. at Rudefeha is developed to the depth of 700 feet on the vein. The ore carries average values of 0.06 ounce gold, 1.0 ounce silver per ton and 6% copper.

The companies operating the Cascade, High Five and Pasadena mines near Riverside have been consolidated, and will increase operations.

Laramie County.

W. Sturgis of Cheyenne, who has been prospecting for coal near La Grange, reports two veins of coal have been located. The first vein is 200 feet helow the surface, and the second was found at depth of 500 feet. Each stratum is between 3 and 4 feet in thickness. The character of the coal is said to be similar to that mined in Sheridan county. Both oil and gas were also encountered by the diamond drill used in making the investigation.

FOREIGN.

AFRICA.

Natal.

The Natal Navigation Collieries & Estate Co. reports output for month of September at 15,003 tons of coal.

Orange River Colony.

The Koffyfontein mines report 2075 carats diamonds recovered during September.

Rhodesia.

The Ponhalonga Proprietary Co., near Bulawayo, reports the new 40-stamp mill in operation, and during September ran twenty-five days, milling 5000 tons of ore, which yielded over the plates 1400 ounces of gold, value £3700. Sixty-five tons of concentrates were recovered, with value (deducting shipping and treatment charges) estimated at £1365. Working costs, £2600, equal to 10s 4.80d per ton.

Transvaal.

The British South African Export Gazette reports the discovery of tin-hearing ground on the eastern border of the Transvaal, on the edge of the high South African plateau. It is stated the underlying formation of the district is granitic. In places over this granite are the uplifted remnants of schistose rocks. Tin-hearing veins are found at the contact of these schists with the granite. Three lodes have been located. A sample taken from one of them yielded 3.5% of tin. The tin oxide yielded 67% tin. The Transvaal Government's railway department is surveying the property with view to connecting it with a railway. The section would thus he within easy reach of Delagoa hay, whence the ore could he shipped to England at nominal cost.

The Great Eastern collieries, near Drakenshurg, reports output for month of Septemher at 13,300 tons of coal.

The West Rand Central G. Co., near Johanneshurg, for month of Septemher reports owing to continued scarcity of native labor, the manager found it impossible to keep the mills running full time. The directors have decided to temporarily suspend crushing, and with the available labor confine operations to development work.

The Transvaal Chamber of Mines, at Johannesburg, under date of Oct. 10, reports:

Natives distributed to mines during August by Native Labor Association	6,321
Time expired and other wastage	6,083
Net gain during July	238
Total number employed end of July	68,466

The cablegram calls attention to the fact that an allotment of 1788 natives has been made to the railways; otherwise there would be a net gain in tho quantity for September of 2026.——The Board of the Nyassa Co. has approved the contract with the Witwatersrand Native Labor Association for engagement of natives within the limits of its territories for the purpose of temporary immigration to the Transvaal mines. The arrangements, which have received the approval of the Government in Lisbon, provide for recruiting of natives for a period of two years and for their repatriation after oxpiration of contract.

At Johannesburg, on Oct. 13, the miners of the City & Suburban G. M. & Estatos Co. passed an unanimous vote in favor of the importation of unskilled Chineso labor. A meeting of tho South Randfontein G. M. Co. also carried a resolution in favor of such importation.

West Africa.

The Wassau mine in Wassau district, Gold Coast, reports starting crushing on the ore October 12th, with ten stamps running. Work is progressing on the cyanide plant and it is expected to be in working order by the time regular crushing with tho full mill begins. Manager Feldtmann reports that the reef which had been lost in No. 5 level north has been rolocated in the crosscut east, and assays threo ounces for a width of 28 inches.

AUSTRALIA.

New South Wales.

Tho British Broken Hill Proprietary reports mill returns for twenty-one shifts to Sept. 29, 3958 tons oro crushed, producing 735 tons concentrates, containing 426 tons lead and 20,580 ounces silver.

Tho Malacca diamond mines at Copeton during tho last week of Septembor washed 126 loads, producing 182 carats of diamonds and 3625 pounds of tin.

Queensland.

The Lancelot Freehold T. & C. Co., at Newellton, reports having produced during Septemher, twenty-eight tons dressed 65% tin-bismuth ore, and had also on hand October 10th four tons second-class ore assaying 45% metallic tin and bismuth; shipped forty-three tons dressed Lancelot ore.

Victoria.

The annual report of the Secretary for Mines and Water Supply for the year 1902 shows a decrease in the yield of gold of 11,824 ounces as compared with that of the previous year. Up to the end of November the aggregate output was ahead of that for the corresponding period of 1901, but there was a falling off in the December returns of 12,006 ounces. Increases for the year were reported from Ballarat, Maryborough, Maldon, Creswick, and Clunes, Omco, Walhalla, Castlemaine, St. Arnaud, Beaufort and Sterling fields. Ballarat showed tho largest increase and Bendigo the largost decrease. Bendigo's total yield was 184,959 ounces (a decreaso of 20,837 ounces), being 17,565 ounces in oxcess of that from Ballarat. The drop at Bendigo was due to decreases at the Goldon Gully, Great Southern Garden Gully, Ironbark and Golden Pyke mines. Among individual mines the Star of the East at Ballarat yielded 15,932 ounces; Long Tunnel Extended, at Walhalla, 18,675 ounces; Duke United and North Duke, Maryborough, 9304 ounces and 8087 ounces, respectivoly; and the Cassilis Omoo, 8926 ounces. The value of the gold won for tho year was £3,062,028, which brought the aggregato since tho opening of the diggings up to £263,551,229 from a total yield of 65,913,912 ounces. The total quantity of material

treated for the year by dredge mining and hydraulic sluicing by gravitation was 6,911,697, as against 5,937,966 cubic yards for 1901. The gold obtained showed increase of 2235 ounces, being 33,109 ounces for the year. The average yield of gold per cubic yard of material treated was 2.19 grains, as against 2.32 grains for the previous year. In all, thirty-seven dredge mining plants were in operation, comprising ten bucket dredges, nineteen pump hydraulic sluices, two jet elevators and six gravitation sluicing plants. The capital invested in plants, machinery, otc., was estimated at £270,000. The sum of £183,400 was paid in wages. On an average 973 men were engaged in working the plants, in addition to wood cutters, carters and others. Coal mining showed an increased output for the year, although strikes on account of wage disputes interrupted operations to a considerable extent. The quantity obtained was 225,164 tons, as compared with 209,329 tons for 1901. The output of minerals other than gold and coal exceeded that of previous year by value of £13,813. Ten tons of tin oro were wen at Beechwerth in connection with gold dredging operations: 400 tons of infuserial earth wore raised at Talbot; at Lake Boga, Boort, and other places in the Mallee, 3227 tons of gypsum were obtained, while the 47,603 ounces of silver shewn in the returns were extracted from the gold at the mint. By treatment with cyanide, 43,302 ounces 15 pennyweights of gold were extracted from 504,212 tons of tailings, value of the gold, £148,399. Tho Government batteries are distributed between Meonambel, Creswick, Dargo, Waugarra, Omeo, Walhalla, Clunes, Woolshed Flat, Rutherglen, Beaufort, Stawell, Talhot, Enfield, Campbelltown and Aveca. The receipts in the shape of revonuo amounted to £697, and the expenditure to £2496, showing a loss of £1799 for the year.

BRITISH COLUMBIA.

Boundary District.

Ore is being rawhided from the Roderick Dhu mine to the Leng Lake wagon road, near Leng Lake Camp.

The Providence mine, near Greenwood, for tho year onding Sopt. 30, 1903, reports:

Tons of ore mined	543 3
Net value	$54,315 24
Cost of mining and incidentals	23,122 40
Net profits	$31,192 84

M. F. Madden of Chicago, Ill., is president and D. F. McIntosh vice-president and manager.

Superintendent Williams of the Granby mines at Phœnix has started driving tunnel No. 4 to striko the main ore body at depth in the Old Ironsides mine. This tunnol has its mouth at tho foot of Church street, in tho center of the city, and when completed will give four main tunnels by which the Knob Hill and the Old Ironsides mines can be tapped, doing away with hoisting. This tunnol will havo to be driven a distance of 1200 feet under the business part of the city.

At the Granby mines at Phœnix two more steam shovels will be put in oporation in its ore quarries at the Knob Hill. Later it is expected to use one of the machines underground in the stopes. The present shovel has a dipper capacity of three-quarters of a cubic yard, while one of the new ones will have capacity of a cuhic yard, equal to 1500 tons per day.

Nelson District.

The Star M. & M. Co. of Philadelphia, Pa., operating the Star group, 1 mile above the Granite mine, near Nelson, has loased the Poorman-Granite stamp mill and tram for five years. The Star Co. will counect its mino by tram with the Granite tramway. The ore is quartz carrying free gold.

The right of way for tho Hunter V. tramway, near Ymir, has been cleared.

——The flume at the Ymir mine has been completed. It runs from the mill to the cyanido works and carries tho tailings for treatment. The flume is half a mile in length.

Work has hoen resumed at the Alice mine, near Creston, by Hampson & Mayhew, lessees, with fifteen men. It has been idlo two years. Shipments of galena will he made to the smolter.

Rossland District.

The Kootenay mino, at Rossland, is shipping regularly, the ore being drawn from the fourth, fifth and intermediate levels. Development is under way on the sixth level.

Le Roi Two oil concentrator at Rossland is in operation with satisfactory results.——At Le Roi mine stoping continues in the upper levels and development is heing increased in the deep workings. On the 1350-foot lovel the south crosscut is heing driven to tap tho ore body opened up in diamond drilling.

Slocan District.

The Minnesota Silver Co., owning the Ivanhoe mine, near Sandon, will increase the output to 500 tons of asserted ore and concentrates per month. The Ivanhoe is ownod by W. H. and W. C. Yawkey of Detroit, Mich., J. D. Farroll of Seattle, Wash., and P. J. Hickey of Minneapolis, Minn., who is manager. It has been under development for five years and is opened to the 1100-foet level. For two years it has been paying expenses on ore taken out in development. The mill was recently altered to save the zinc more carefully and a 47% product is being shipped to Iola, Kans.

Vancouver Island.

The North Western S. & R. Co. smelter at Crofton, in Victoria mining division, is treating 450 tons of ere per day. From tho Lenora mino 150 tons daily are being received. This is increased by a regular supply from Texada Island and thirty tons a day from Prince of Wales Island.

West Kootenay District.

The 10-stamp mill of the Oyster-Criterion mine, owned by the Great Northern Mines, Ltd., at Camborne, in Lardeau, is in operation. The 3500-foot aerial tramway, which delivers tho oro from a peint 140 feet below the main tunnel and 1800 feot abovo the level of tho mill, is also eperating, and the oro bunker of the mill is filled. There are several hundred tons of ore on the dumps at the mine and 1900 feet of development werk has been done. The mill is provided with three Frue vanners. Tho ore is handled automatically from the time it starts threugh tho rock breaker until it emerges into the dump for the tailings. In the mill is the air compressor, which is operated by wator power. Four machine drills will be put to work stoping ore. J. Lade is superintendont of the mine and mill.

The mill of the Eva mine, near tho Oyster-Criterion mine, at Camborne, which also has ten stamps, is in steady operation. Tho Eva mill has four Frue vanners. It is crushing thirty tons per day.——Work on the McMinnville greup, which adjoins the Eva and Kingston in the Camhorno camp, is progressing under direction ef E. Wright of McMinnville, Or. The werk consists of a tunnel being drivon on the main vein, which is 14 feet wide. The ore is free-milling, gold-bearing quartz, running $10 per ton. A stamp mill will be built.——Tho Kingston group, which adjoins tho McMinnville, will resume, says Manager Blochherger.

CANADA.

According to a report issued by the Dominion Governmont at Ottawa, there was imported into Canada from the United States during 1902 ore crushing machinery to the value of $48,500, steam engines and hoilers to tho value of $347,024.

Alberta.

The Blairmoro Coal & Coko Co. has taken over the Fishburn-Proctor coal mine, extending 4 miles along the railway and comprising 6000 acres near Blairmore. There aro soven workable seams of coal from 3 to 30 feet wide, says President E. H. Fishburn. C. Morris is mine superintendeut.

Ontario.

It is reported that C. M. Schwab et al. of New York have hought the properties of the Bruce C. Co., Ltd., at Bruce Mines, on Georgian Bay, near Algoma, 60 milos from the Canadian Soo.

Quebec.

The copper mines at Eustis and Capelton, 8 miles south of Sherhrooke, on the Boston & Maine Railroad, give employment to 200 men, writes P. Lang, U. S. Consul at Sherbrooke. The company formed last year to huild a smelter at Sherhrooke has heen unahle to raise necessary funds for the plant. It is thought that a smelter at this place would cause the opening up of additioual copper properties, as well as renewing work on old ones, which were abandoned because of lack of smelting facilities at reasonahle prices. The ashestos mines at Thetford and Black Lake, on the Quebec Central Railway, have had a profitable year. Their shipments to the United States were valued at $647,067, as compared with $610,741 in 1902.

GERMANY.

United States Consul General O. J. Hughes, at Coburg, writes that the pumping system formerly employed at the Kaiserstuhl II mine at Dortmund was sufficient to raise 4 cubic meters (141 cubic feet) of water per minuto to a height of 300 meters (975 feet). The present condition of the mine necessitates raising 8 cubic meters (282 cubic feet) per minute and an electrical pumping system has heen adopted. The pump is triple-acting and at 75 revolutions per minute can raise 5 cubic meters (176 cubic feet) of water to a height of 400 meters (1300 feet). It is driven directly by a three-phase induction motor, rated at 570 H. P. The motor, which has a diameter of 10 feet, has star-connected windings, the outer terminals being carried to slip rings. A rheostat is provided for starting the motor. The stator is made in two parts and is supported upon two six-arm spiders from main bearings. The motor operates at 1900 volts and 22½ cycles per second, and when running without load absorbs 62 amperes (corresponding to 16 kilowatts). At normal load 170 amperes are required. The power factor is 82%, the efficiency 92%, and the slip 2.7%. Tho generating station contains two alternators, one of 840 and one of 140 H. P., both three phase. The exciting current is furnished by an independent dynamo driven by a separate engine. The two machines may be worked in parallel, and the station includes a high-voltage switchboard. The meter is located in a chamber in the mine.

MEXICO.

Chihuahua.

Negotiations for sale of the Dolores mine in northorn Chihuahua, near the line of the Sierra Madre & Pacific Railroad, have heen closed, and the Venture Corporatien of Londen, England, has made first payment. Tho mino was owned principally by San Francisco, Cal., mon.

E. T. Le Claire et al. of Milwaukee, Wis., have closed a deal for the Sufrigio, Brava, La Luz and New York mines, near Urique, which are extensions of tho Lluvia de Oro mine. The deal was for $200,000 in gold. At tho Lluvia de Ore mine, noar Urique, thero is a mill of six stamps, but twenty stamps will he added.

J. Long of Parral, manager of the Hidalgo M. Co., says the Loiter optien on the Hidalgo M. Co. mines has been extended to Novemher 20th. The mills of the company are expected to be in operation hy January 1st. J. M. Botello, manager, will start up tho Parral M. Co. mill by January 1st.

E. S. Burke Jr. of Cleveland, Ohio, has put mon to work on tho Concheno mines, near Minaca.

Durango.

The American M. Co. of Chicago, Ill., will build a load-silver smelting plant at the mines at Velardena. The plant will have capacity of 300 tons. The company will put in machinory and drills for use at Reyes.

Guanajuato.

J. B. Macmanus et al. of Guanajuato report having organized a company to concentrate the sands and slimes of the Guanajuato river.

The La Luz M. Co. of Colorado Springs, Colo., will put in an oloctric hoisting plant on its property at Guanajuato. Tho equipment will consist of a hoist capahle of lifting two cagos from depth of 2000 feet and the necessary accessories and machinery. Power to operate the plant will bo furnished hy the Guanajuato P. & E. Co. The La Luz Co. is increasing development work.

Mexico.

At Chalchiltepec, district of Temescaltepec, 50 miles southwest of San Juan de las Huertas railroad station, near Toluca, J. F. O'Brien has organized a company to exploit a group of mines. Mason & Mason have hought the Santa Rosalia mino and H. Millor, of El Oro, is superintendont. Operations will hegin next week.

Sonora.

T. W. Foster, manager of the Missouri-Mexican M. Co. of Kansas City, Mo., which has a group of antigua properties at Campo Todos Santos, 9 miles southeast from Suaqui do Batuc, and south of the Yaqui river, says development work is progressing. The Missouri-Mexican M. Co. has 148 pretenencias, showing several ledges, yielding pay ore. The oros are copper, carrying values in gold and silver. One of the veins yields lead carhonates. The company is composed of Eastern men, and they will put in a plant of machinery for complete development of the group. G. E. Whittich of Larned, Kan., is president.

Work is progressing on the reduction plant for the Ruhy G. &. C. Co., at Batamote, east from Ortiz station.

The concentrator at Salero, in Tyndall district, Santa Rita mountains, 15 miles northwest from Patagonia, is in operation and concentrates are heing shipped. The plant is owned hy the Arizona G. & C. Co.

F. Morgan has resumed operations at the antigua mine, La Mexicana, 4 miles east of Cananea, says the Oasis. The mine is owned hy Sacramento, Cal., men, operating as L. L. Louis & Co. A shaft is being sunk, and is down 200 feet, cutting into the old workings. Shipments of silver ores will he resumed.

NEW ZEALAND.

The Waihi Grand Junction G. Co., near Waihi, reports on the 500-foot level, in northeasterly direction, 219 feet from No. 2 shaft; the width of No. 2 lode has been shown 4 feet, with assay values of $29.75 in gold.

The New Zealand Government at Wellington has introduced in Parliament a Public Works bill providing for a loan of £1,000,000, three-fifths to be devoted to railways and the remainder to land settlement and gold mines.

NICARAGUA.

A. L. Gottschalk, United States Consul at San Juan del Norte, says there are seven "mineral regions" or groups of mines in course of development in eastern Nicaragua. The regions are locally known as follows: Pispis, Tunki, Siuna, Ceco (or Wanks), Cuicuinita, Rio Grande and La Grupera (or "El Mico" region). The labor employed in the mines of this part of the country is of four classes: 1. Mosquito and other Indians for making trails, felling timber, and machete werk in general. 2. English-speaking coast negrees, or half-breeds ("coast creoles"), for work under ground. 3. Nicaraguans from the interior, for same purpose. 4. Foreigners (whites), as section bosses, commissaries, for timbering, and fer ether skilled labor. These four classes of labor are all paid in Central American silver (1 pese or "sol" being equal to 38.4 cents in United States currency), and laborers earn respectively by the day, by classes 1, 2, 3 and 4. 38.4c, 57.6c, 57.6c and $1.92 to $2.69 and food, which must always be furnished them by the mine. One mine owner, who employs a large number of Mesquito Indians, says he has computed the expense of feeding his men, in gangs of twonty-five, at 19.2c per diem.——Tho pay of laborers as quoted abevo differs materially from the wages usually given in the interier (mines of Chentales, Segovia, and ether departments); as in the interier laborers are "matriculated"—that is, are engaged for a term of months undor a "peonage" system, tho local military autherities enforcing fulfillment of contract with their employer whenever necessary. It is nsual to pay them an "advance" on engaging them (usually less than one-half the first month's wages).——Water pewer is available, the country boing little more than a network of rivers and their tributaries. The climate, though not unhealthy, is rainy almost throughout the year, aud there is no fear of sudden dreught, causing the rivers to run dry, as in so many ether subtropical regions. The country is thickly wooded, and timber ahounds for purposes of lumbering and fuel.

——In Tunki region, near the Prinzapolka river, the principal mines are the Bonanza, Neptune and the Atlas. The Bonanza mino, J. Lapierre et. al., owners, has six 3½-foot Huntington mills in operation. The Neptune is owned by F. A. Pellas, who has a mill.——On Okumwass river, the Minnesota mine is worked with a 3½-foot Huntington mill and makes output of thirty to fifty ounces geld per month. The owners are H. A. Maypother of Jamaica and H. Patterson.——In Pispis region, up Prinzapolka river, on the Bamhano, the principal mines are the Siempre Viva, Constancia, Concordia, San Antonio, Santo Domingo and Lene Star. Tho last named is owued by Smith, McIuness & Bluett. In ten months preceding July, 1903, they crushed 43,940 tons of ore, yioiding $65,910. Work is done with a 3½-foot sectional Huntingten mill, but they are building a 20-stamp mill.——The Siempre Viva mine for the first five months of 1903 produced $34,169.31 with their 20-stamp mill. Tho Siempre Viva M. Co. has headquarters at Bluefields and S. D. Spellman is president.——Tho principal mines in Siuna region are La Luz y Los Angeles (with two 3½-foot Huntingtons), Buenaventura (owned by J. Pizarro), and the Santa Rita (owned hy I. Osorio).——La Grupera (or El Mica) region is near the Escondido river, ahove towu of Rama. Brown & Harris of Bluefields own a group of 150 claims, as the Topaz M. Co. They have a 20-stamp mill and concentration plant, and are putting in cyanide process.——The work done on upper roaches of the Cocó is principally placer; same applies to Rio Grande, which has been loss thoroughly prospected. La Rosalia and the Hermandad are quartz mines in Cuicuinita district, hoth the property of Chiuese merchants at Bluefields. The district takes its name from the Cuicuinita river, one of the upper branchos of the Prinzapolka.

EXPORTS OF GOLD FROM BLUEFIELDS FROM JANUARY 1, 1900, TO JUNE 30, 1903.

Year—	Quantity—Ounces.	Value.
1900	13,334½	$216,507 25
1901	16,741	259,077 00
1002	22,718½	339,056 80
1903 (first six months)	13,100	192,670 00

PERU.

Frank Klepetko, consulting engineer for the mines at Cerro de Pasco, in Junin department, owned by J. B. Haggin et al. of New York, says they are preparing to put in an extensive smelting plant at their mines.

TASMANIA.

The Tasmania G. M. Co., Ltd., has been organized in London, Eng., to take over the mines and works of the Tasmania G. M. & Quartz Crushing Co., at Beaconsfield, for £266,500. The inflow of water in the lower levels has made it necessary to increase capacity of pumping plant. The mine has been worked from the main shaft to depth of 818 feet. Another shaft has been sunk 1100 feet, cutting the vein at 1000 feet, showing width of 7 feet. The ore shoot has been opened for 1500 feet. The mine is said to be worked out down to the 718-foot level. The ore averages 15 dwts. gold per ton. The mill has 105 stamps and it is proposed to add 40 more. J. Taylor of London, Eng., is manager.

Personal.

E. L. BALLOU has retured from Pony, Mont., to Igo, Cal.

R. S. SLUSHER is in Phœnix, Ariz., examining mining property.

J. S. CONDON of Verdi, Nev., is in San Francisco, Cal., on mining business.

C. K. MCCORNICK has returned to Salt Lake City, Utah, from California and Arizona.

W. H. LINNEY, manager of the Dewey mines at Pearl, Idaho, is examining mines in Arizona.

H. B. WRIGHT is chief engineer for the Crow's Nest Pass Coal & Coke Co., at Fernie, B. C.

J. P. EVANS, manager of the Colorado Iron Works Co., Denver, Colo., is in San Francisco, Cal.

D. B. KEMP, of Telluride, Colo., interested in Colorado mines, is in San Francisco, Cal.

G. E. BAILEY, E. M., of San Francisco, Cal., has gone to Washington, D. C., on mining business.

G. E. ALEXANDER of Denver, Colo., is now metallurgist at the Crown King mine, Crown King, Ariz.

F. SEARLES of Nevada City, Cal., interested in Nevada county, Cal., mines, is in San Francisco, Cal.

T. E. MCSORLEY, of Mokelumne Hill, Cal., interested in Calaveras county mines, is in San Francisco, Cal.

PRESIDENT J. DERN of the Con. Mercur mines returned this week to Salt Lake City, Utah, from Nebraska.

H. B. KAEDING of San Francisco, Cal., has gone to Corralitos, Chihuahua, Mexico, to examine mining properties.

H. R. TAYLOR of Cincinnati, O., is general superintendent of the South Percha G. M. & M. Co. at Hillsboro, N. M.

MANAGER J. DEDERICHS of the Black Diamond mine at Stockton, Tooele county, Utah, is visiting in California.

W. A. BYERS has returned to Salt Lake City, Utah, from Salmon City, Idaho, where he is engaged in mining.

WILLIAM THOMPSON, manager of the Rossland-Kootenay M. Co., of Rossland, B. C., has gone to Mexico on a short business trip.

J. RICHARDSON returned to Salt Lake City, Utah, last week from Montpelier, Idaho, where he is developing mining properties.

L. E. CASSATT, superintendent of the Cassatt-Homestake mine near Idaho Springs, Colo., returned last week from an Eastern trip.

S. C. HAZELTON is assistant superintendent of the United States M. Co.'s plant at Bingham Junction, near Salt Lake City, Utah.

R. H. CAMPBELL has roturned to California from Nome, Alaska, where he has been engaged in extensive hydraulic mining operations.

W. H. CLARY JR., manager of the South Bank mine, near Sheep Ranch, Calaveras county, Cal., is in San Francisco, Cal., on business.

G. W. SMITH of Florence, Colo., is examining mining properties in Chihuahua, Mexico, for the El Colorado M. & M. Co. of Colorado Springs, Colo.

A. F. CRANK of the Blaisdell Co. has sailed for Johannesburg, South Africa, where he will have charge of the company's South African business.

FRANCIS T. FREELAND has resigned the management of the Smuggler mine, Aspen, Colo. S. I. Hallett, the former manager, will resume charge.

B. B. LAWRENCE of New York, with J. H. Roheson of Georgetown, Colo., have returned from a visit to tbe old Whipsaw copper property, near Briggs, Ariz.

F. C. MUELLER, vice-president of the Promontorio G. M. Co., returned to Nogales, Ariz., last week from a several weeks' trip to California on mining business.

W. BAYLEY of Los Angeles, Cal., director in the Tomhoy G. M. Co., Ltd., bas returned from the company's mines at Telluride, San Miguel county, Colo.

A. A. LANE, part owner of the La Bufa M. Co., operating La Bufa mines near Minas Prietas, Sonora, Mexico, returned to the mines last week from a trip to England.

FRANK DAVIS, manager of the Sonora M., M. & D. Co. and the Yaqui S. & R. Co., operating at Toledo, Ures district, Sonora, Mex., is in San Francisco, Cal., on business.

D. S. JOHNSON, formerly with the American S. & R. Co., at Aguascallentes, Mexico, has taken a position with the Pennsylvania M. Co. at Grass Valley, Nevada Co., Cal.

J. CONZETTE, manager of the Ruby G. M. Co. at Galena, S. D., is in Utah examining milling plants, with a view to placing a mill on the Ruby property best adapted to the ore of that mine.

J. L. GIROUX, president and manager of the Giroux Con. C. Co., with A. M. Snedeker et al., have gone to examine mines in Sonora, Mex., after a trip of inspection of their copper mines at Ely, White Pine county, Nev.

T. RAPSON, who developed the Trimountain mine, near Painesdale, Mich., as chief mining captain, is superintendent of the Miskwabik mine, near Allouez, Keweenaw county, Mich., vice Superintendent Scott of the Phœnix mine.

Commercial Paragraphs.

THE Blaisdell Co. reports having 40-foot and 30-foot class A excavators under construction at Erith, England, for shipment to South Africa.

THE San Francisco, Cal., office and supply house of the New York Belting & Packing Co. has been moved from 509 Market St. to 605-607 Mission St., San Francisco, Cal.

THE Lunkenheimer Co., of Cincinnati, O., manufacturers of brass and iron steam specialties and engineering appliances, have opened a branch office at No. 24 Boulevard Voltaire, Paris, France, where they carry a complete stock of their goods.

A. R. PARTRIDGE, Starr King Bldg., San Francisco, Cal., manufacturer of the centrifugal impact pulverizer, reports shipping one machine to the Rustlers M. Co., in El Dorado county, Cal. He also reports having one pulverizer ready for shipment to Lassen county, Cal.

A. E. LINDROOTH, who has been representing the Link Belt Machinery Co. in Denver the past six years, has formed a partnership with his assistant in the Denver office, Benedict Shubart, with offices in the Boston Block, Denver, Colo., and will represent the Link Belt Co., as heretofore, as well as the Goodman Mfg. Co. of Cbicago, Ill., manufacturers of high-grade electrical mining machinery, such as mine haulage systems and traction locomotives, and also the Morgan third-rail system, which they have recently acquired, and now in use throughout the East.

THE Crocker-Wheeler Co., Ampere, N. J., have an order from the Lorain Steel Co., Lorain, O., through the Pittsburg office, for forty-one motors, in size from 2½ H. P. to 360 H. P.; another order from the New Jersey Zinc Co., Hazard, Pa., through the New York office, is for one 125 K. W. and two 600 K. W. generators, and 37 motors, aggregating 401 H. P. The Philadelphia office placed an order from the Warren Foundry & Machine Co., of Phillipsburg, N. J., for one 200 K. W. generator, four 35 H. P. motors and two 60 H. P. motors, and through the Chicago office, the G. H. Hammond Co. bave ordered for its packing plant, at the Union Stock Yards, in that city, one 50 H. P., one 25 H. P. and two 20 H. P. motors, and an 800 K. W. 550 volt, size 896 engine-type generator.

Dividends.

Bunker Hill & Sullivan M. & C. Co., Idaho, $30,000, payable Nov. 5.

Catalogues Received.

Catalogue No. 5 (fourth edition) of the Evans hydraulic elevators and hydraulic mining machinery, published hy the Risdon Iron Works, San Francisco, Cal., gives copious illustrated data on principal machinery points connected with hydraulic mining.

Bulletin No. 5 from the Mine & Smelter Supply Co., Denver, Salt Lake City, El Paso and New York, treats of the new No. 5 Wilfley concentrator recently illustrated and described herein. Tbe treatise gives a good detailed description of the table, tells how to erect and operate it, and illustrates its several parts.

Catalogue No. 37 from tbe F. M. Davis Iron Works Co., makors of mining and milling machinery, Denver, Colo., is devoted entirely to ore milling machinery and treats of everything connected therewith from rock breakers to zinc precipitating boxes. Like other progressive publications of similar character, it is standard size and is a compendium of information on ore milling macbinery.

"Temporary Edition, 33B–1903," is the unpretentious title of a valuable little treatise on air compressors, just issued by the Ingersoll-Sergeant Co., 26 Cortlandt street, New York City, wbich, besides giving illustrated description in detail of some of their machinery, contains several tables and formulæ of interest to any one having anything to do with rock drills or air compressors. The little book is of standard size—6x9—and deserves place in one's working library.

Latest Market Reports.

SAN FRANCISCO, November 6, 1903.

METALS.

SILVER.—Per oz., Troy: London, 27½d (standard ounce, 925 fine); New York, bar silver, 59⅝c, refined (1000 fine): San Francisco, 59⅝c; Mexican dollars, 47½@49c San Francisco, 45½c New York.

During the past two weeks silver has taken a decided slump from about 61 cents to 59⅜ cents. All interested in the silver market had hoped that the price would be maintained above 60 cents. Evidently the withdrawal of the Government from the market is having its effect, which was not at first noticeable. The market will now probably continue weak until the Government is again a large buyer of the metal.

COPPER.—New York: Standard, $14.00; Lake, 1 to 3 casks, $14.00; Electrolytic, 1 to 3 casks, $13.75; Casting, 1 to 3 casks, $13.50; San Francisco: $15.00. Mill copper plates, $17.00; bars, 18@24c. London: £58 10s spot per ton.

Tbe copper market shows signs of strength. Prices are unchanged from those quoted last week, but sales of Lake are reported at somewhat higher figures than those quoted above.

LEAD.—New York, $4.50; Salt Lake City, $3.50; St. Louis, $4.00; San Francisco, $4.50, carload lots; 4¾c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5¾c; pig, $4.75. London: £11 5s ₱ long ton.

SPELTER.—New York, $6.00; St. Louis, $5.10; London, £21 2s 6d ₱ ton; San Francisco, ton lots, 6¾c; 100-lb. lots, 7c.

TIN.—New York, pig, $25.75 @ 26.00; San Francisco, ton lots, 27½c; 500 lbs., 28c; 200 lbs., 28c; less, 28½c; bar tin, ₱ lb., 30@32c. London, £118.

PLATINUM. — San Francisco, crude, $18.00 ₱ oz.; New York, ingot, $19.00 ₱ Troy oz. Platinum ware, 75 @ 80c ₱ gram.

QUICKSILVER. — New York, $46.00@47.00, large lots; London, £8 7s 6d; San Francisco, local, $43@44 ₱ flask of 76½ lbs.; Denver, $49.50. Export, $42.50@43.00.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

SOLDER. — Half-and-half, 100-lb. lots, 18.75c; San Francisco, Plumbers', 100-lb. lots, 15.50c.

ZINC.—Metallic, chemically pure, ₱ lb., 50c; dust, ₱ lb., 10c; sulphate, ₱ lb., .04c.

NICKEL.—New York, 50@60c ₱ lb.; ton lots, 40@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30@34c.

ANTIMONY. — New York, Cookson's, 7¼c; Hallett's, 6⅝c; San Francisco, 1000-lb. lots, 8c; 300@500-lbs., 8½c; 100-lb. lots, 10½c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, $16.35 @17.10; gray forge, $14.65; San Francisco, bar, 3c ₱ lb., 3½c in small quantities.

STEEL. — Bessemer billets, Pittsburg, $27.00@29.00; open hearth billets, $28.00 @30.00; San Francisco, bar, 7c to 12c ₱ lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer	$17 00@18 00
Foundry Northern 1	16 50@17 00
Northern 2	16 00@16 50
Northern 3	15 50@16 00
Southern 1	16 10@——
Southern 2	15 60@——
Southern 3	15 10@——
Forge	14 85@——
Charcoal	19 00@20 00
Billets, Bessemer	28 00@29 00
Bars, iron	1 50@——
Bars, steel	1 75@ 1 80
Rails, standard	28 00@30 00
Rails, light	28 00@34 00
Plates, boiler	1 90@ 2 00
Tank	1 75@ 1 80
Sheets, 26 store	2 90@ 3 00
No. 27	2 90@ 3 00
No. 28	3 00@ 3 10
Angles	1 75@——
Beams	1 75@——
Tees	1 80@——
Zees	1 75@——
Channels	1 75@——
Steel melting scrap	13 50@14 00
Relaying rails	23 00@25 00
Dealers forge	12 00@12 50
No. 1 railroad wrought	14 00@14 50
No. 1 cast, net ton	13 00@14 00
Iron rails	17 00@17 50
Car wheels	17 00@18 00
Cast borings	5 25@ 5 50
Turnings	10 00@10 50

LUMBER. — (Retail): Pine, ordinary sizes, $24.00@25.00; extra sizes higher; redwood, $28.00@30.00; lath, 4 feet, $4.50 @5.00; pickets, $21.00; shingles, $2.50 for No. 1 and $2.25 for No. 2; shakes, $13.50 for split and $15.00 for sawed; rustic, $28.00 @35.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, $3.35; Cut, $3.55; 10d to 16d, Wire, $3.45; Cut, $3.35; 8d Wire, $3.50; Cut, $3.50; 6d and 7d, Wire, $3.60; Cut, $3.60; 4 and 5d, Wire, $3.70; Cut, $3.70; 3d, Wire, $3.85; Cut, $3.85; 2d, Wire, $4.10; Cut, $4.10. Special rates for carload lots.

LIME.—Santa Cruz, $2.35; Rocbe Harbor, $2.35 ₱ bbl.

CEMENT.—Imported, $2.50@2.75 ₱ bbl.; California carload lots, $2.25 f. o. b. at works; small lots, $2.50 ₱ bbl. in sacks, 4 sacks to bbl.

GENERAL SUPPLIES.

OILS.—Linseed, boiled, bbl., 49c; cs., 54c; raw, bbl., 47c; cs., 52c; Lucol oil boiled, bbl., 44c; cs., 49c; raw, bbl., 42c; cs., 47c. Kerosene—Pearl, per gal., 22c; Astral, 22c; Star, 22c; Extra Star, 26c; Eocene, 25c; Elaine, 28c; Water White, in bulk, 15½c; Mineral Seal, iron bbls., 19c; wooden bbls., 21½c; cs., 25c; Mineral Sperm, cs., 26½c.; Deodorized Stove Gasoline, bulk, 17c; do., cs., 23½c; 86° Gasoline, bulk, 21c; do., cs., 27½c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19½c; Lard Oil, E W. S., bbl., 85c; cs., 90c; Neats-foot Oil, pure, bbl., 75c; cs., 80c; Sperm, crude, 50@60c; Natural White, 70c; Bleached, do., 75c; Wbale Oil, cs., 50@55c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; loss than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2.00 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11c ₱ set; 14 oz., 40s., 10c.

COAL. — San Francisco, coast, yard prices: Wellington, $8.00; Seattle, $6.50; Coos Bay, $5.50; Southfield, $8.00. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8.00; Cumberland, $13.00; Cannel, $8.50; Welsh Anthracite, $13.00; Rock Springs, $8.50, long ton; Colorado Anthracite, $14.00. Coke, $10.50 per ton in bulk, $13.00 in sacks; Sunnyside, $8.50, long ton.

CHEMICALS. — Cyanide of potassium, 98%–99%, jobbing, 23@24c ₱ lb.; carloads, 23@23½c; in tins, 30c; soda ash, $2.00 ₱ 100 lbs.; hyposulphite of soda, 3@3½c per lb.; caustic soda, in drums, 3@3½c ₱ lb.; Cal. s. soda, hhls., $1.20@1.40 ₱ 100 lbs.; sks., $1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb. tins; roll sulphur, 2½@2¾c; powdered sulphur, 2@3c; flour sulphur, French, 3¼@3½c; alum, $2.00@2.25; California refined, 1¾@2c; sulphide of iron, 8c ₱ lb.; copper sulphate, 5¼@5¾c; chloride of lime, spot, $2.50@2.75; sulphuric acid, in carboys, 66° B, 1¾@2c ₱ lb.; nitric acid, carboys, 8c ₱ lb.

BONE ASH.—Extra No. 1, 5@6c ₱ lb. No. 1, 4@5c.

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails, ½c ₱ lb. above keg price; in 1 and 5-lb tin cans, 100 lbs. per case, ½c. per lb. above keg price. Dry Lead—In bbls., 1 ton and over, 6c; do. in kegs, 6½c.

RED LEAD.—500 lbs. and over at one purchase, ₱ lb., 6½c; less than 500 lbs., 7c.

LITHARGE.—Pure, in 25-lb. bags, 8@9c ₱ lb.

BORAX.—Concentrated, 6@7c ₱ lb; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

MANGANESE.—Pure, ₱ lb., 60c.

SODIUM.—Metal, ₱ lb., $1.00.

BISMUTH.—Subnitrate, ₱ lb., $1.75.

MERCURY.—Bichloride, ₱ lb., 90c.

MOLYBDENUM.—$2.00 ₱ lb.

CHROMIUM.—90% and over, ₱ lb., $1.00.

PHOSPHORUS.—American, ₱ lb., 75c.

SILVER.—Chloride, ₱ oz., 90c@$1.00; nitrate, 55c.

ALUMINUM.—No. 1., 99%, small lots, 37c ₱ lb.; 100 lbs., 35c; 1000 lbs, 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

URANIUM.—Oxide, ₱ lb., $3.50.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise notod.)

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific Coast inventors:

FOR THE WEEK ENDING OCTOBER 27, 1903.

742,576.—FISHING REEL—A. J. Arnold, National City, Cal.
742,385.—MIXER—H. W. Blaisdell, Los Angeles, Cal.
742,389.—PIPE WRENCH—F. D. Bullard, Los Angeles, Cal.
742,397.—NOZZLE—W. S. Day, Spokane, Wash.
742,786.—LUBRICATOR—E. K. Green, Los Angeles, Cal.
742,424.—BAKE OVEN—M. Hennings, S. F.
742,648.—OIL BURNER—A. W. Hess, San Jose, Cal.
742,787.—SASH FASTENER—F. G. High, Los Angeles, Cal.
742,332.—RATCHET CLUTCH—J. H. G. & P. R. Kunny, Los Angeles, Cal.
742,451.—WATER SUPPLY FOR WELL DRILLS—W. H. Ladley, Maricopa, Cal.
742,462.—TRACTION WHEEL—J. W. Livermore, Berkeley, Cal.
742,699.—ROOST—C. H. Mattox, Baker City, Or.
742,717.—CONVEYOR—W. L. McCabe, Seattle, Wash.
742,478.—HAND BAG—W. W. McCormick, S. F.
742,207.—GARMENT HANGER—A. Mieden, Sumpter, Or.
742,471.—PUMP—Morrice & Grim, Sonora, Cal.
742,724.—SHADE FIXTURE—J. Nicholas, Berkeley, Cal.
742,480.—GENERATOR—E. I. Nichols, S. F.
742,800.—HARNESS—J. N. Patten, Colegrove, Cal.
742,726.—BATTERY—J. A. Pedrazzi, Carmel, Cal.
742,235.—TRAMWAY—B. C. Riblet, Spokane, Wasb.
742,236.—TRAMWAY GRIP—B. C. Riblet, Spokane, Wash.
742,509.—HORSESHOE—C. W. Smith, Renton, Wasb.
742,510.—CONCENTRATOR—C. H. Snow, Stockton, Cal.
742,752.—HARROW—N. W. Thompson, Erskineville, Or.
742,529.—WATER MOTOR—Trenchard & Heath, Gannel, Cal.
742,546.—TIME LIMIT TICKET—R. W. Wood, Seattle, Wash.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

WATER SUPPLY DEVICES FOR WELL DRILLING.—No. 742,451. Oct. 27, 1903. Wm. L. Ladley, Maricopa, Cal. One-half assigned to R. L. Peeler of same place. This invention consists of an open-bottomed cylinder provided with a valve by which the bottom may be closed or opened at will; a means for raising and lowering the device within the well, and a means for opening the valve when it reaches the bottom of the well and holding it open until the contents of the apparatus are discharged. The object of the invention is to provide a means for placing the required quantity of water at the bottom of the well and discharging it gently and without motion by simply raising the receptacle after the bottom has been opened to allow the water to flow out.

HAND OR LIKE CONTAINING BAGS.—No. 742,478. Oct. 27, 1903. Wm. W. McCormick, San Francisco, Cal. The object of this invention is to so construct the bag that the ends are substantially of the same width from top to bottom of the bag, and to so connect them with a frame having a radius not greater than the diameter of the bag, that the upper ends may be raised when the bag is opened and folded when the bag is closed in an approximately vertical plane and without projecting into or outwardly from the bottom of the bag.

CONCENTRATORS.—No. 742,510. Oct. 27, 1903. C. H. Snow, Stockton, Cal. The object of this invention is to make a concentrating table that will admit of working pulps of different degrees of fineness simultaneously and independently of each other upon oppositely inclined tables, which are independently adjustable and have a common concussive movement.

PUMPS.—No. 742,471. Oct. 27, 1903. G. Morrice and C. G. Grim, Sonora, Cal. This invention relates to improvements in pumps of the double-acting type, in which a reciprocating plunger is adapted to draw water alternately into valve-controlled passages connecting with the pump barrel above and below the plunger and to discharge the water in a continuous stream. Its object is to provide a pump of this character suitable particularly for deep-mining operations, which shall be simple in construction and which is readily convertible into a single-acting pump, thereby allowing repairs or renewals to be made without suspending the operation of the pump.

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SITUATIONS WANTED.

A COMPETENT MILLMAN OF 10 YEARS' EXperience would like to take charge of a mill in any part of the country, understanding cyaniding thoroughly. Wife would like to take charge of boarding house at same place. Address W. G., care of Mining and Scientific Press.

AN ASSAYER AND CHEMIST WITH TWELVE years' experience in mining, milling, smelting and cyanide work desires a position. Best of references. Address Box 379, Central City, Colo.

CYANIDE CHEMIST WHO HAS SUCCESSfully managed cyanide plants will be open for engagement in November. Ten years' experience in different countries. Reasonable salary. Address "Reliable," care of this office.

FIRST-CLASS STATIONARY ENGINEER; 25 years' experience in mills and mines. Address Frank Wagner, Brooklyn Hotel, San Francisco.

MINING ENGINEER OF GOOD STANDING, with twelve years' experience in mines and mills, wants position as expert. School of Mines graduate. Address V. X., this office.

PRACTICAL EXPERIENCE IN METAL MINing, installing and operating steam boilers, engines and mining machinery, together with a thorough course in mining engineering at the Scranton schools, enables me to be thoroughly competent to take hold of a new property and develop it by the latest scientific mode of mining to a paying basis. Can furnish A1 reference. Open for engagement after January 1st, 1904. THEO. T. SWIFT, Muskegon, Mich. Lock Box 113.

SUPERINTENDENT WANTS POSITION WITH substantial company. Practical miner, millman, assayer and cyanide expert. Address Supt., this office.

WANTED BY AN EXPERIENCED MINING Engineer and Manager, a position as mine manager in gold, silver or copper proposition, with a first-class corporation. Have had 35 years' experience in U. S. and Mexico; prefer Mexico. Speak Spanish, German, French and English. Am well acquainted with Mexico, and am employed now. Desire a change between November and January 1st, 1904. Salary expected not less than $5000 per annum. Can furnish the best of reference. Address "Mine Manager," care of Mining and Scientific Press, San Francisco, Cal.

WISH POSITION AS SUPERINTENDENT OF a mine, assayer, millman, steam engineer, or tool sharpener. Fifteen years' experience. Have good assay outfit. Address J. L. WETMORE, Rich Gulch, Calaveras Co., Cal.

WANTED—POSITION BY AN EXPERIENCED Analytical Chemist, Assayer and Millman. References furnished. Address H. T. S., this office.

YOUNG GRADUATE OF A GOOD MINING school desires position in a mine where there will be chance for advancement. Good assayer, chemist, surveyor, and draughtsman. Address G. R., care of Mining and Scientific Press.

WRITE TO US
FOR COMPETENT
TECHNICAL MEN
For all classes of work. FIVE THOUSAND POSITIONS FILLED IN TEN YEARS.
ENGINEERING AGENCY,
210 Monadnock Block, CHICAGO.

ASSESSMENT NOTICES.

GOLDEN WEST MINING AND MILLING Company.—Location of general place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of September, 1903, an assessment (No. 1) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 123 California street, Room 423, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 24th day of October, 1903, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 18th day of November, 1903, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
CHAS. BOVONE, Secretary.
Office—123 California street, Room 423, San Francisco, California.

POSTPONEMENT.

Notice is hereby given that the date of the delinquency of the stock referred to in the above notice is hereby extended from October 24th, 1903, to November 11th, 1903, and the day appointed for the sale of delinquent stock in the above notice is hereby extended from November 18th, 1903, until December 7th, 1903, by order of the Board of Directors of said corporation duly entered of record.
CHAS. BOVONE, Secretary.

MACHINERY FOR SALE.



For Sale--Thirty Bottom Dump Cars,
ALL STEEL, ENTIRELY NEW. CAPACITY 5 CU. YDS., STANDARD GAUGE.
These cars set very low to track and can be readily loaded by hand. Suitable for handling stone, ore, shale, marl, or other material. An excellent car for contractors' use. Shipment can be made within 30 days. For further information, write
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FOR SALE.
Several Lots of New and Second-Hand Standard Rotary Mine Cars at a low figure.
Also, New and Relaying Rails---12, 16, 20 and 25-pound. Immediate delivery.
THE ATLAS CAR & MFG. CO.
CLEVELAND, OHIO.

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Prescott Mine Pump.
NEW. NEVER INSTALLED.
Size 15 x 23 x 39 x 10 x 24 inches. Triple expansion, pot form, with air pump, surface condenser and appurtenances.
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A COMPLETE CONCENTRATING PLANT
Can be bought at 12c on the $1. The machinery is of the highest type and in good condition.
One 200 h. p. Corliss Type Engine. Two Safety Tube Babcock & Wilcox Boilers, about 250 b. p. One 800-lb. High Mortar 40-stamp Mill, rapid drop. One 9x15 in. Blake Crusher. Eight Tullock Automatic Ore Feeders. Twelve Double-end 3-Compartment Hartz Jigs. One 4-Compartment Single Hartz Jig. Six Sets Revolving Screens, all housed in. Two Sets of Elevators, complete. All necessary Shafting, Pulleys, Boxes, Belting and most of the piping, etc. This plant has been used very little. It cost $100,000; if sold at once, will take $12,000 for it. Located on the D. & R. G. Ry.
S. S. MACHINERY COMPANY,
1529 Lawrence St., Denver, Colo.

Partial List of MINING MACHINERY FOR SALE.
5, 10 and 20-Stamp Mill, Concentrators and Rock Breakers.
1—150 H. P. Duplex Air Compressor.
1 Compound Norwalk Duplex Air Compressor, 17½x 26x30.
1 Double Drum Hydraulic Hoist, 2 6-ft. Pelton Wheels.
1—126" Pelton Water Wheel.
1 Double 10x12 Hendy Hoist.
1 Double 8x10 and Single 8x12 Hoist.
1 Direct Connected Electric Hoist, 4-ft. Drum.
2—3 H. P., 125-volt Westinghouse Motors.
1—150 H. P. Stanley Alternating Motor.
1—384 H. P. Stanley Alternating Motor.
1—30 H. P. Stanley Starting Motor.
1—200-ampere 550-volt Multipolar Generator.
1—75 H. P. Motor, 500 volts, connected with Dow Triplex Pump, capacity 350 gals. per minute, 500-ft. head.
1 Duplex Dow Pump, 28" stroke, 8" suction, 6" discharge.
2 Duplex Hookers, 6" suction, 5" discharge.
1 Worthington Duplex, 4" suction, 2" discbarge.
1 Compound Buffalo Duplex, 10x16x8½x10.
1 Knowles Sinking Pump, 10x10x14.
A number of smaller Pumps; 6" Jack Head.
800 H. P. of Return Tubular Boilers.
A number of Engines; 10 Air Drills.
5 Rock Crushers, various sizes.
8000 ft. 16-lb. Rail; 2, 3, 4, 5 and 6" Pipe.
2000 ft. 10-lb. Soft Steel Air Pipe.
We have not room to list everything. Write us, stating your needs. Address J. B. JARDINE, 220 Fremont St., or F. DEUTCH, 148 Second St., San Francisco, Cal., for further particulars.
Write for List B for machinery on band.



In addition to our large stock of Machinery, we have a number of complete plants of different kinds. Write us for specifications of any of these.

COMPRESSORS.
30x28x48 Rand Duplex.
24x30x60 Union Iron Works.
24x24¼x30 Ingersoll-Sergeant Straight Line.
16x16x24 Ingersoll-Sergeant Straight Line.
16x18x12x22 Leyner.
17x20x10x16 Leyner.
22x24x18½x20 Norwalk.
10x16¼x10¼x12 Ingersoll-Sergeant Duplex.
12x12x16 Rand Straight Line.
12¼x14 Rand Duplex, Belted.
10x7x8 Hughes Single.
8x9x12 Leyner.

BOILERS.
4—350 H. P. Babcock & Wilcox.
2—250 H. P. Abendroth & Root.
1—150 H. P. National Water Tube.
1—66x16, 100 H. P. Horizontal Tubular.
3—60x16, 80 H. P. Horizontal Tubular.
1—54x16, 70 H. P. Horizontal Tubular.
2—54x14, 60 H. P. Horizontal Tubular.
2—48x14, 50 H. P. Horizontal Tubular.
3—44x12, 40 H. P. Horizontal Tubular.
1—40x12, 30 H. P. Horizontal Tubular.
2—40x10, 25 H. P. Horizontal Tubular.
1—30x10, 15 H. P. Horizontal Tubular.
1—50 H. P. Locomotive Type.
1—20 H. P. Locomotive Type.
2—15 H. P. Locomotive Type.
2—10 H. P. Locomotive Type.
1—25 H. P. Vertical Tubular.
2—20 H. P. Vertical Tubular.
1—18 H. P. Vertical Tubular.
1—16 H. P. Vertical Tubular.
3—15 H. P. Vertical Tubular.
2—10 H. P. Vertical Tubular.
2— 8 H. P. Vertical Tubular.
4— 5 H. P. Vertical Tubular.

Send for Complete Machinery List.

THE MACHINERY DEPOT OF THE WEST
THE S·H·SUPPLY CO.
22ND AND LARIMER STS., DENVER, COLO.

FOR SALE—ONE 6" x 30" HIGH SPEED CRUSHING ROLL.
Made by Colorado Iron Works. Used six months. Cost $1300. Price, $450 cash. G. L. BROOKS, Albuquerque, N. M.

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FOR SALE.
Cinnabar Property, Over 180 Acres, in El Dorado County, California.
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BERNARD CINNABAR MINING CO., Room E, Academy of Sciences Building, San Francisco, Cal.

DELINQUENT SALE NOTICE.

INYO MARBLE COMPANY OF CALIFORNIA.—Location of principal place of business, San Francisco, California; location of works, Inyo, Inyo County, California.

NOTICE—There are delinquent upon the following described stock, on account of assessment (No. 37) levied on the 18th day of August, 1903, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Geo. Dillmann	530	980	$49 00
F. A. Berlin	487	400	20 00
Nathan Bibo	551	60	3 00

And in accordance with law, and an order from the Board of Directors, made on the 18th day of August, 1903, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, Room 30, fifth floor, Mills Building, San Francisco, California, on WEDNESDAY, the 18th day of November, 1903, at the hour of 3 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

CHARLES E. ANDERSON, Secretary.
Office—Room 30, fifth floor, Mills Building, San Francisco, California.

DELINQUENT SALE NOTICE.

LARKIN MINING COMPANY.—LOCATION OF principal place of business, San Francisco, California; location of works, El Dorado County, near Placerville, California.

NOTICE—There are delinquent upon the following described stock, on account of assessment (No. 15) levied on the 21st day of September, 1903, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Amt.
Alex. P. Christie	192	300	$7 50
Alex. P. Christie	193	34	85
Harry P. Christie	196	300	7 50
Harry P. Christie	197	33	82½
Robert Christie	198	300	7 50
Robert Christie	199	33	82½
Chas. E. Elliott	284	250	6 25
E. A. Selfridge, Trustee	316	500	12 50
M. Yancy	335	100	2 50

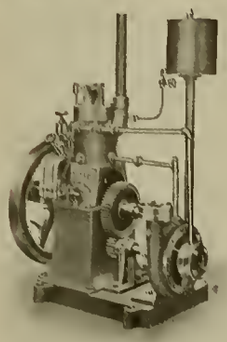
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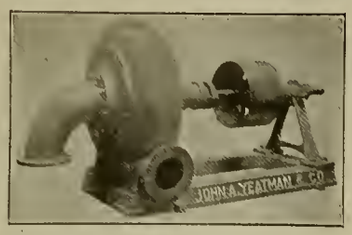
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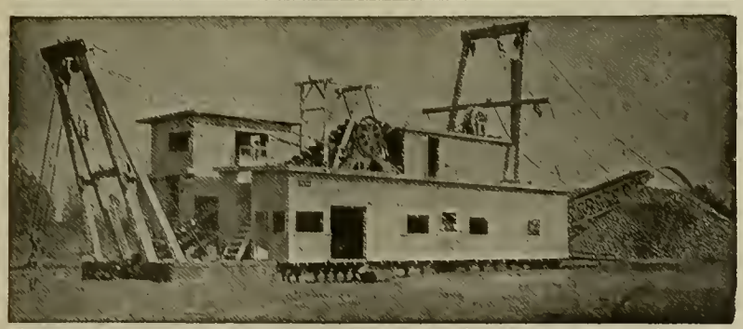


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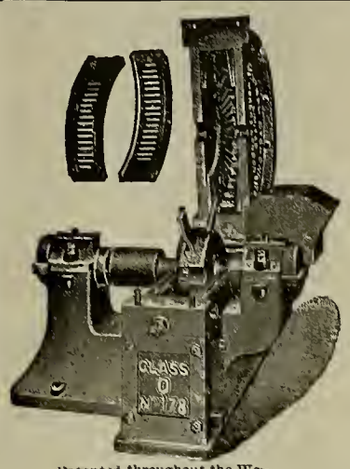
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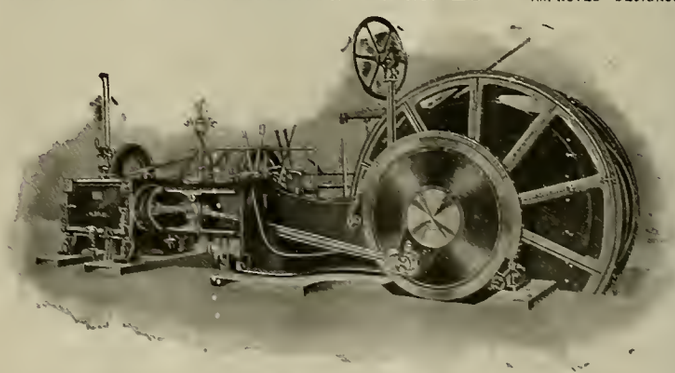
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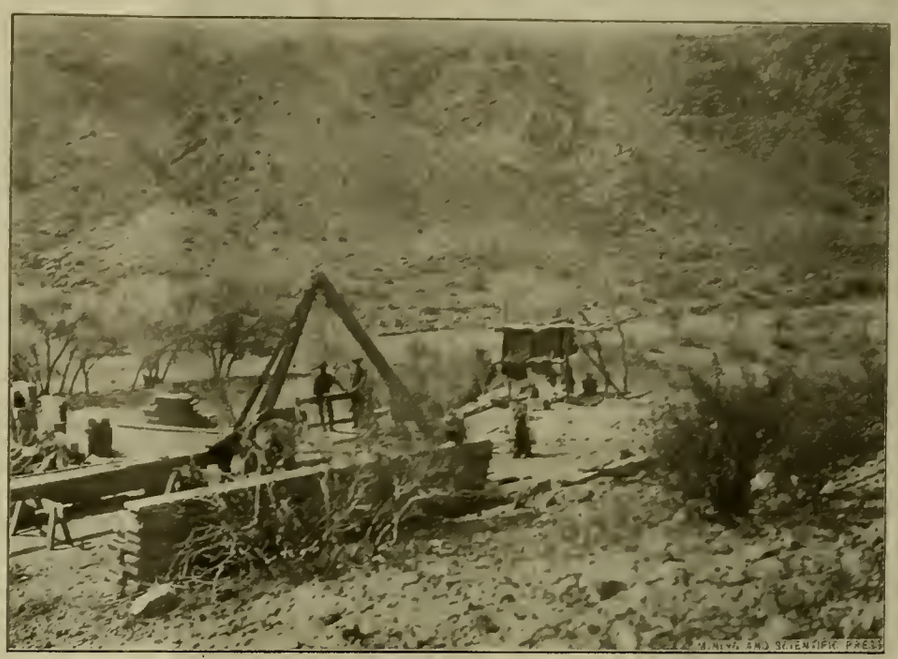
MINING AND SCIENTIFIC PRESS.

Whole No. 2260.—VOLUME LXXXVII. Number 20. SAN FRANCISCO, CAL., SATURDAY, NOVEMBER 14, 1903. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

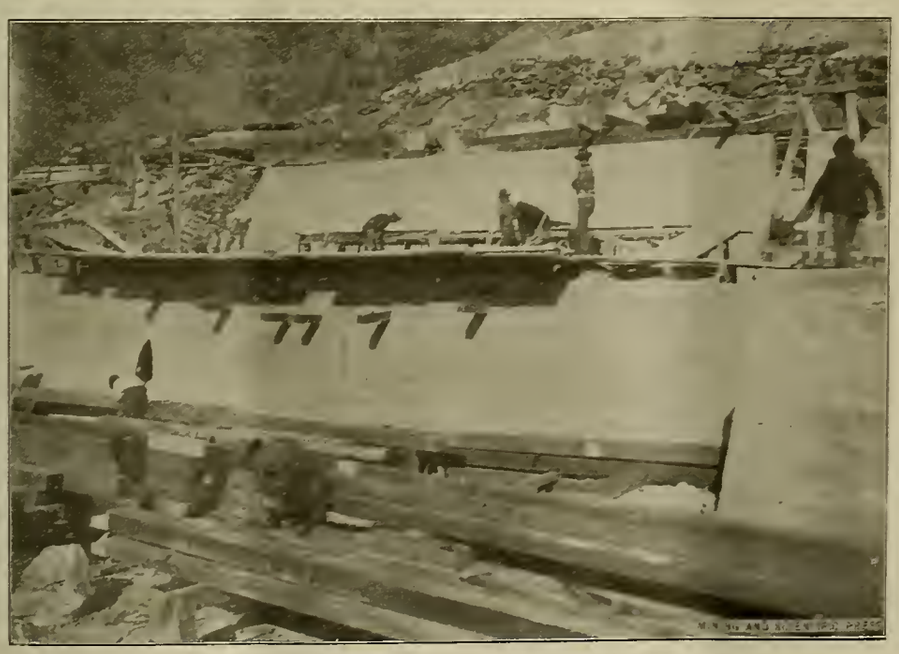
Uniform Measurement of Water.

The different methods of measuring water, and the variance of the terms employed to express quantity of water used or required, render an understanding of this subject somewhat confusing. The idea of measuring water for the use of mines and metallurgical establishments probably originated in California during the early years of placer mining, when the mines were owned by one party, while the water necessary to work them was often controlled by another. Originally water was measured by flow over an open weir, but subsequently an arrangement was made to measure a given quantity flowing through an aperture under pressure. Miners and ditch owners established different regulations in the several districts of California. The shape of the orifice through which the water flowed varied in the several districts, and the thickness of the board through which it flowed ranged from 1 to 3 inches. Some apertures were beveled, others were square. Each of these differences had a direct effect on the quantity of water which would be discharged through an opening of given size in a stated time (one minute), but a still greater difference resulted from a variation in the height of the surface of the water above the center of discharge. This varied from 4 to 6 inches in the several districts. In addition to this the "hour-inch" varied. In some counties there were 10, 11 or 12-hour inches, and in some a 24-hour inch. All this variation was the cause of much confusion. Other States long since adopted one or the other of the California schemes for water measurement, there being no standard prior to 1900, when the State Legislature of California created a standard inch by fixing it at 1⅝ cubic feet of water per minute through any kind of an aperture or over any sort of weir.

The measurement of water by cubic feet is preferable to any of the uncertain measurements of the variable miner's inch as formerly made, and its universal adoption is advised throughout the mining regions of the world. The duty of water varies greatly in the various uses to which it is put. On water wheels the power developed depends on height of fall, or head in feet, above the wheel. In stamp mills the quantity of water used per stamp or ton of ore crushed will vary with the ore. Where amalgamation is practiced inside the battery it is desirable to use as little water as possible, and keep the screens from clogging and the plates from banking up with sand. It assists amalgamation, both inside and outside of the mortars, and it is not economy to use more water than is necessary to accomplish this. If the ore be heavily sulphuretted a greater quantity of water will be required, and where large capacity is desirable it is also necessary to use larger amounts of water than when the output per stamp is less. In concentration the use of water varies with the size and type of machines used, and also with the character of material under treatment. The same conditions as to the use of water applies to cyaniding. Some ores require the use of more water than others. There is neither standard nor precedent to regulate the quantity of water employed in any particular metallurgical operation, and any attempt to establish one would prove futile for the reasons previously given. The metallurgists who best know the value of water are those who have charge of large operations in desert regions where the water is settled and pumped back for reuse owing to its scarcity. As these men naturally use as little water as possible they demonstrate that it is needless to employ more water than is required to perform certain mechanical functions in metallurgical operations. Many mill men make the mistake of using more water than is required, thus increasing the expense of ore treatment with no commensurate gain in any direction to offset the waste.



Developing Water Supply at Sultan Mine, Arizona. (See page 319.)



Retaining Walls Sultan Mill, Arizona. (See page 319.)

A Pneumatic Stamp.

The means for pulverizing the copper-bearing conglomerates in the Lake Superior region has always been an interesting matter. Various kinds of crushing devices have been tried, and the steam stamps, now in almost universal use there, have been evolved from the experience of the past. In principle they are similar to the old-time Ball stamps, the main difference being in their size and the greater force of the blows delivered. Twenty years ago a Ball stamp was considered as doing good work in crushing 125 tons daily. The Ball stamp of to-day crushes 500 tons or more of the same kind of rock. This is due partly to increased weight and size of the stamp head and to the larger pistons employed, and partly to different screens used, which is made possible by improved concentrating machinery. This copper district has always been a field for experimentation along practical lines, and the latest innovation is the introduction of a pneumatic stamp at the Mass mine, in Mass City, Mich. In the operation of this stamp compressed air will take the place of steam. If the power necessary to drive the compressors proves cheaper than steam, pneumatic stamps may supersede the old-time steam stamps.

THE mine and mill operators in the Missouri zinc districts have again resorted to a shut down of mines and mills to force up the price of spelter. This plan was resorted to in 1899 with satisfactory results, and it is expected that the price of zinc will be materially advanced in this instance.

THE Provincial Government of British Columbia has undertaken to compel James Dunsmuir to remove all Chinese from his Cumberland coal mines. Numerous indictments have been brought against the management, and a daily fine of $500 is the anticipated result until all Chinese are removed.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 340 Market Street, San Francisco, Cal. Telephone, Davis 771.

ANNUAL SUBSCRIPTION.

United States, Mexico and Canada $3 00
All Other Countries in the Postal Union 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

BRANCH OFFICES:

New York City, 730 Park Row Bldg. Boston, 27 School St.
Chicago, 1116 Monadnock Block. Denver, 936 Mack Block.

J. F. HALLORAN . . . . . Publisher

SAN FRANCISCO, NOVEMBER 14, 1903.

TABLE OF CONTENTS.

ILLUSTRATIONS: Page.

Developing Water Supply at Sultan Mine, Arizona 314
Retaining Walls Sultan Mine, Arizona 314
Riveting Suction Pipe, Sultan Mine, Arizona 319
Klinger Chute, Alaska Treadwell Mine 320
Amalgam Barrel for Black Sand 321
Arrangement of Shaft, Ashland Mine, Michigan 321
Power Station, Carmel Mine, Pony, Mont 321
Mining and Metallurgical Patents 321

EDITORIAL:

Uniform Measurement of Water 314
A Pneumatic Stamp 314
Shut Down of Missouri Zinc Mines and Mills 314
Removal of Chinese From British Columbia Coal Mines 314
Progress of Mining Equipment in British Columbia 315
Colorado the Scene of New Labor Difficulties 315
Special Session to End Litigation of Butte Mines 315
False Economies 315
A Water Famine 315
The Necessity for Drainage 315
Discharge of Chinese in Tuolumne Co., Cal 315
Aftermath of the Strike at Morenci, Ariz. 315

MINING SUMMARY 325 326 327 328 329

LATEST MARKET REPORTS 330

MISCELLANEOUS:

Concentrates 316
Assaying of Gold and Silver at The United States Mint 317
Consumption of Zinc in Cyanide Plants 318
New Method of Extracting Copper From Sulphide Ores 319
Equipment of the Sultan Mine, Arizona 319
Mining on Douglas Island, Alaska 320
Topographic Map of Northwestern Montana 321
Device for Treating Black Sand 321
Uniform Coal Rebates 321
Comptroller's Books for Month of July, 1903 322
Shaft Sinking and Equipment at the Ashland Mine 323
Equipment of the Carmel Mine, Pony, Mont 324
Mining and Metallurgical Patents 324
Obituary 320
Personal 320
Commercial Paragraphs 320
Books Received 320
Catalogues Received 320
New Patents 330
Notices of Recent Patents 330

AS indicating the progress of modern mining equipment and practice in British Columbia, the statement is made that at the Granby mines at Phoenix it is the intention to operate a large mechanical shovel in an underground stope, probably by electricity. Two steam shovels are in use in the surface cuts, and their success and economy there suggested their use underground. No objection to this novel use of mechanical shovels in underground workings presents itself, if the character of the roof is such as to make its employment safe. Where heavy timbering is required to support a caving roof the application of the idea is impracticable, but there are many large stopes in mines where the ground stands well and mechanical shovels might be employed to advantage.

COLORADO is the scene of new labor difficulties, in the strike of the coal miners. The strike covers all of the large coal mines of the State and many small ones, and temporarily stops the production of that class of fuel. Although the strike was called only last Monday, already the use of dynamite has entered in the campaign, in the attempt made to destroy an electric power plant at Hastings, 20 miles north of Trinidad, on the 10th inst. About 11,000 men have gone out of the mines, and in New Mexico a large number has been called out. Attempts have been made to extend the strike into Wyoming; but thus far without great success. The demand of the miners is for an eight hour day and increased pay, and other concessions, concerning the weighing of coal. The several mining companies have shown no disposition to meet any of these demands. It is thought the militia will be sent to the scene of the present trouble.

IN response to a popular demand, Governor Toole of Montana has called a special session of the State Legislature to convene December 1, for the purpose of taking some legislative action that will put an end to the seemingly interminable litigation in Butte mines. In view of this prospective remedy, the mines controlled by the Amalgamated Copper Company in Montana have resumed work throughout the State. It is expected that the State Legislature will pass a fair-trial law, which will permit dissatisfied litigants to secure a change of venue. Doubtless, also, a law will be passed which will permit corporations not organized under the laws of Montana to hold stock in Montana corporations, as Judge Clancy has decided that the Amalgamated Copper Company, a New Jersey corporation, could not hold the stock of the Butte & Boston or the Parrot Silver & Copper Company, these being Montana corporations.

False Economies.

In mine management economy is always a praiseworthy, and usually a necessary, feature of the business. Some managers have a strange idea of economy, however. One who had the direction of operations at a large mine, where a great many men were employed, would grow excited when he saw men standing idly at a windlass at a prospect shaft, waiting for miners 60 feet below to finish filling the bucket—would excitedly inquire of the superintendent why they were not at work, suggesting that they "dig trenches" or "chop wood," instead of idling away their time. In the mine, when he saw a number of men standing or sitting about the station, he would want to know why they were not at work. It was explained that they had fired a round of holes in the stope a few minutes previous, but as the ventilation was bad they were waiting for the smoke to clear up. There were ten men in this stope. It required three-quarters of an hour to dissipate the gas to an extent which would permit the men to return to the stope in safety, and then it was so "thick" it would cause the eyes to smart and develop a bad case of powder headache in those unaccustomed to it. The stope should have been cleared in twenty minutes had proper ventilation been provided, but a larger blower would cost about $300, and the idea could not be entertained by so economical a manager. Each day there was a loss of time in that single stope the equivalent of $3 in money, and in most other stopes, of which there were several, the condition was as bad, if not worse. Had the proper arrangement been made, the entire cost of the improvement could have been saved in a single month.

It costs several hundred dollars to cut and properly timber a good-sized ore pocket on each level under the station at the shaft, but it costs money, too, to have men wait for the skip to come, that they may dump the carload of ore. Where these ore pockets are not provided the skip seems always waiting for ore, and the car men seem to be usually waiting for a skip.

False ideas of economy such as here referred to are responsible for many mine failures. A manager should be as economical in the use of other people's money as he would be in the use of his own, but economy when directed along such lines as here indicated is parsimonious, and is equivalent to gross extravagance.

A Water Famine.

Mining has not proven to be a transitory industry in California. For more than fifty years the mineral deposits of the State have been vigorously exploited. New discoveries are of frequent occurrence in both old and new districts. Some of the mines of the early 50's are still in operation, and there is no indication that the mining industry in that State will not continue to thrive for many years to come. Still, notwithstanding these facts, there is in some directions a strange lack of foresight in providing an adequate water supply to meet the requirements of the dry months of late summer and fall. In Tuolumne county is this condition particularly noticeable. Almost every fall for years past many of the mines of that county are idle, because of insufficient water to supply the mills, and in some cases the hoists. Ordinarily progressive, that section shows a peculiar apathy to its own best interest in keeping the mines in operation. When electric power was introduced into that county to supply power to the various mining companies it was predicted that the water supply would thereafter prove abundant for all essential purposes. This was several years ago—1895-96—but the past summer and fall there are numerous mines in Tuolumne county which have been idle owing to lack of water. The rainfall and snowfall in the Sierras is abundant enough in any year to supply all needs if the storm water, or even the water flowing from the melting snows, be conserved in proper reservoirs, but for some reason this is not done, and the mining industry there gets an annual setback in consequence.

The Necessity for Drainage.

The Cripple Creek, Colo., drainage tunnel is a success, as drainage tunnels generally are, but the slow rate at which the water level is lowered in mines adjacent to the tunnel which are not connected directly with it, suggests the advisability of starting another tunnel at a lower level as soon as possible, in order that sufficient time may be given to drain an extensive area below the level of the present tunnel before it becomes necessary to enter that ground in search of ore. At present the water level is lowering in the Elkton and Mary McKinney mines at the rate of about one foot per week, or about 50 feet in a year, if this rate were maintained; but, as the water level lowers, the pressure decreases, and the rate of flow will be a decreasingly smaller amount from month to month.

Doubtless these facts are recognized by the mining engineers of the Cripple Creek district; but as long as ore is available the matter is given less serious consideration than it should receive. When the mines are worked down to the present tunnel level it will be impossible, judging from past experience in that direction, to go below the water line without pumping plants of far greater capacity than any heretofore placed in there. In view of this fact, and in consideration of the long time which will probably be required to drive a lower, and, consequently, a much longer tunnel, to reach the mines now being drained by the tunnel recently driven, this work should not be delayed. Moreover, the present condition and progress of drainage demonstrates that several years would be required to drain the ground below the present tunnel level to a depth of 250 feet, for it is scarcely likely that it could be drained at as rapid a rate as that obtaining at present. If this work is not undertaken in time to have a new tunnel well advanced into the ore-bearing zone by the time the ground is worked out above the present drainage tunnel level, there will come a halt in Cripple Creek's mining operations at that time, and several years of patient waiting must follow pending the completion of a new tunnel.

A NUMBER of residents of the Soulsbyville and Carters mining districts in Tuolumne county, Cal., on the 11th inst. waited on the superintendent of the Black Oak mine at Soulsbyville and demanded the discharge of the Chinese ore sorters who have been employed there for years. The demand was refused and the objectors then ordered the Chinese to leave, providing wagons for the conveyance of themselves and effects to Sonora. The pumps were withdrawn from the Black Oak shaft and all work stopped. The company had been paying $1.75 per day to Chinese for cobbing and sorting shipping ore. The Miners' Union demanded that the pay be increased to $2.50, to which the management would not agree. The Black Oak is one of the largest mines in Tuolumne county and has been operated steadily for more than twenty years, and has been for years the main support of Soulsbyville. This step is one of the most radical yet taken by the Miners' Union in Tuolumne county, where they are strong, and it is not unlikely that this move, like others of the sort in other States, will result in ultimate loss.

AS an aftermath of the strike at Morenci, Ariz., last summer, when an organized body of men sought to terrorize the inhabitants of that town, and were only restrained by the militia from murdering those against whom their wrath was particularly directed, ten of the leaders out of the fourteen who were indicted were found guilty and sentenced to terms in the penitentiary at Yuma, together with heavy fines. The promptitude with which these cases were brought into court and final action secured is praiseworthy, and this example will no doubt have a salutary effect on those who may be disposed to act in similar manner. It simply indicates that the people of Arizona propose to reserve to themselves the right to conduct legitimate business in their own way without interference from a lot of foreign renegades.

CONCENTRATES.

TRACTION engines have been successfully used on the deserts of Arizona and California freighting copper ore and rock salt.

✦✦✦✦

IN the Hidden Treasure mine at Sunny South, Placer county, Cal., the white gravel channel is over 1600 feet in width, the greater part of which is mined.

✦✦✦✦

CONCRETE may be mixed with machines designed for that purpose; but some engineers, in their specifications on contract work, specify that no machines shall be employed, all concrete mixing being done by hand.

✦✦✦✦

THE length of a minute of latitude varies with different distances from the equator or the poles. At the equator it is estimated at 1852.8 meters, at 20° it is 1845 meters, at 40° it is 1850.5 meters, and at 70° 1859.1 meters.

✦✦✦✦

WHERE an association of eight or more persons locate a placer claim of 160 acres, it is not necessary to make a separate discovery on each 20-acre tract of the claim and $100 worth of annual assessment is all that the law requires for the 160 acres.

✦✦✦✦

PROTOGINE granite is a variety of granite breaking with a granular or sandy fracture, with large amount of quartz and little dark mica. Sericite, a silky white mica, is abundant, with white orthoclase, and microcline. As accessory, are garnet, pyrite, etc.

✦✦✦✦

THE character of mill screen should be adapted to the rock under treatment. A woven wire screen which gives satisfaction on a granular ore may not prove suitable on a flinty ore which crushes in flaky particles. For the latter slotted screens are better suited.

✦✦✦✦

WHEN estimating the power that will be required to operate mining and milling machinery it is economy to add at least 50% to the estimate in view of future extensions, and a higher factor for safety is advisable. Machines seldom develop the power theoretically figured.

✦✦✦✦

THE so-called cotton balls of the borax marshes of Nevada and California are the result of efflorescence from the mud of the shores of the lake. When water collects on the lake all the soluble borax goes into solution. When the water is evaporated it sinks into the mud, which upon further evaporation causes the above-mentioned efflorescence.

✦✦✦✦

"FLUORINE" is a name given by the miners of the Cripple Creek, Colo., district to ore containing fluorite of amethystine color. It is often accompanied by tellurides gold ores in that district. Fluorite, or fluor spar, is common in the zinc and lead mines of the world. It occurs in various colors, purple or amethyst being the most common. It is also green, rose-colored and white.

✦✦✦✦

TRAMMING with wheelbarrows is expensive economy, and is only justifiable when a small amount of earth or rock is to be moved. In some mines wheelbarrows are used in filling stopes. If proper arrangements were made the filling could be run in without the necessity of tramming of any sort. These are the things which require foresight and which count in the economies of mining.

✦✦✦✦

MECHANICAL arrangements for handling timbers underground, particularly at shaft stations, expedite work and reduce cost of labor. In mines where large amounts of timber are used in the stopes the timbers should be taken off the cages or skips at the station on the level above that where the timbers are to be used, and lowered through raises driven connecting the levels, and passing through the stopes.

✦✦✦✦

A VEIN may be said to have two hanging walls in the case of a lens-shaped ore body standing vertically with walls dipping in opposite directions, but this is merely of local occurrence, for where the lens begins to "pinch" in its downward course it may be said to have two foot walls. Foot and hanging walls are relative terms and refer to the general dip of the vein or lode, and where a vein stands absolutely vertical it really has neither foot nor hanging.

✦✦✦✦

THE order of drop of stamps—1, 4, 2, 5, 3—is not universally employed, but is recognized as a satisfactory sequence of drops by many millmen. The statement that the order—1, 3, 5, 2, 4—is a bad order of drop is not sustained by fact, as when the order 1, 4, 2, 5, 3 is given them, the order 1, 3, 5, 2, 4 results if the point of beginning is at No. 5 instead of at No. 1. It is the aim that no two adjoining stamps in a 5-stamp battery shall drop consecutively. It is also desirable to keep the pulp evenly distributed.

✦✦✦✦

STAMPS drop from 28 times to 110 times per minute, according to height of drop, and beyond the latter number of drops it is not safe to go, on a 5-inch fall, for if the cam-shaft be revolved at a greater speed than fifty-five revolutions the tappets will strike the cams, unless the height of drop be lessened materially, and the stamps will not reach the rock on the die beneath, besides which there is great danger of breaking the arms of the cam. Two hundred revolutions with 400 drops per minute is a physical impossibility with cams of the usual size and shape.

✦✦✦✦

THERE are several prominent faults in the Leadville, Colo., district, the greatest one being the Mosquito fault, the displacement of which is about 5000 feet. Other noted faults are the Carbonate fault, on the west side of Carbonate hill, displacement 750 feet; the Iron fault, on Iron hill, displacement 1200 feet; Mike fault, between Iron hill and Breece hill, displacement 50 feet. Besides these there are a number of others of minor importance. The amount of displacement varies greatly from place to place. These faults have had an important bearing on the economy of mining in Leadville mining district.

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WHEN A puts a mining location notice on a claim on Sunday, but, fearing a legal location cannot be made on Sunday, dates it Monday, and B puts up a notice subsequently, dating it on the previous Saturday, no rights are obtained by B. It is a question of fact, and while the reading of the location notice—In this case Monday—is prima facie evidence that the claim was located on that day it may be set aside upon it being shown that the first steps in making the location were taken on Sunday. A location made on Sunday is legal and as valid as one made on any other day in the week.

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A CONVENIENT method of assaying cyanide solutions for gold and silver is as follows: Evaporate 29.2 cubic centimeters of the solution to dryness in a lead tray. Roll up the lead and cupel, weighing the resulting button. Should the solution be known to contain more than .2 ounce of gold per ton it is advisable to scorify the lead with borax glass before cupellation. The lead tray should be about 2x3 inches, and weigh about twenty grammes. The solution in it can be quickly evaporated by placing on an asbestos board over a Bunsen burner. If no Bunsen burner be available the slower process of the alcohol lamp may be resorted to.

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IT is impossible to determine whether a vein passes downward from one kind of a formation into another beneath it, without following the vein to that point. The presumption is that it does, but the question of values is important and can only be learned by actual development. The character of rock through which a vein passes usually has an influence on the physical condition of the vein whether there be a change in values and character of minerals or not. Veins in slaty rocks generally present a banded structure, and those in massive rocks are more massive, with sometimes a banded structure along the walls.

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DIAMOND DRILLS can not be economically employed in boring through rocks much shattered and broken, for the reason that water can not be made to remain in the drill hole, it running away in the crevices of the rocks. In compact, soft ground, such as slate, the diamond drill will cut rapidly, but no cores are obtained. Samples may be taken of the fine cuttings forced back by the stream of water; but such tests are not wholly reliable. When the rock is hard and a core is obtained, this will give a good idea of the value of the ground at that place; but a series of holes is necessary to learn the size and shape of any ore body that may be met.

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ANORTHITE is lime feldspar, and occurs in some diorites and basic schists, also in diabase, gabbro, norite, etc.—not a very common mineral. Anorthosite, or anorthite rock, is a gabbro in which anorthite occurs abundantly, almost to the exclusion of other minerals, forming sometimes 95% of the rock. It is usually coarse-grained. It occurs extensively in the Laurentian of New York and Lake Superior region, in Labrador and Newfoundland. A similar rock occurs in Los Angeles county, Cal., forming a large portion of Mount Gleason, near Ravenna. In it occur large masses of iron ore, magnetite, and in one locality veins of quartz containing gold and auriferous pyrite.

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WHEN lead-silver bullion is melted and allowed to cool slowly to near the melting point, crystals of lead will separate out which are much poorer in silver than the original bullion was before melting. This fact is taken advantage of in refining this class of bullion in the Pattison process. The crystals of lead are skimmed off and more bullion added, when new lead crystals form which in turn are skimmed off. In this manner the precious metal of a large amount of lead bullion is concentrated, and the lead, poor in silver and gold, obtained separately. The concentrated gold-silver-lead bullion, containing a relatively small amount of lead, is then cupelled, and the gold and silver refined.

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THE mere occupation of land on the public domain for twenty years without a proper filing in the land office—being what is termed a squatter's claim—does not vest the squatter with any rights as against a bona fide mineral locator, who peacefully enters the tract and locates a vein thereon. The mineral locator must perform the assessment work and other acts required by the United States and local laws, but whether the vein is commercially valueless or not is difficult of determination. The law simply says "mineral bearing rock in place," and makes no mention of the value of the mineral so contained. The locator is left to judge of its value, on the presumption that if the vein be valueless he will abandon the claim.

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BOTH masonry and concrete are occasionally employed in American mines but are more common in Europe. It has been found that concrete is often advisable at the collar of shafts, either inclined or vertical. Steel is also used in mine support to a limited extent. In shafts it might be employed to advantage, and would prove a perfect protection against fire. Under heavy pressure it would probably prove a dangerous substitute for timber, as it would give little warning of collapse; and if it gave way under the strain would come without warning, whereas in workings supported by timbers there is always sufficient indication of approaching disaster—sufficient in most cases for men to escape, if not to prevent collapse. Filling is the only safe course to pursue, as no timber will support heavy ground perpetually.

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THE term "limestone dike" is a misnomer. Dikes are intrusive—injected in molten condition from below. Sedimentary beds, such as limestone, quartzite, sandstone, shale, etc., are not dikes. These latter are sometimes called reefs. Eruptive rocks are also intruded in flat sheets in horizontal formation. These are called sills. Should the formation be upturned subsequently these sills might be mistaken for dikes, or dikes thrust upward into rock strata standing at a high angle might be mistaken for sills if earth movements caused the inclosing formation to assume a recumbent position. In studying the stratigraphy of rock masses care must be taken not to mistake slaty cleavage for lines of sedimentation. The former is induced by pressure and movement, the latter by deposition of the rock material in water. Cleavage planes and lines of sedimentation may coincide.

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THE most universally used means of precipitating gold from cyanide solutions is by means of threads of zinc. In a few works the gold solution is run through charcoal filters, which collect the gold, which when well charged with the precious metal is dried and incinerated in a furnace of proper construction. It has been found in practice that a series of charcoal filters afford the most satisfactory results, a single one rarely recovering more than 25% of the gold. Charcoal is successfully employed to precipitate gold from chlorine solutions. Iron sulphate is also used for this purpose. Sulphuretted hydrogen will precipitate gold from both bromine and chlorine solutions containing it. Mercuric chloride will precipitate gold from gold solutions of cyanide, and action is facilitated by heating the solution, but it is limited in its usefulness, as in the presence of free potassium cyanide no precipitation of gold occurs.

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IN the determination of zinc ores only volumetric methods are employed in practical working. There are two volumetric methods: titration with a standardized solution of potassium ferro-cyanide; and titration with a standard solution of sodium sulphide. The ferro-cyanide method is preferable, and is based on the fact that salts of zinc decompose potassium cyanide in an acid solution, forming a white compound of zinc which is insoluble, and that an excess of ferro-cyanide is detected by a brown coloration of the solution produced by uranium acetate or nitrate. To prepare the standard solution of potassium ferro-cyanide 28 grammes of the pure salt are dissolved in 2000 cubic centimeters of water. In standardizing two parts of 0.200 gramme each of pure zinc oxide (which has previously been ignited to convert any zinc carbonate present into zinc oxide) are dissolved in 10 cubic centimeters of pure muriatic acid. Add 7 grammes of pure ammonium chloride and 250 cubic centimeters of hot water and titrate with the solution of ferro-cyanide. As the end point is approached a drop of solution is occasionally removed from the glass stirring rod and added to a drop of uranium acetate or nitrate placed on a porcelain plate. As long as there is not an excess of ferro-cyanide in the solution the uranium acetate will retain its yellow color, but as soon as the ferro-cyanide is in slight excess the uranium acetate will turn a light brown. The titration should be carried to a point where the light brown color appears with a drop of uranium acetate. About 16 cubic centimeters will be required, and that amount may be run in from the burette before making the test, but the titration should be finished carefully by testing after each additional drop of ferro-cyanide. As soon as the brown color is obtained a note should be made of the reading of the burette, wait a minute or two to see if some of the tests already made have not developed the brown color. Generally it will be found that the test has proceeded too far and a correction must be made accordingly. A further correction must be made for the amount of ferro-cyanide necessary to produce the brown color without the presence of zinc. In calculating the result it will be considered that 200 milligrams of zinc oxide contain 160.6 milligrams of zinc; 1 cubic centimeter of ferro-cyanide solution made up of 44 grammes per liter will be equal to 0.01 gramme of zinc, or about 1% when 1 gramme of ore is taken for assay. The uranium acetate solution is prepared by dissolving a quantity in water, making a strong solution, which is clarified by adding a few drops of acetic acid. It should be kept in a tightly stoppered bottle in a dark place. The ferro-cyanide solution should be kept in a dark-green bottle, well stoppered and not exposed to strong light.

Assaying of Gold and Silver at the United States Mint.

Written for the MINING AND SCIENTIFIC PRESS by JOHN W. PACK, First Assistant Assayer United States Mint, San Francisco.

The gold and silver brought to the Mint are in a great variety of conditions. It may be bars, having already been melted, or nuggets and grains, as taken from gravel deposits, or in amalgam or retorts from mills.

To ascertain the amount of gold and silver in these deposits, they must be carefully assayed. And to obtain an accurate sample from a deposit it must first be melted and carefully mixed when thoroughly melted. A gold deposit after melting and being cast into a bar is then sent to the assay department, where two chips are taken from the diagonal top and bottom corners of the bar. These two samples are then hammered and rolled out in thin strips for greater convenience in cutting when weighing.

The fineness of the metal is expressed in thousandths, hence it is found more convenient to employ the French system of weights, using the half gram as the unit of 1000 parts, with decimal divisions of ten thousandths of that weight. The assay of a sample of pure gold would be represented by an assay of 1000 fineness.

After weighing accurately 1000 weight (or one-half gram) of the samples taken from the bar, there is added to each of these assays sufficient fine silver to make an alloy containing twice as much silver as gold. Three parts of silver to one of gold has been used, but two parts is found to work more satisfactorily. By practice one becomes able to judge of the amount of gold in his sample and is guided by his estimate of the fineness in addition of silver.

The weighed-up portions of each sample with the silver added to each are now placed in two pieces of lead foil of about 40 grains for each crude assay, and about 30 grains of lead for fine gold assay; also a very small amount of pure copper is added where no copper is present in the sample. This addition of copper has a tendency to keep the metal tough after cupellation.

The metal after being securely rolled in the lead is placed in a cupel, which has already been heated to the proper temperature in the muffle. The door of the muffle is then closed till the lead melts and begins to oxidize freely; the door is then opened part way to allow for more rapid oxidation. After the lead and other base metals are eliminated the cupel is removed from the furnace and the button allowed to cool and harden. It is then removed from the cupel, hammered and brushed to remove any particles of bone ash, then annealed and rolled into a strip about 2 inches in length. This strip is again annealed and rolled up loosely. The metal in the assay is now ready for parting, or separating the silver from the gold.

The object in adding the fine silver to the assay previous to cupellation is to form an alloy in which the particles of gold will be so far apart that the nitric acid may have free access to all the silver contained, and thus insure its being dissolved, the gold meauwhile retaining the shape into which the strip was rolled. The rolled strip is now dropped into a flask or matrass containing 1 ounce of nitric acid (of 32°, Baume hydrometer), which has already been heated.

The assay is boiled in this acid for ten minutes, then the solution is poured off and the assay recharged with fresh acid of the same strength and boiled for ten minutes more. After this second boiling, the gold remaining, still retaining the form into which the strip was rolled before boiling, and technically termed a cornet, is washed with distilled water, then deposited in a small clay annealing cup or crucible, which is placed in the muffle and heated to redness, that the cornet may be thoroughly annealed.

This gold cornet is then weighed back, the resulting weight, less the silver surcharge remaining, being the gold fineness of the sample. The two samples taken from the bar must agree in fineness. If, in making up the assay, there have been three parts of fine silver added in place of two parts, then the assay is first boiled in nitric acid of 22° Baume for ten minutes, and then, on the second boiling, acid of 32° Baume.

Then, for the determination of the base metal and silver in the samples under consideration, one-half gram or 1000 weight of the metal, is taken, inclosed in a piece of lead foil, 40 grains ordinarily, or 80 grains if much copper is present in the sample. After the cupellation, the resulting button containing the gold and silver is weighed, the loss indicating the proportion of base metal. The fineness in gold having been ascertained from the weight of the cornets, the fineness of the silver is determined by deducting the combined weight of the gold and base metal from 1000.

Proof or test assays, the object of which is to detect any inaccuracies, accompany all assays of samples of bullion. These proofs for the gold assays are made from pure gold (1000 fine). For proof of base metal assays gold of 999 fineness, and for gold coin or ingot metal the proof is made from gold 900 fine, or of 900 parts in 1000.

The assays are usually treated together in sets, comprising assays of eight samples of different gold deposits. A proof accompanies each of these sets, and its fineness approximates the average fineness of the eight assays, if they do not greatly vary. Proofs accompanying the gold assays of crude gold deposits are usually made as follows: 1000 weight, or one-half gram of pure gold, is weighed up; to this is added 2000 of silver and 30 of copper, all of which is neatly rolled in a piece of lead foil weighing 40 grains.

Proofs for fine gold deposits—that is, gold 990 fine or more—are as follows: Pure gold weighed up 1000, silver 2000, copper 30, with 30 grains of lead. Proofs for coin metal: Pure gold 900, silver 1800, copper 100, with 60 grains of lead. Proof for base metal: Gold of a standard fineness is used, not necessarily 1000 fine; ordinarily the gold used in making this proof (999 fine) is made from cornets that have been melted. Of this gold a 900 weight is used, with 90 of silver, 10 of copper and 40 grains of lead. The exact amount of gold in the proof accompanying the assay for base metal being known, any deviation from this amount after cupellation is used in making the necessary correction upon the assay of the sample taken from the bullion deposit.

Example: If the base metal proof shows a loss of 8 in place of 10, which was the amount of copper added, and the assay of sample shows a loss of 30 after cupellation, then a deduction of 32 is made for the base in the sample. If the proof shows a loss of 12, and the assay of sample 30, then a deduction of 28 is made for the base. The proof accompanying the gold assay is to detect any possible inaccuracy which may occur either in cupellation or in dissolving the silver from the cornet, and also for affording a basis for the necessary correction for surcharge. The surcharge in an assay is the very minute amount of silver which still remains enclosed within the gold cornet, even after persistent boiling in nitric acid, and varies from two-tenths to eight-tenths of a thousandth—the smaller the amount of gold used in making up a proof or other assays the less the surcharge of silver will be.

When it is ascertained from the proof which accompanied the assays of the samples, and which received the same treatment throughout the operation, what the exact amount of silver retained by the proof cornet is, we then deduct this amount of surcharge from the absolute weight of each cornet resulting from the assays of the samples under treatment.

Example: Proof cornet weighs 1000.5, knowing we have weighed up but 1000 of pure gold, the .5 represents the surcharge; if the cornet from the assay of sample weighs 875.5, we should deduct .5, giving correct fineness 875.

As stated before, two samples are made from each deposit of gold, each sample being weighed and treated by different men in the department, neither having any knowledge of the other's results until the work is checked, and no one in the department being cognizant of the identity of the depositor until after the results are obtained.

If upon checking the results from the two assays of a deposit we find them to disagree, the deposit from which the sample was taken is remelted and well stirred to make a uniform mixture of the metal, which is again sampled and assayed.

In preparing gold or silver for coinage the proper amount of copper is added to the fine gold or fine silver, 10% of copper being used in either case. When this has been thoroughly melted and mixed it is cast into ingots. In case of gold the first and last ingot of each melt is taken to the assay department where a chip is taken from each for assay. The silver ingot melts are sampled previous to pouring into their respective moulds by dipping out a small portion of the molten metal and granulating it by pouring it into water; these granulations are dried and delivered to the assayer for examination by the volumetric method to be hereafter described. If the resultant assays of either kind of ingots show their fineness to be within the legal limit of variance the ingots are considered suitable for coinage, otherwise the melt is condemned and eventually remelted.

When a gold deposit contains platinum it may be detected by the peculiar dark amber color of the nitric acid when the silver is being dissolved from the cornet. If platinum is present the cornet after being annealed is again cupelled as before with the exception that four parts of silver are added to one part of gold present; this insures a more perfect separation.

There are two methods used for silver assaying—by cupelling with lead or by the humid or volumetric method. As the method by cupellation is too liable to inaccuracies, even when great precautions are taken in the work, it is only used as an approximation upon which to base the working of the humid assay. The button resulting from such cupellation must be parted to determine the amount of gold if any be present.

Humid assaying is a method of determining the amount of pure silver in an alloy by means of precipitation of the silver from a solution with a precipitating agent of a known strength. For this purpose a solution of chloride of sodium or common salt is used to precipitate the silver as a chloride.

Two solutions of different strengths are used. The first is known as the normal salt solution, the second, or weaker, the decimal salt solution.

First prepare a saturated salt solution by adding to water at a temperature of 60° F. all the salt it will dissolve; when saturated it will be of a density of 25° B.

The normal solution is prepared by adding 2.07 parts of saturated solution to 97.93 parts of water.

The decimal solution is prepared by adding 100 cubic centimeters of the normal solution to a liter flask and then filling the flask with distilled water, or in other words, making a solution of one part of normal solution to nine of water.

When the fineness of the silver is unknown an approximate assay is made by cupellation. If the approximate fineness is known, as in silver ingot metal, or in foreign coins or in fine silver, that is silver almost pure, then a previous assay by cupellation is not required.

As the normal salt solution is based upon the amount of solution required to precipitate one gram of silver, the unit of weight for silver assaying is one gram, or the 1000 weight. As the normal solution will vary from many causes it is necessary to test it often with a proof. This is done by weighing up 1002 weight of proof silver (1000 fine), placing it in a special bottle and dissolving in nitric acid. Then a pipette holding 100 cubic centimeters is filled with the normal solution, which is added to the contents of the bottle, the greater portion of the silver is converted to a chloride of silver, which will appear as a heavy, milky, white precipitate. After placing a glass or rubber stopper in the bottle it is shaken for four or five minutes, either in an agitator or by hand, after which the silver chloride will settle to the bottom, leaving the solution above perfectly clear for further test with the decimal solution.

If the normal solution were correct it would precipitate just the 1000 weight of silver, leaving two milligrams still in the solution, as we had weighed up 1002 milligrams. Now from a small pipette a cubic centimeter of the decimal solution is added. This precipitates one of the two milligrams of silver remaining, which appears as a white cloud of silver chloride in the clear solution above the chloride already thrown down.

After shaking the bottle and adding another charge of decimal solution, we will then suppose that no cloud appears. We then know that the normal solution has precipitated 1001 of silver instead of 1000. But suppose upon the second charge of the decimal solution a cloud representing a half a thousandth more shows, this indicates the normal solution, being only .5 too strong, for we weighed up for the proof 1002 of pure silver and find the normal solution has precipitated 1000.5, leaving 1.5 to be precipitated by the decimal solution; hence the difference between the 1002 and the 1001.5 shown by the working is the correction to be made for each assay.

By experience one becomes expert in determining the density of the cloud thrown down by the decimal solution whether it donates more or less than one. This greatly assists in the work. Now knowing the density or strength of our normal solution we can proceed with the assay of the sample.

As before stated the silver sample is taken from alloy while melted, a small portion being poured into cold water and granulated, two samples being taken from each melt. From these granulations, after being dried, the necessary amounts for duplicates are weighed up.

To determine the amount to be weighed up, take the resultant silver fineness obtained by the approximate assay and divide 1000 by this fineness.

For example, suppose that fineness to be about 900: Then 1000 divided by 900 gives as the result 1.111, or it requires 1.111 gram of the metal to contain 1 gram of pure silver, but on account of the uncertainty of the fineness obtained by the approximation assay, we weigh up 1.115 gram in preference. These calculations can be avoided by the use of tables, as contained in Mitchell's works on assaying.

After dissolving the silver in a bottle with nitric acid and charging with 100 cubic centimeters of normal salt solution, suppose we have to add 3 cubic centimeters of decimal salt solution to precipitate all of the silver, the working of the sample is expressed in the following proportion:

$$1115 : 1000 + 3 :: 1000 : 899.5,$$

and as the proof indicates that the normal solution precipitates 1000.5 of silver, we then make correction of .5 on the working assay resulting in a true fineness of 900.

By referring to the tables before mentioned, the calculation to obtain the fineness is not necessary, but will be found opposite the amount indicating the weight used in the assay.

If the weight of the alloy taken for assay was not sufficient to contain 1000 of silver, then when the decimal salt solution charge is added no cloud of silver chloride will appear. In this case a solution of decimal nitrate of silver is used, of which each cubic centimeter will neutralize one cubic centimeter of the decimal salt solution. This is working in a descending scale and is not so desirable as working by the decimal salt solution, for the assay solution after shaking is not so clear, making it more difficult to read the cloud. If mercury is known to be present in the sample of silver, the addition of acetate of

soda to the assay will cause the mercury to remain in solution.

When the alloy contains other metals which prevent the solution in the bottle from becoming clear after shaking, we sometimes use a different method known as the synthetic humid assay, in which 500 weight or 1000 weight of the alloy is used and sufficient pure silver is added to make up a full gram for precipitation. If 500 is used, subtract the amount of pure silver added and multiply for the full gram; if 1000, simply subtract the silver added from the result.

When the silver also contains gold, an assay is also made for the gold by cupelling 1000 gold weight half a gram and then parting the button.

Proof gold is prepared by dissolving the gold cornets in nitro-muriatic acid—one part of nitric to two of muriatic acid—allowing to stand for several days to allow any silver present to settle. Then it is decanted carefully, the last portion being diluted with water and filtered. The solution of gold chloride is then evaporated partly till there is not so large an amount of free acid present. This gold solution is then diluted with water, and dropped slowly into a vessel containing pieces of pure aluminum which converts the chloride of gold to metallic, after being washed, and any particles of metallic aluminum present being dissolved with more muriatic acid, it is again washed and melted, and rolled into thin strips for use.

The proof silver is prepared by dissolving fine silver in nitric acid, then precipitating as a chloride. This chloride of silver is either converted into metallic silver with aluminum in the presence of free muriatic acid, or is reduced to metallic silver with carbonate of potassium, then rolled into strips for use.

Consumption of Zinc in Cyanide Plants.*

NUMBER III.

Written by WALTER H. VIRGOE.

At the commencement of this paper it was stated that silver product was always much finer than gold product, and, consequently, much easier to reduce. On a plant situated in the State of Michoacan the cost of reducing metallics, exclusive of labor, fuel and crucibles, is 2.27 cents (Mexican) per fine ounce of bullion produced, and the cost of reduction of fines is not more than 29.28 cents per kilo of fine bullion produced. On another plant in the Territory of Tepic the total cost, inclusive of labor, fuel, crucibles, etc., is only 23 cents (Mexican) per kilo, and at this latter plant no metallics are produced which can not be returned to the boxes, and the product consisting of that material which will pass a 12-mesh screen has an initial fineness of 80% to 90%. Both the above-mentioned plants are treating chloridized ores.

A good deal has been said about the fouling of solutions by zinc, but no instance of fouling has so far fallen under my personal observations where the falling off of extractions could be attributed to zinc in solution. Such cases may occur when plant solutions are deficient in alkali in the form of lime.

A good deal has also been written and said about the great need that exists for a method to determine "available cyanide" in a plant solution in place of the present method, which determines free cyanide and part of the cyanide in combination with the zinc, or all that latter cyanide if much free alkali be present; although it is undoubtedly advantageous to know how much cyanide is present as free and how much as combined, yet at the same time the value of the cyanide combined with the zinc as available cyanide is very much underestimated, and practical results would be but little affected were such a method devised and in general use.

It has been known for years that zincic-potassic-cyanide is a solvent for gold and silver and an excellent solvent in the presence of lime or other alkali. The cuprons-potassic-cyanides are likewise solvents, as the author has pointed out in a previous paper, but they are, as would be expected, much less efficient than the zinc salt.

It is proposed, therefore, to take up the cudgels in defense of this salt and to show that its presence in solution is, if anything, more advantageous than harmful. The titration of a solution of zincic-potassic-cyanide depends entirely upon the degree of dilution of the solution. If a solution of zincic-potassic-cyanide be titrated, the cyanogen contents of which form the equivalent of 1% KCN, the yellow iodide color forms when about one-fourth of the cyanide has been titrated, indicating that the salt apparently splits up in this way:

$$2(Zn Cy_2\ 2KCy) + Ag\ NO_3 = 2(Zn\ Cy_2\ KCy) + AgKCy_2 + KNO_3.$$

Upon standing a few moments, the yellow iodide disappears and the solution clears up, and, if further $AgNO_3$ be added, the yellow cloud of silver iodide will again form and again gradually disappear until the full amount of silver nitrate has been added to combine with the 2KCy.

With dilute solutions the titrations are very unsatisfactory; it seems as though silver iodide is somewhat difficult of solution in dilute solutions, consequently, the more dilute the solution of this salt titrated, the greater the error of titration.

These remarks, of course, apply to the titration of this salt in the absence of alkali.

Where the phenomena of the clearing up of a solution, after the final titration point had apparently been reached, is observed in titrating a plant solution, the cause may be attributed to the presence of considerable zinc and lack of alkali in the solution.

Again, it is hardly necessary to point out that the zinc salt is titrated to a degree which depends upon the sufficiency or insufficiency of the amount of free alkali present. If the alkali be lime, one molecule of the zinc salt requires the presence of two molecules of lime, and the equations are, therefore, probably as follows:

1. $2(ZnCy_2.\ 2\ KCy) + 4\ Ca(OH)_2 + 2\ AgNO_3 = 2\ ZnCaO_2 + 2\ AgKCy_2 + 2\ KNO_3 + 2\ CaCy_2 + 4\ H_2O.$

2. $2\ AgNO_3 = 2\ CaCy_2 = Ag_2CaCy_4 + Ca(NO_3)_2.$

A plant solution should contain, if possible, sufficient alkali, in my opinion, to fulfill the needs of the above equation—that is to say, there should be at least one pound of lime in solution to every one-half pound of zinc.

In order to be sure that the solution contains the requisite amount of lime, the author advocates titrating the plant solution with and without the addition of lime water or a solution of soda or potash, and, if any difference be observed, adding the alkali till a constant reading is obtained. By this means the operator will find out how many pounds of lime of a known degree of purity should be added to each ton of his solution.

The author has never found in practice that the zinc in solution has any tendency to accumulate above a certain point, and, since this is the generally recognized state of affairs, if at any normal period in the working of a plant extractions should be correct with this amount of lime in solution, any subsequent falling off of results should be attributed to some other causes than to the results of titration. To make it more clear, a plant may start up with a 2% solution and the extractions may be 86%, there being plenty of lime in the solution; later on, when a normal period is reached, and the solutions contain the normal amount of zinc, titration results will record the strength of the plant solution as free cyanide plus combined cyanide in a more or less regular proportion. If the extractions are somewhat lower than they should be the strength of the solution might be raised to, say, 0.25%, when, if the extractions regain their original degree, there is no reason why they should not remain so since the zinc does not accumulate.

It has often been remarked that the addition of alkali to a plant solution entails usually a decrease in the percentage of silver values extracted while reducing the consumption of cyanide. The occurrence of such a phenomenon is due to the fact that the solution, having become deficient in alkali, titration results would record all free KCy and only a small part of that combined with the zinc in solution; the addition of free alkali would cause the recording as free cyanide of a larger percentage of combined KCy, and zincic-potassic-cyanide being a poor solvent for silver, the extractions of this metal would be liable to be lowered, and there would be an apparent decrease of cyanide consumption for the time being.

With reference to the extracting power of $(ZnCy_2)$ zinc-potassic-cyanide, 2 KCy, upon gold and silver in ores, Table No. 1 illustrates this, being a comparison of results obtained with a solution of this salt with and without the addition of lime and a solution of plain KCN.

The value of the addition of the alkali is obvious, and this salt is an excellent solvent for gold, though comparatively not so good a solvent for silver, even in the presence of lime, though this may be simply a question of duration of treatment. Without lime less

*Jour. Chem. Met. and Min. Soc., S. A. (Condensed.)

TABLE No. I.—TABLE SHOWING COMPARISON OF EXTRACTIONS AS AFFORDED BY SOLUTIONS OF POTASSIUM CYANIDE, ZINCIC-POTASSIC-CYANIDE AND ZINCIC-POTASSIC-CYANIDE PLUS LIME.

Number.	Weight. Ore, gms.	Weight. Sol., gms.	Reagents Used.	Strength. Before, %.	Strength. After, %.	Cyanide consumption, lbs.	Heads. Au.	Heads. Ag.	Heads. Total.	Tails. Au.	Tails. Ag.	Tails. Total.	Extraction. Au.	Extraction. Ag.	Extraction. Total.	Remarks.
1	100	100	KCy	11	06	1 0	$8 57	$0 66	$9 23	$1 24	$0 28	$1 52	85	57	83	The ore treated being a clean quartz carrying the gold in a fine state of division.
			$ZnCy_2.2KCy$	11	09	0 4	8 57	0 66	9 23	4 78	0 51	5 29	44	23	42	
2	100	100	KCy	22	11	1 6	8 57	0 66	9 23	0 98	0 23	1 10	89	65	87	Ditto.
			$ZnCy_2.2KCy$	22	20	0.4	8 57	0 66	9 23	4 55	0 47	5 02	47	28	45	
3	100	100	$ZnCy_2.2KCy + CaO$	11	.10	0.2	8 57	0 66	9 23	1 75	0 48	2 23	80	27	76	Crystals of the zinc salt were dissolved in a saturated solution of lime water in these two tests.
			$ZnCy_2\ 2KCy + CaO$	22	.21	0 2	8 57	0 66	9 23	1 86	0 45	2 31	78	32	75	

TABLE No. II.—TABLE SHOWING COMPARATIVE EXTRACTIONS AS AFFORDED BY SOLUTIONS OF ZINCIC-POTASSIC-CYANIDE AND POTASSIUM CYANIDE ON ORES OF DIFFERENT CLASSES.

Number.	Weight. Ore, gms.	Weight. Sol., gms.	Reagent Used.	Strength (on ore). Before, %.	Strength (on ore). After, %.	Cyanide consumption, lbs.	Heads. Au.	Heads. Ag.	Heads. Total.	Tails. Au.	Tails. Ag.	Tails. Total.	Per Cent Extraction. Au.	Per Cent Extraction. Ag.	Per Cent Extraction. Total.	Nature of Ore Treated.
1	100	200	KCy	.33	.27	1.2	$14 04	$7 66	$21 70	$1 03	$1 82	$2 85	92	77	87	Very fine quartz mixed with considerable schistose slimes. Silver, principally as sulphide, partly as chloride and bromide.
			$ZnCy_2.2KCy$	.33	.27	1.2				1 21	3 97	5 21	91	48	76	
2	100	200	KCy	.80	.40	8.0	0 52	3 40	3 92	trace	0 70	0 70	....	80	83	Pyritic quartz tailings, somewhat decomposed.
			$ZnCy_2\ 2KCy$	.80	.76	0.8				trace	0 97	0 97	....	72	76	
3	100	200	KCy	1.60	.20	16.0	0 50	10 00	10 50	.....	2 17	2 17	....	79	80	Quartz tailings containing much oxidized iron and manganese, heavy consumption of cyanide being due to this latter metal.
			$ZnCy_2.2KCy$	1.00	.50	10.0				.....	4 05	4 05	....	60	62	
4	100	200	KCy	.8	.52	5.6	19 21	32 03	51 24	5 99	22 80	28 79	69	29	44	Pyritic quartz ore containing considerable base metals—zinc, lead, manganese, etc.; silver present as sulphide.
			$ZnCy_2.2KCy$	.8	.58	4.4				7 63	21 35	28 98	61	34	44	
5	100	200	KCy	.8	.74	1.2	3 52	1 81	5 33	0 05	0 57	0 62	99	69	89	Clean quartz tailings; silver present as sulphide.
			$ZnCy_2.2KCy$	.8	.78	0.4				0 62	0 71	1 33	83	61	76	
6	100	150	KCy	.6	.43	3.4	2 89	17 60	20 49	0 05	5 22	5 27	99	71	75	Clean quartz tailings, containing small quantities of base metals.
			$ZnCy_2.2KCy$	.6	.51	1.8				0 42	9 81	10 23	86	45	51	
7	100	100	KCy	.11	.06	1.0	8 57	0 55	9 12	1 24	0 28	1 52	85	49	83	Clean quartz ore free from base metals; solution saturated with lime.
			$ZnCy_2.2KCy$	.11	.10	0.2				1 75	0 48	2 23	80	13	76	

NOTE.—4% CaO added to the first six experiments; tests, forty-eight hours' agitation.

TABLE No. III.—TABLE SHOWING RESULTS OF BOTTLE AGITATION TESTS CONDUCTED WITH SOLUTIONS OF POTASSIUM CYANIDE CONTAINING VARYING AMOUNTS OF ZINCIC-POTASSIC-CYANIDE.

Test No.	Weight of Ore, grm.	Weight of Sol'n, grm.	Per cent of CaO added to ore.	Reagent Used. KCy, %.	Reagent Used. KCy as $ZnCy_2.2KCy$, per cent.	Reagent Used. Total KCy, per cent.	Reagent After Use. Total KCy, %	Cyanide consumption, lbs.	Heads. Au.	Heads. Ag.	Heads. Total.	Tails. Au.	Tails. Ag.	Tails. Total.	Per Cent of Extraction. Au.	Per Cent of Extraction. Ag.	Per Cent of Extraction. Total.
1	100	100	.5	.40	.00	.4	.38	.4	$11 16	$1 73	$12 89	$2 68	$0 50	$3 18	76	71.1	75.4
2	100	100	.5	.35	.05	.4	.38	.4	11 16	1 73	12 89	2 48	55	3 03	77 8	68.3	76.5
3	100	100	.5	.30	.10	.4	.38	.4	11 16	1 73	12 89	2 89	58	3 47	74 2	66.5	73.1
4	100	100	.5	.25	.15	.4	.38	.4	11 16	1 73	12 89	2 89	58	3 47	74 2	66.5	73.1
5	100	100	.5	.20	.20	.4	.38	.4	11 16	1 73	12 89	2 89	59	3 48	74.2	65.9	73.1
6	100	100	.5	.15	.25	.4	.38	.4	11 16	1 73	12 89	3 30	59	3 89	70.5	65.9	69.9
7	100	100	.5	.10	.30	.4	.38	.4	11 16	1 73	12 89	3 51	60	4 11	68.6	65.4	68.2
8	100	100	.5	.05	.35	.4	.38	.4	11 16	1 73	12 89	3 71	62	4 33	66.8	64.2	66.5
9	100	100	.5	.00	.40	.4	.38	.4	11 16	1 73	12 89	3 92	71	4 63	64.9	59.0	64.1

cyanide is available than with lime, as the following equations show:

$$1.—2(ZnCy_2 2KCy)+2Au+H_2O+O \quad 2AnKCy_2+ ZnCy_2+ZuK_2O_2+2HCy.$$

$$2.—H_2O+2(ZnCy_2 2KCy)+2An+O+3Ca(OH)_2= 2(AnKCy_2)+ZnK_2O_2+ZnCaO_2+ 2CaCy_2+4H_2O.$$

Again, Table No. 2 illustrates the action of zinc-potassic-cyanide in comparison with pure solutions of cyanide upon different classes of ore. Thus it is seen how excellent a solvent this salt is in certain cases, and how the extractions are accompanied with a much lower cyanide consumption.

Table No. 3 illustrates the solving power of a solution of cyanide containing lime, the solvent being in test No. 1 plain cyanide, in test No. 9 plain zincic-potassic-cyanide, and in the intermediate tests cyanide partly free and partly combined in varying proportions. These are the results of thirty-hour bottle tests.

When leaching tests are made in a laboratory on a small scale it is observed that even if glazed earthenware vessels be used, and every precaution taken, the recorded consumptions are greatly in excess of those shown by bottle tests, which approach very closely to practical results. On all plants the initial consumptions are much higher than those recorded after a few weeks of running. If a little zincic-potassic-cyanide be added to the solutions of the laboratory tests there is apparently much less oxidation of the solutions and the cyanide consumption is considerably decreased. Therefore, much of this initial consumption on new cyanide plants, hitherto attributed to absorption by new tanks, etc., is caused by oxidation of the solutions, and as the solutions gradually take up zinc the consumption of cyanide decreases till it reaches its normal level, the solutions being protected in some way by the presence of this salt, and, therefore, it might be highly advantageous in some cases to add zincic-potassic-cyanide to fresh solutions, and, of course, the requisite amount of lime, especially on such plants where the conditions produce a very small chemical consumption of zinc.

(TO BE CONTINUED.)

New Method of Extracting Copper from Sulphide Ores.*

Written by GUSTAVE GIN.

An aqueous solution of sulphur dioxide possesses the property of attacking oxide and carbonate of copper, forming an unstable sulphite of the binoxide, which is gradually transformed into a mixture of cupro-cupric sulphite and sulphate, according to the reaction:

(1) $3CuO + 3SO_2 = 3CuSO_3$

(2) $3CuSO_3 + CuO = Cu_2SO_3, CuSO_3 + CuSO_4$

Cupro-cupric sulphite ($Cu_2SO_3, CuSO_3$) is only slightly soluble in water, but is easily soluble in solutions of sulphurous acid or cupric sulphate. On heating the solution to 180° C. (under a pressure of 10 kg.) it loses sulphurous acid, while cupric sulphate and metallic copper are formed:

(3) $(Cu_2SO_3 + CuSO_3) = 2Cu + CuSO_4 + SO_2$

If the formulæ 1, 2 and 3 be grouped together, it appears that the reactions correspond to

$$4CuO + 2SO_2 = 2Cu + 2CuSO_4$$

That is, half the copper can be obtained in the metallic state and the other half in the form of sulphate.

On the above principles a new process for the treatment of copper ores has been devised. In this the ore is roasted in such a manner that the whole of the sulphide of copper is transformed into dioxide or sulphate and the whole of the iron into peroxide. Then it is lixiviated by means of a solution of sulphurous acid prepared in the ordinary manner from the fumes given off during the roasting. A saturated solution of cupro-cupric sulphite and sulphate of copper is obtained, containing at the same time a certain proportion of ferrous sulphite and sulphate. The ferric sulphite in the presence of an excess of sulphurous acid is transformed according to the reaction.

$$Fe_2O_3, SO_2+SO_2=FeSO_4+FeSO_3.$$

The saturated solution of the salts of copper and iron is pumped into a copper boiler, where it is heated to 180° C., by which a pressure of 10 kg. is produced. At this temperature the sulphite and the ferrous sulphate are completely insoluble and are precipitated. The cupro-cupric sulphite is dissociated and loses two-thirds of its copper in the metallic state and at the same time sulphate of copper is formed.

The cloudy liquor is forced by its own pressure through a filter-press heated by steam circulating around the plates. In this manner a solution of sulphate of copper is obtained, which can be cemented or treated for crystallized sulphate, and a precipitate containing metallic copper, and sulphite and sulphate of the protoxide. This precipitate is washed with pure water, which becomes saturated with sulphate; the latter may be extracted by crystallization. The residual sulphite is then oxidized by moist air and gives sulphate of the protoxide, which can be eliminated by a fresh washing, and there remains finally metallic copper of great purity, which is melted and run into ingots.

*Trans. Congress of Applied Chemistry, Berlin.

Equipment of the Sultan Mine, Arizona.*

Written for the MINING AND SCIENTIFIC PRESS by CHARLES E. BUNKER, Construction Engineer.

The Sultan mine, operated by the Golden Link M. Co., is located in Yavapai county, Arizona, in nearly a westerly direction from Prescott, and 19 miles from Hillside station, on the Santa Fe, Prescott & Phœnix Railroad. It is on the western slope of the Santa Maria river, in what is recorded the Enreka mining district.

The surface equipment consists of a 20-stamp mill, 75-ton cyanide plant, a pumping station and power house.

All foundations are made of concrete. The retaining wall below the batteries is concrete in the proportions of 285 pounds of Portland cement to four parts of sand and eight of broken rock (by measurement) to the cubic yard. The retaining wall under the ore bin is of the proportions of 380 pounds of cement to the cubic yard—with the proportion of sand and broken rock the same as in the lower wall. The retaining wall back of the power house is in the same proportions as the lower wall.

The battery blocks are solid concrete. The base which extends the entire length of the twenty stamps to the height of the line sills is one solid masonry block, 6 feet deep by 13 feet wide by 31 feet long. On the front side of this base are built the mortar blocks proper, which are 8 feet on the base battering on front and back sides to 4 feet 11 inches on top and 4 feet high. These top blocks were constructed after the battery posts and line sills were in place by building a form between them and tamping it full of concrete. The concrete is mixed in the proportions of 400 pounds of cement to four parts of sand and eight of broken rock (by measurement) to the cubic yard.

The engine foundation is 7 feet deep by 8 feet wide by 25 feet long. The concrete is in the proportion of 285 pounds of cement to the cubic yard, the proportions of sand and gravel being as elsewhere.

The dynamo, air compressor, feed-water heater and feed-water pump are all on concrete foundations. The pillow blocks and floors in and about the plant are concrete, faced with cement. The floors, pump foundations and retaining walls at the cyanide plant are also of solid concrete of about the same proportions as given above.

The battery frame is of the "back-knee" type. The back knees form the line sills on which the ore bin rests. The ore bin is 30 feet long by 16 feet high, by 16 feet wide, with a 45° angle brace in the lower back corner, which supports the floor joist. There are also in each bent a 10x12 45° angle brace in the upper corners of the bin, securely drawn together with 1-inch bolts for the purpose of eliminating the vibration imparted to the structure as far as possible by the rock breaker, which rests on the caps of the bin—an arrangement which is to be condemned in all mill construction wherever possible. In this particular case, it was imperative that the breaker be so placed. The crusher is a 9x15 inch Blake. It weighs ten tons, so it is easily understood what the vibration might be when the crusher is in operation.

The mortars are of the Homestake pattern, and each weighs 6300 pounds. They are narrow and designed for fast crushing. The dimensions in the bottom of the mortars above the false bottoms are 10½x50 inches. At the line of discharge the width is 15 inches.

The stems are of the Allis-Chalmers special mild steel, 3½ inches in diameter by 14 feet 6 inches long, tapered on each end. They are spaced in the mortar with 10-inch centers. The stamps, including stem, tappet, bosshead and new shoe, weigh 1000 pounds.

The two cam shafts are of the best hammered iron, 6 inches in diameter. Each carries ten cams, which are provided with the patent eccentric fastening device of the Blanton type. The cams and tappets are of chrome steel. The order of drop of the stamps is 1, 3, 5, 2, 4, which is not to be recommended in any case, as it tends to cause the pulp to bank in one end of the mortar, thus allowing the stamps in one end of the mortar to "pound iron" while the other end is chocked up, doing little if any work. The order of drop to be universally recommended is 1, 5, 2, 4, 3 in a battery of five, or, in a battery of ten, 1, 6, 5, 10, 2, 7, 4, 9, 3, 8, that is, supposing the stamps to be numbered consecutively from one end in the battery from one to ten.

The rock breaker and cam shafts are driven by rubber belting from pulleys on one main line shaft, which is a continuation of the engine crank shaft. This shaft rests on concrete pillows and the line sills of the battery frame, and is situated directly back of the mortar blocks, under the feeder floor.

The copper plates in front of the mortars are 16 feet long and 5 feet wide, and are plated with two ounces of silver to the square foot. The plates have a grade varying with the length, that is, the plate is sprung to form a gradual decreasing grade. At the head near the mortar the grade is 1¾ inches to the foot. At the lower end the grade is 1½ inches to the foot. The idea of the decrease in grade is that as the natural rate of flow of the pulp is increased it is also retarded by less grade so the flow is maintained at about a constant velocity over the entire length of the plate.



Riveting Solution Tank, Sultan Mine, Arizona.

The clean-up pan is to the right of the north battery and in front of the clean-up room. It is 30 inches in diameter, and provided with an adjustable grinding muller with chrome steel shoes. The clean-up room is provided with hot and cold water, tables and clean-up tub for washing screens and panning sands, also an amalgam safe and quicksilver trap.

The power house is divided into the boiler-room and engine-room. In the boiler-room is a nest of two 60-inch by 16-foot horizontal tubular boilers, each rated at 80 H. P. capacity. The boilers are set in rubble lined throughout with fire brick. Each boiler is fitted to burn oil.

The oil is fed to the boiler at a constant temperature and pressure by a compact and neatly designed fuel oil circulating system. Under one boiler are two burners, with circular orifice. Under the other is one burner with a rectangular orifice. As to the merits of the two burners our limited experience so far has proven the former burner to be superior in many ways.

The boiler feeder is a 5¼x3½x5-inch duplex steam pump supported on a concrete block. The boilers are also provided with a feed water injector. All feed water before entering the boilers passes through a tubular heater, through which all exhaust steam from the Corliss engine, air compressor and feed pump passes. All piping, with the exception of the main 4-inch steam pipe in the boiler room, is laid in conduits below the concrete floor. Either boiler has sufficient capacity to operate the entire plant. With

*See illustrations front page.

this flexibility one boiler is always in reserve.

The engine room contains all of the power motors with the exception of the pumps. The Corliss engine is a 10x16x30-inch tandem compound, built by Allis-Chalmers, and rated at 120 H. P. when running at 106 revolutions per minute. The steam is taken into the high pressure cylinder at 125 pounds pressure and exhausted to the low pressure cylinder at 45 pounds pressure.

The air compressor is a 10x10x12-inch simple slide valve engine, governed by a combined air-steam governor. The compressor is run to carry an air pressure of between forty and seventy pounds for operating the filter presses at the cyanide plant. In the engine room is an electric 50 H. P. dynamo, which runs at 1200 revolutions per minute. It is driven by a 10-inch double leather belt from a countershaft running overhead and above the ceiling. The dynamo furnishes lights and power to operate the electric pumps at the pumping station 1 mile below the power house. The foundations of the engine room, as already stated, are of concrete. All piping and electric wiring are laid below the floor. The floor is paved in diagonally laid squares, with a tiling around the outer edge of the room. The room is ceiled throughout with double-beaded ceiling, and is lighted by four skylights and two double mullion windows.

(TO BE CONTINUED.)

Mining on Douglas Island, Alaska.*

Written by ROBERT A. KINZIE.

The chutes employed in the Treadwell mines of Alaska are of unusual construction. The cuts show the features of the so-called finger chute which is used throughout the island when a large amount of coarse rock is to be handled. The fingers are held in place by the weight of an arm B and are separately swung from the rod c c, so that the motion of each is independent of that of the other. For the purpose of raising the fingers so that the ore can be drawn, to the top of each finger is fastened a piece of rope. These pieces are brought to a common center and fastened to the main hoisting rope, which passes over a pulley in the top of the drift and thence down to a small windlass. When ore is to be drawn the fingers are raised to the height necessary to allow the ore to pass. When enough ore has been drawn the fingers are released and fall into position, stopping the flow. If a large piece is caught on the lip of the chute it will hold only the finger or fingers that come in contact with it, while the others drop to their normal position. To prevent fine dirt dripping into the roadway, a tailboard is put across the mouth of the chute and held in position by the angle irons D.

The cost of putting up chute raise, cutting station, and installing finger chute complete, is as follows:

Twelve feet of raise at $9 per foot	$108 00
Eighty cars of dirt at 20 cents	16 00
Cutting chute station for windlass	40 00
Forty cars of dirt at 20 cents	8 00
Building finger chute	17 58
Lumber (700 feet, board measure, at $12)	8 75
Iron and steel	40 00
Blacksmith work	7 00
Rope	2 00
Total cost	$247 33

The principal advantages gained by using the finger chutes are dispatch in loading and freedom from blocked chutes and spilling ore on the tracks. Their cost is prohibitive except where a large amount of coarse, dry rock is to be handled, and in the Ready Bullion and Mexican mines they have been in a great measure superseded by the common board chute, which costs much less. In the Treadwell they alone are used, and they are being put in at intervals of 20 and 15 feet, instead of 30 feet, as heretofore. The additional expense of putting in finger chutes every 15 feet, instead of every 30 feet, is $8.33 per foot of drift. The saving in shoveling in a stope 60 feet wide would be $12 per foot, making a saving of $3 67 by additional chutes, to which must be added the advantage of not losing time by chutes getting blocked. With chutes 15 feet apart, the train can move with brief stops and be practically drawing from the same part of the stope. The blocked chute can be freed by one man and not delay the train more than ten minutes. Also, in case the back of the stope should become so bad that men could not get in to work the ore into chutes, more than twice as much could be drawn from the stope with chutes 15 feet apart.

A modification of the finger chute is used for the skip and bin chutes. They are made with six fingers and are 6 inches wider than the ordinary chute. A trough is added to carry the ore from the lip to the edge of the shaft. It is 9 feet long and 3 inches wide, with an inclination of 36°, so that the ore will run freely from the lip to the skip. Attached to the end of the trough is a hinged door made of ¼-inch steel plate. When raised it immediately and entirely stops the flow, and allows the trough to be filled in readiness for loading the next skip. It takes, on an average, twenty seconds to load a four-ton skip and make everything clear for hoisting.

Table I gives the duty of machine drills in the different characters of work for which they are employed.

TABLE I.—SHOWING DUTY OF MACHINE DRILLS ON DOUGLAS ISLAND, ALASKA. "B."

Mine.	Character of Work.	Average Number of Feet Drilled per Machine Drill per Ten-Hour Shift.	Pounds of Powder Used per Machine Drill per Ten-Hour Shift.	Average Number Tons Broken per Machine Drill per Ten-Hour Shift.	Average Cost per Machine Drill in Ten Hours. Labor-Drilling.	Explosives.	Drill Sharpening, Repairs, Power, Etc. Supplies.
Treadwell Mine.	Pits	36 35	15 89	69 69	.....	$2 50	.....
	Stopes	28 69	12 53	31 96	.....	1 97	.....
	Cutting Out	25 16	11 45	12 70	.....	1 89	.....
	Drifting	38 22	16 73	9 60	.....	2 63	.....
	Raising	34 18	11 95	7 60	.....	2 35	.....
	Shaft Sinking	34 12	13 05	9 28	.....	2 15	.....
Totals		32.30	14 13	39 67	$7.87	$2 22	$2 10
Mexican Mine.	Pits	31 61	15.64	49 70	.....	$2.46	.....
	Stopes	31 78	13 90	36 10	.....	2 26	.....
	Cutting Out	31 40	13 74	18 40	.....	2 23	.....
	Drifting	46.83	17.86	11.40	.....	2 91	.....
	Raising	35.29	15 44	11 23	.....	2 51	.....
	Shaft Sinking	41.00	17.92	20 92	.....	2.92	.....
Totals		34.59	15 13	25 52	$7 95	$2 46	$2.23
Ready Bullion Mine.	Pits	39.63	17 34	197.06	.....	$2.82	.....
	Stopes	29.85	12 96	38.01	.....	2 11	.....
	Cutting Out	26.23	11.48	17.06	.....	1.87	.....
	Drifting	30.16	13.19	10.33	.....	2.15	.....
	Raising	26.44	11.57	6.96	.....	1.88	.....
	Shaft Sinking	26.80	11.72	15.21	.....	1.91	.....
Totals		28 58	12 49	28 19	$7.03	$2.03	$3.02
700-Foot Mine.	Pits	36.41	15.92	55 15	.....	$2.59	.....
	Stopes	29.26	12.81	35 68	.....	2 09	.....
	Cutting Out	26 00	11.37	12 40	.....	1.85	.....
	Drifting	38.00	17.12	15.64	.....	2 71	.....
	Raising	33.50	14 70	8 60	.....	2.39	.....
	Shaft Sinking	32.16	14 07	20 50	.....	2.29	.....
Totals		31.33	13.72	27.41	$6.48	$2 23	$3.23
Av. Totals.		31.92	13.96	33.51	$7.58	$2.27	$2.42

Under the heading "Pounds Powder Used per Machine Drill per Ten-Hour Shift" is given the actual amount of powder used for blasting the holes drilled, but it does not include powder used for bulldozing, blasting chutes, etc. The cost of this powder is given under the head of "Explosives." It varies with the different mines, and from month to month in the same mine, according to the varying expenses of handling and sales of powder to outside parties.

The "Labor-Drilling" cost is given in the actual expense of machine men and helpers. The men do a great deal of the paring down and trimming, and the above cost will vary accordingly.

The last column, "Average Cost per Machine Drill in Ten Hours," gives the cost of drill sharpening, repairs, power, and all other costs not included under the heads of "Labor-Drilling" and "Explosives."

TRAMMING.—At present there are three methods of tramming in use—by hand, with horses, and by endless rope haulage.

When the tramming is done by hand one man loads a car, pushes it to the ore bin, dumps, and returns it to the chute. Ordinarily there are several men tramming from the same chute, and a great deal of time is lost by awaiting their turn to load; and, again, at the bin there is another wait until the last car is dumped before starting on the return trip.

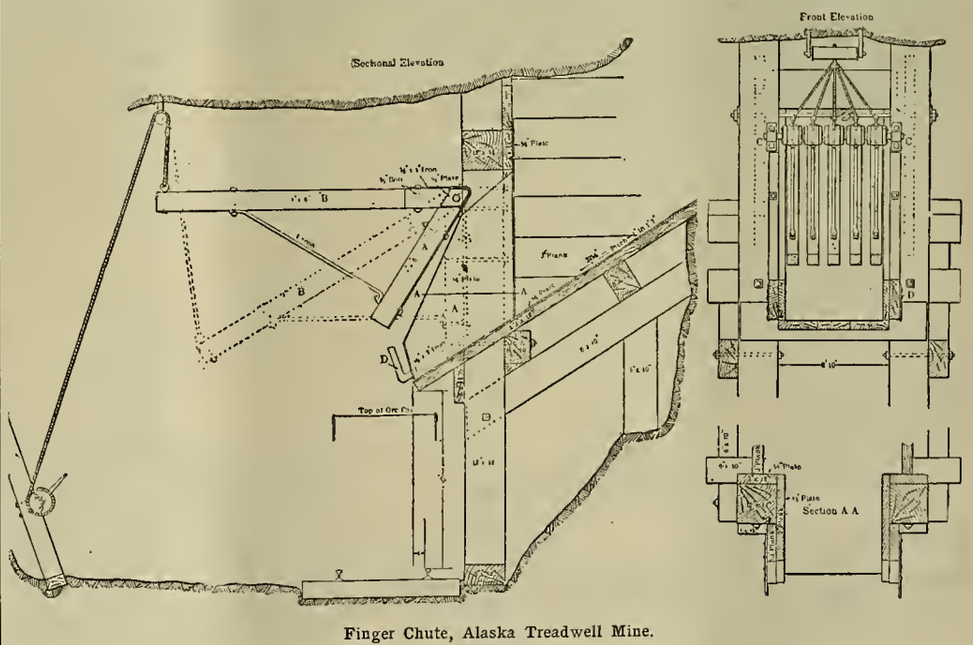
By using horses the lost time is minimized by making up two or more trains of eight cars each, so that when one train is dumping another is loading and the third is on the way.

While there is a marked saving in men by using horses, their first cost is considerable, a horse costing $180 delivered; and their depreciation is another factor to be considered, for they are continually meeting with accidents, which either disable them permanently or lay them off at a cost of $1 a day for maintenance.

By the use of mechanical haulage both the lost time and cost per ton has been greatly reduced. The system is essentially the so-called tail rope system in use in numerous places, but modified to make it conform with underground conditions. On the hanging wall side of the ore bin is situated a double-drum winding engine, size of cylinders 7 inches by 10 inches, with drums 2 feet 8 inches in diameter. Set directly in front of and close to the engine are four posts. Two are designed to carry a sheave suspended on a horizontal axle, for guiding the upper rope and causing it to wind smoothly on the drum, while the remaining two support a roller which answers the same purpose for the lower rope. From the drum to the point where the drifts branch out the upper rope is supported by snatch blocks suspended from the back of the drift and by sheaves at the ends of arms securely fastened to 10x10-inch posts. A horizontal sheave is placed at the point where the direction of the rope is changed to allow it to enter the drift. Since this sheave is subject to severe strains, it should be held rigidly in place by horizontal 10x10-inch pieces securely bolted to the 10x10-inch posts. From this point to the end of the drift the upper rope is carried by sheaves fastened to the posts of the finger chutes, immediately under the protruding lip, where it will be out of the way and at the same time protected from blasting. The sheaves are inclined so that the greatest strain is at right angles to the axles, and the rope prevented from jumping out by pegs placed across the top of the sheave. The lower rope is kept in line by a series of horizontal sheaves fastened to blocks, their number depending on the crookedness of the tunnel; and it is prevented from dragging on the ground by iron rollers placed between the tracks.

The lower sheaves are placed as near the track as possible, and are mounted on pieces of 10x10-inch timber securely braced against the side of the tunnel. To guide the rope into the sheave the front end of the block is beveled off to the height of the rail. On the top of the sheave is a piece of wrought iron, its object being to prevent the rope from jumping out and also to hold the axle in a vertical position. At the ends of the various drifts, or at convenient points in them, is placed a series of sheaves, or a single sheave, as the case may be, to carry the end loop of the rope. At first was tried a sheave mounted on a truck and fastened by clamps to the rails, but this proved a failure on account of the great strain, pulling up the track and doing other damage.

For purposes of signaling, two bare iron wires are run the entire length of the tunnel. These wires are parallel and 4 inches apart. At the winding engine they connect with a bell and signal light, while the current is obtained from the electric light circuit. The signals are given by placing an iron candlestick across the two wires or by means of a special portable signal device. As the wires are bare, signals can be given from any point, which is a great convenience in case of the train jumping the track or other accident. Two trains are used on each level, consisting of seven cars, each car holding 1½ ton. While one train is discharging at the shaft ore bin the other is loading. The trains are run at a maxi-



Finger Chute, Alaska Treadwell Mine.

*Trans. Am. Inst. Min. Engs. (Condensed.)

mum speed of 800 feet per minute, and at present their capacity is 750 tons of ore per shift, or 1500 tons per day.

SAMPLING, MAPS AND ASSAYING.—Close attention is paid to sampling and recording the assay value of the ore. As a drift, raise, crosscut or other development work is in progress, a sample is taken after each round has been blasted. These samples are taken by either the shift boss or the foreman, and their description and location are recorded on a special tag, enclosed with the sample in the sack.

At intervals of 15 feet, and closer if there is any doubt as to the value of the ore, lines of samples—each sample being 10 feet long and varying with the nature of the ore—are taken across the back of the stopes at right angles to the strike. These samples are taken by cutting trenches, usually 10 feet long, 4 inches wide across the strike of the ore, and 5 feet apart, for the entire length of the new work. A hand sample is taken from each car at the ore bins, and again at the crushers a grab sample is taken by means of large dippers, before the ore goes to the mill.

TABLE II.—SHOWING NUMBER AND PERCENTAGE OF DIFFERENT NATIONALITIES WORKING AT THE MINES ON DOUGLAS ISLAND, ALASKA.

	Per Cent.	Treadwell.	Mexican.	Ready Bullion.	Total.
Americans	26.5	147	46	27	220
Norwegians, Swedes, Danes	25.0	104	60	41	205
Scotch	1.0	4	2	5	11
Austrians and Slavonians	24.5	113	29	58	200
Irish	3.5	22	5	2	29
Germans	3.0	13	7	4	24
French	...	2	..	..	2
English	2.5	16	2	2	20
Italians	3.0	6	8	9	23
Finns	5.0	17	20	3	40
Russians	1.0	5	3	..	8
Turks	...	1	..	..	1
Japanese	4.0	17	15	..	32
Indians	1.0	6	2	1	9
Totals	100.0	473	199	152	824

The only samples taken in the mill are from the tailings and sulphurets. The tailings sample is taken either at the tail of the vanners by means of dippers, or at the end of the tailings launders by means of automatic samplers. The sulphurets are sampled by means of the ordinary grooved sampling rod. When the mine sample reaches the assay office it weighs from 50 to 150 pounds.

The assay office is fitted with the usual grinding machinery, two double muffle furnaces, pulp and bullion scales, etc. There is an average of about one hundred samples assayed each day, and the returns from a sample are obtained the day after it is taken. All samples are assayed for gold only. In connection with the assay office are the retorting and melting rooms for refining the amalgam from the mills.

A complete set of maps is kept, showing in detail the underground and surface workings of the mines, also the value and position of each sample taken and the quantity of broken ore and reserves.

Topographic Map of Northwestern Montana.

The United States Geological Survey has published a map of the Saypo quadrangle in northwestern Montana, which embraces an area covering 30 minutes of latitude and longitude, extending from 47° 30′ to 48° 00′ latitude and from 112° 30′ to 113° 00′ longitude, and contains 805 square miles.

It lies wholly on the eastern slope of the Continental Divide. The Sun River mountains extend through the central portion from north to south and form the most important topographic feature. These mountains, which are extremely rough, rise from an altitude on the plains to the east of 4650 feet above sea level to 8865 feet in the highest peak. They are composed of a number of small ranges that lie parallel to one another and have a general north-and-south trend. The summits of these short ranges are usually beset with sharp pinnacles, and viewed from a distance present a typical sierra or saw-like appearance, contrasting strongly with the level plains that occupy the eastern third of the quadrangle. Several small streams rise in these mountains and flow eastward to join the Sun river. Here also the Teton river has its source. The valley of Sun river occupies the western part of the quadrangle and separates the Sun River mountains from the main chain of the Rockies, which form in Montana the Continental Divide. Sun river itself rises in the northwest corner of the quadrangle, flows southward almost to the southern boundary, turns abruptly to the east and then cuts through the mountains in a deep, narrow canyon, one of the most picturesque in Montana. There are no settlements in the mountainous portion of the quadrangle, but the eastern plain is occupied by the ranches of sheep and cattle raisers.

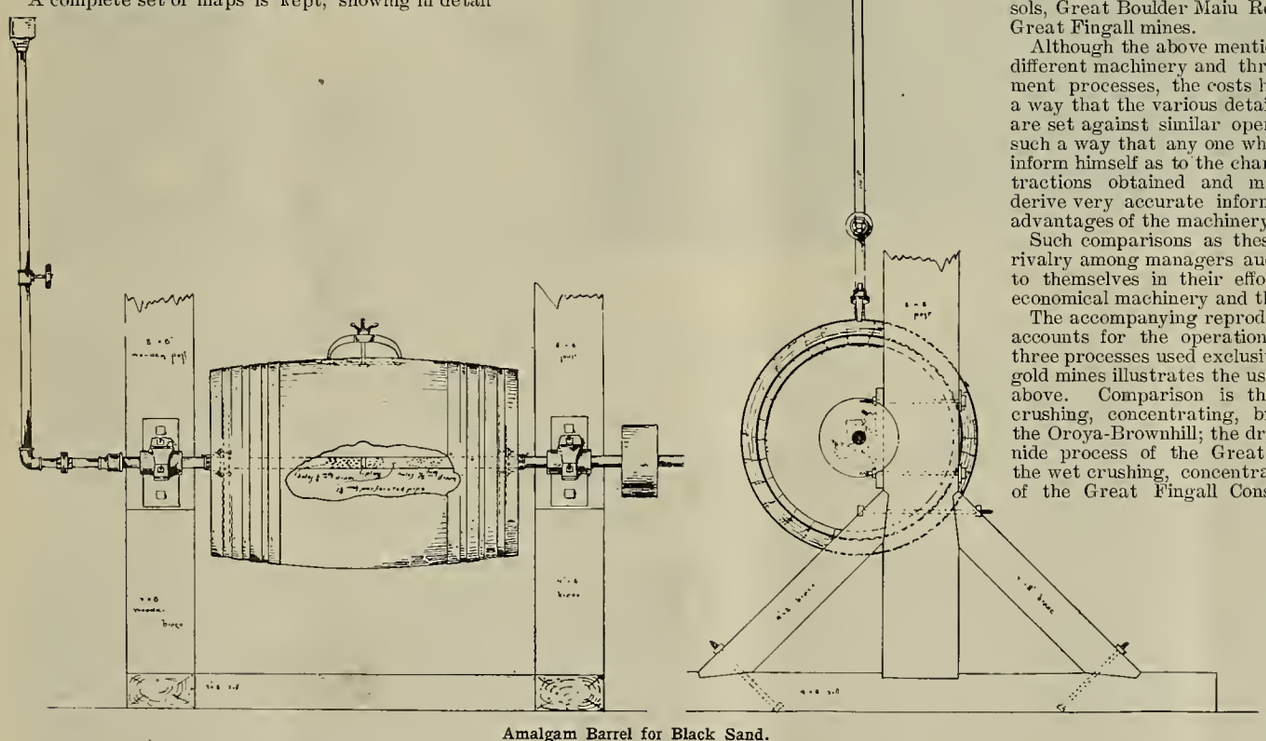
The map of the quadrangle is made on the scale of 1:125000, or nearly 2 miles to the inch. The topographic features are represented by contour lines of elevation representing vertical intervals of 100 feet. All roads and trails are shown.

The map is printed in three colors, the waters being in blue, the topographic features in brown, and the cultural features—roads, railroads, towns, etc., and all lettering for names—in black. A full explanation of the topographic methods employed and conventional signs used is printed on the back of each map. The maps can be procured from the Director of the United States Geological Survey, Washington, D. C.

Device for Treating Black Sand.

TO THE EDITOR:—The accompanying sketches are those of an amalgamating barrel which I have used successfully the past five years for cleaning up black sand. It is a great labor saver and easily constructed. Using a piece of 1½-inch pipe for shaft and a 10-gallon keg for an amalgamator, filling the barrel one-third full of black sand, with two pounds of quicksilver, it can be arranged to run by water-wheel set in the sluice box, or independently. The water supply can also be connected the same way. When the barrel turns about fifteen revolutions per minute I have found it to work best. At the belt end of the shaft I always set a small keg or tub to catch any quicksilver that should get out of the barrel. This is not patented.

GEO. W. OTTERSON,
Superintendent Detroit-Alaska H. M. Co.
Seattle, Wash.



Amalgam Barrel for Black Sand.

Uniform Cost Returns.

Written by W. A. PRICHARD.

All good work in mining is the result of an honest desire on the part of a director, engineer or manager to meet surrounding conditions and make the greatest profit out of a mining property.

A mining property, unlike a manufacturing concern, is an exhaustible asset. Every pound unnecessarily expended in development, machinery or working costs on a mine is irretrievably lost to the mining investor. In order to avoid such wasteful expenditure it is necessary to determine with as much precision as possible what is the best machinery for a given purpose, what are the best working methods to employ, and what is the best type of man to place in charge of such machinery and operations. The great multiplicity of machinery and methods employed in mining operations makes such determinations extremely difficult on account of the large number of ingenious men engaged in mining, each with his individual proficiency in certain branches of work. Aggregate working costs differ widely in mines working on similar ores under similar conditions. Comparative analysis of the working costs shows up still wider differences in the cost of certain operations, such as crushing with stamps, concentrating, amalgamating, etc., a perfect understanding of which should be the very A B C of a mining man's education.

Where several mines with similar ores, such as at Kalgoorlie, are working under the same general conditions of labor, supplies, etc., the officials of each individual mine should be afforded every facility for profiting by the mistakes and successes of all others in the district. By systematizing the records of engineering, metallurgical and mining results under a common system, great economy can be introduced in the experiments, methods of working and selection of supplies and machinery. Every mine has its own system of account keeping and reporting to conform with the different ideas and methods of different auditors and managing directors, and although the cost sheets of each mine fulfill all of the requirements of that particular mine, the varying conditions and different processes and methods employed make comparison extremely inconclusive. In order to show up the advantages and defects of different machinery and methods, it is necessary to compute the costs on a common system for comparison. The writer has, to meet this requirement, designed a special cost form. This cost form has, since the beginning of the present year, been used as an auxiliary to the regular cost and extraction sheets at the Lake View Consols, Great Boulder Main Reef, Oroya-Brownhill and Great Fingall mines.

Although the above mentioned mines are employing different machinery and three widely different treatment processes, the costs have been split up in such a way that the various detail operations at one mine are set against similar operations at the others in such a way that any one who is interested enough to inform himself as to the character of ore treated, extractions obtained and machinery employed, can derive very accurate information as to the relative advantages of the machinery, methods and processes.

Such comparisons as these introduce a healthful rivalry among managers and afford great assistance to themselves in their efforts to introduce the most economical machinery and the most skillful employes.

The accompanying reproduction of the expenditure accounts for the operation of three mines by the three processes used exclusively in Western Australia gold mines illustrates the use of the form referred to above. Comparison is therein made of the wet crushing, concentrating, bromo-cyanide process of the Oroya-Brownhill; the dry crushing, roasting cyanide process of the Great Boulder Main Reef, and the wet crushing, concentrating, cyaniding process of the Great Fingall Consolidated, together with their mining and other expenditures for the month of July, 1903.

At the recent conference of the Chamber of Mines at Kalgoorlie, a resolution was passed favoring the adoption of a uniform system of reporting costs. The above information is offered as a possible aid toward that end. The present practice of a few mines in Western Australia of publishing costs monthly has been a wonderful impetus towards improvement in mining.

Uniformity of account keeping is much needed in the matter of separating development from ore extraction and in charging out salaries and management expenses. The writer has instituted at a few mines the system of charging to ore extraction all ore derived from development at the average stoping cost for ore derived from stopes. The accompanying table explains the system: (See next page.)

*Transaction Chamber of Mines, Western Australia.

COMPARISON OF COSTS FOR MONTH OF JULY, 1903.

	OROYA BROWNHILL. 4,035 TONS TREATED.				GREAT BOULDER MAIN REEF. 1,750 TONS TREATED.				GREAT FINGALL CONSOLIDATED. 8,270 TONS TREATED.			
	Expenditure	Total Expenditure	Cost per Ton	Total Cost per Ton	Expenditure	Total Expenditure	Cost per Ton	Total Cost per Ton	Expenditure	Total Expenditure	Cost per Ton	Total Cost per Ton
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Rockbreaking	...	58 17 6	...	0 0 3·50	...	46 1 9	...	0 0 6·32	...	143 2 5	...	0 0 4·15
Power	40 18 6	...	0 0 2·44	...	20 11 0	...	0 0 2·81	...	49 18 5	...	0 0 1·45	...
Labor	14 0 0	...	0 0 0·83	...	17 15 6	...	0 0 2·43	...	34 8 4	...	0 0 1·00	...
Repairs	1 17 6	...	0 0 0·11	...	3 11 7	...	0 0 0·47	...	54 10 5	...	0 0 1·58	...
Supplies	2 1 6	...	0 0 0·12	...	0 16 5	...	0 0 0·17	...	4 3 3	...	0 0 0·12	...
Drying Wet Ore	...	...	...	...	3 7 3	...	0 0 0·44	...	...	...	...	...
Transport to Mill	...	46 12 7	...	0 0 2·77	...	...	...	...	...	105 2 9	...	0 0 3·05
Power	6 16 5	...	0 0 0·41	...	...	...	...	...	12 5 3	...	0 0 0·35	...
Labor	39 4 8	...	0 0 2·33	...	...	...	...	...	80 10 0	...	0 0 2·33	...
Repairs	...	...	...	...	...	...	...	...	5 17 9	...	0 0 0·17	...
Supplies	0 11 6	...	0 0 0·03	...	...	...	...	...	6 9 9	...	0 0 0·20	...
Milling	...	504 11 1	...	0 2 6·01	...	326 7 0	...	0 3 8·76	...	1,499 18 0	...	0 3 7·52
Power	252 7 1	...	0 1 3·01	...	195 4 6	...	0 2 2·77	...	529 0 9	...	0 1 3·36	...
Labor	86 6 6	...	0 0 5·13	...	81 11 3	...	0 0 11·19	...	438 4 7	...	0 1 0·71	...
Repairs	26 4 3	...	0 0 1·56	...	15 6 2	...	0 0 2·10	...	218 7 6	...	0 0 0·33	...
Supplies (General)	139 13 3	...	0 0 8·31	...	24 5 1	...	0 0 4·79	...	303 14 1	...	0 0 8·81	...
Mercury	...	...	...	...	...	...	...	...	10 11 1	...	0 0 0·31	...
Concentrating	...	125 1 9	...	0 0 7·44	...	...	...	...	...	106 0 1	...	0 0 3·08
Power	36 7 6	...	0 0 2·16	...	...	...	...	...	72 0 2	...	0 0 2·09	...
Labor	68 17 5	...	0 0 4·10	...	...	...	...	...	8 10 0	...	0 0 0·25	...
Repairs	17 18 5	...	0 0 1·07	...	...	...	...	...	25 9 11	...	0 0 0·74	...
Supplies	1 18 5	...	0 0 0·11	...	...	...	...	...	...	...	...	...
Roasting	...	137 5 8	...	0 0 8·17	...	308 10 10	...	0 3 6·31	...	50 0 0	...	0 0 1·45
Power	18 13 9	...	0 0 1·08	...	47 19 0	...	0 0 6·58	...	...	...	...	...
Labor	63 14 7	...	0 0 3·79	...	58 11 0	...	0 0 8·03	...	...	...	...	...
Repairs	14 17 3	...	0 0 0·89	...	7 9 2	...	0 0 1·02	...	(Estimated)	...	...	...
Supplies (General)	0 17 1	...	0 0 0·05	...	3 14 9	...	0 0 0·51	...	...	...	...	...
Fuel	39 13 0	...	0 0 2·36	...	190 10 11	...	0 2 2·17	...	...	...	...	...
Grinding (Mills or Pan)	...	229 11 8	...	0 1 1·66	...	219 19 8	...	0 2 6·17	...	77 10 0	...	0 0 2·25
Power	167 6 6	...	0 0 9·95	...	92 9 3	...	0 1 0·68	...	...	...	...	...
Labor	5 13 4	...	0 0 0·34	...	61 5 5	...	0 0 8·40	...	...	...	...	...
Repairs	49 14 4	...	0 0 2·96	...	21 10 7	...	0 0 2·96	...	(Estimated.)	...	...	...
Supplies (General)	6 17 6	...	0 0 0·40	...	44 14 5	...	0 0 6·13	...	...	...	...	...
Mercury	...	...	...	...	...	...	...	...	...	...	...	...
Classifying, Elevating, and Ret'g Solution	...	110 0 0	...	0 0 6·54	...	...	...	...	...	...	...	...
Power	61 16 9	...	0 0 3·68	...	...	...	...	...	...	...	...	...
Labor	6 0 0	...	0 0 0·36	...	...	...	...	...	...	...	...	...
Repairs	41 0 11	...	0 0 2·44	...	...	...	...	...	...	...	...	...
Supplies	1 2 4	...	0 0 0·06	...	...	...	...	...	...	...	...	...
Agitation and Cyaniding	...	1,521 8 0	...	0 7 6·49	...	212 16 0	...	0 2 5·18	...	773 5 0	...	0 1 10·45
Power	90 18 9	...	0 0 5·41	...	77 10 2	...	0 0 10·63	...	37 6 10	...	0 0 1·08	...
Labor	129 12 6	...	0 0 7·71	...	12 14 4	...	0 0 1·74	...	321 14 0	...	0 0 9·34	...
Repairs	19 16 2	...	0 0 1·18	...	12 4 7	...	0 0 1·68	...	40 3 11	...	0 0 1·17	...
Supplies (General)	60 0 0	...	0 0 3·57	...	0 15 7	...	0 0 0·10	...	35 2 0	...	0 0 1·01	...
Cyanide	619 16 0	...	0 3 0·86	...	190 11 4	...	0 1 3·03	...	268 6 8	...	0 0 7·79	...
Cyanogen Bromide	493 4 0	...	0 2 5·34	...	...	...	...	...	...	...	...	...
Acid	54 0 0	...	0 0 3·21	...	...	...	...	...	21 7 7	...	0 0 0·61	...
Lime	54 0 7	...	0 0 3·21	...	...	...	...	...	49 4 0	...	0 0 1·45	...
Filling, Drying and Emptying Presses	...	270 10 11	...	0 1 4·09	...	195 1 5	...	0 2 2·75	...	143 13 0	...	0 0 4·16
Power	25 9 3	...	0 0 1·51	...	59 1 3	...	0 0 8·10	...	34 0 3	...	0 0 0·99	...
Labor	194 10 2	...	0 0 11·57	...	99 15 0	...	0 1 1·68	...	109 6 11	...	0 0 3·16	...
Repairs	16 14 0	...	0 0 0·99	...	9 9 1	...	0 0 1·30	...	...	...	...	...
Supplies	33 17 6	...	0 0 2·02	...	26 16 1	...	0 0 3·67	...	0 5 10	...	0 0 0·01	...
Disposal of Residues	...	175 6 7	...	0 0 10·43	...	89 10 6	...	0 1 0·28	...	447 17 5	...	0 1 1·00
Power	7 4 9	...	0 0 0·43	...	...	...	...	...	24 17 2	...	0 0 0·71	...
Labor	167 4 4	...	0 0 9·95	...	88 13 10	...	0 1 0·11	...	399 8 4	...	0 0 11·60	...
Repairs	0 17 6	...	0 0 0·05	...	...	...	...	...	15 1 11	...	0 0 0·43	...
Supplies	...	...	...	...	0 16 8	...	0 0 0·17	...	8 10 0	...	0 0 0·26	...
Precipitation and Smelting	...	245 8 2	...	0 1 2·59	...	33 13 0	...	0 0 4·62	...	110 15 10	...	0 0 3·22
Power	3 12 9	...	0 0 0·22	...	...	...	...	...	...	...	...	...
Labor	65 8 9	...	0 0 3·88	...	12 16 2	...	0 0 1·76	...	11 8 8	...	0 0 0·38	...
Repairs	0 12 6	...	0 0 0·04	...	...	...	...	...	9 5 11	...	0 0 0·27	...
Supplies	175 14 2	...	0 0 10·45	...	20 16 10	...	0 0 2·86	...	90 1 3	...	0 0 2·62	...
Propn. Assaying and Sampling	...	61 3 3	...	0 0 3·64	...	7 10 4	...	0 0 1·03	...	56 8 4	...	0 0 1·64
Power	8 1 6	...	0 0 0·48	...	...	...	...	...	2 2 10	...	0 0 0·06	...
Labor and Salaries	26 11 0	...	0 0 1·58	...	4 0 4	...	0 0 0·55	...	28 7 4	...	0 0 0·83	...
Repairs	5 9 6	...	0 0 0·33	...	...	...	...	...	4 12 0	...	0 0 0·12	...
Supplies	21 1 3	...	0 0 1·25	...	3 10 0	...	0 0 0·48	...	21 6 2	...	0 0 0·63	...
Total Treatment Costs	...	3,485 17 2	...	0 17 3·33	...	1,439 10 6	...	0 16 5·42	...	3513 12 10	...	0 8 5·97
Summary	719 3 6	...	0 3 6·78	...	492 15 2	...	0 5 7·57	...	761 11 8	...	0 1 10·10	...
Power	867 3 3	...	0 4 3·57	...	440 10 1	...	0 5 0·11	...	1,431 18 2	...	0 3 5·55	...
Labor and Salaries	195 2 4	...	0 0 11·61	...	69 11 2	...	0 0 9·54	...	373 11 4	...	0 0 10·83	...
Repairs	1,704 8 1	...	0 8 5·37	...	436 14 1	...	0 4 11·90	...	946 11 8	...	0 2 3·49	...
Supplies												
Management and General Expenses	...	743 6 11	...	0 3 8·22	...	289 1 8	...	0 3 3·65	...	1,293 2 8	...	0 3 1·47
Stoping	...	1,601 14 11	...	0 7 11·27	...	822 2 5	...	0 9 4·74	...	3,477 16 6	...	0 8 4·93
Power	290 18 10	...	0 1 5·30	...	196 9 1	...	0 2 2·94	...	274 12 11	...	0 0 7·97	...
Pumping	62 9 7	...	0 0 3·71	...	...	...	...	...	84 5 10	...	0 0 2·45	...
Labor and Salaries	779 13 11	...	0 3 10·38	...	432 14 3	...	0 4 11·34	...	2,320 15 5	...	0 5 7·35	...
Repairs	234 5 9	...	0 1 1·93	...	95 10 9	...	0 1 1·19	...	80 3 10	...	0 0 2·33	...
Supplies	202 18 8	...	0 1 0·07	...	91 5 8	...	0 1 0·52	...	706 2 9	...	0 1 8·49	...
Propn. Assaying and Sampling	31 8 2	...	0 0 1·88	...	6 2 8	...	0 0 0·84	...	11 15 9	...	0 0 0·34	...
TOTAL WORKING COSTS	...	5,830 19 0	...	1 8 10·82	...	2,550 14 7	...	1 9 1·81	...	8,282 12 0	...	1 0 0·37
Mine Development	...	4,045 11 7	...	...	...	1,167 17 4	...	...	...	3,100 2 7	...	...
Power	705 5 5	...	...	...	191 10 9	...	...	...	446 0 11	...	...	...
Labor and Salaries	2,101 10 9	...	...	...	570 7 9	...	...	...	1,972 9 0	...	...	...
Repairs	400 14 9	...	...	...	159 4 7	...	...	...	240 7 5	...	...	...
Supplies	676 7 4	...	...	...	235 1 11	...	...	...	386 12 4	...	...	...
Propn. Assaying and Sampling	161 13 4	...	...	...	11 12 4	...	...	...	54 12 11	...	...	...
Plant	...	8,802 5 8	...	...	...	46 16 8	...	...	...	1,399 8 9	...	...
Labor and Salaries	3,105 5 5	...	...	...	15 0 10	...	...	...	598 8 9	...	...	...
Supplies and Sundries	5,787 0 3	...	...	...	31 15 10	...	...	...	792 0 0	...	...	...
GRAND TOTALS	...	£18,768 16 3	...	...	...	£3,765 8 7	...	...	...	£12,773 3 4	...	...
Additional Expenditure	...	...	...	...	...	336 13 10	...	0 7 1·14				
Treatment of Old Sands (949 tons)	...	...	...	...	336 13 10	...	0 7 1·14	...				
Treatment of Old Slimes	...	...	...	...	...	...	...	...				

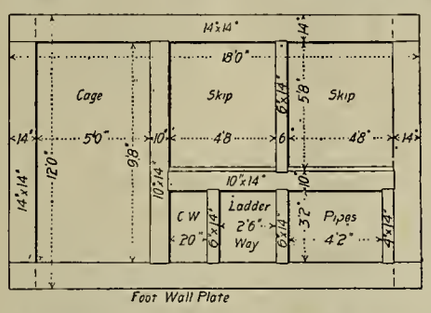
Shaft Sinking and Equipment at the Ashland Mine.*

Written by H. F. ELLARD.

The sinkiug and eqnipping of modern shafts is ever an interesting featnre of mine work. The location of our No. 6 and No. 7 shafts, as well as their condition in May, 1901, made the sinking of a new shaft at this property at Ironwood, Mich., a necessity. At that time the mine was pnrchased by the Cleveland-Cliffs Iron Co., and this improvement was at once decided npon.

Upon assuming charge of local operations here on June 11 following, the attention of the writer was directed to this feature of the work. After a careful snrvey of general conditions, we commenced, July 15, to explore the foot wall at the location most desirable, and by test pitting and diamond drilling, we determined that the ledge consisted of a layer of qnartzite, almost uniformly 75 feet thick, overlying strong qnartz slates, both cut at different points by dikes of diorite, which in the unaltered form here encountered proved extremely hard material.

The drift consisted of 20 to 25 feet of peat, sand and boulders. The diamond drill cut the measnres at



Arrangement of Shaft, Ashland Mine, Michigan.

right angles from the 1st, 3d, 8th and 10th levels, and proved the foot to dip to the north at an angle of approximately 60° from the horizon; this incline was, therefore, adopted for the shaft. The location selected is a point 155 feet in the foot wall aud immediately south of No. 6 shaft.

It was decided to sink a shaft of considerable capacity, as we wished to have it serve the territory formerly developed by Nos. 5, 6, 7 and 8 shafts. We, therefore, made provision for two skips, a cage and counterweight, a ladderway and pipe compartment. These with sufficient dividers called for a shaft 9 feet 8 inches by 15 feet 8 inches inside dimensions. The ontside dimensions, inclnding laths, reqnired an opening of 12 feet 4 inches by 18 feet 4 inches, but the grounnd actnally broken was generally abont 13 feet by 19 feet, displacing 247 cnbic feet, or twenty tons of rock per foot of sinking.

The sizes of the compartments, as shown in the accompanying cnt, are as follows:

Cage compartments, 5 feet by 9 feet 8 inches.

Two-skip compartments, each 4 feet 8 inches by 5 feet 8 inches.

Counterweight compartment, 1 foot 8 inches by 2 feet 8 inches.

Ladderway, 2 feet 6 inches by 2 feet 8 inches.

Pipe compartment, 2 feet 8 inches by 4 feet 4 inches; all inside dimensions.

The timbers used are as follows:

Wall plates and end pieces, 14x14 inches; white pine.

Cage divider, 10x12 inches; tamarack.

Divider for foot of skip compartment, 10x12 inches; tamarack; all other dividers, 6x12 inches, tamarack.

Cage runners, 5x8 iuches, and skip rnnners, 6x7 inches; Norway pine.

Stnddles, 12x12 inches; white pine.

To give additional stability to the divider carrying the skip roads without dovetailing it into the end pieces a studdle of 4x12 inches, tamarack, was added between this divider and the foot-wall plate. The other end of this divider was dovetailed 1 inch into the cage divider, and, in addition to this, is strengthened by the 6x12 inch dividers between the counterweight and ladder compartments. The size of the wall plates and end pieces was reduced to 12x12 inches when the shaft had reached a point in the ledge where the ground was considered sufficiently strong to warrant this. The laths are 2-inch hemlock on the ends and foot wall sides; on the hanging side 2-iuch tamarack was used almost exclnsively. A 3-inch tamarack floor was placed between the rails of the skip roads, and 45-ponnd rails were used for the skips and cage. A casing of 2-inch plank on the skip side separates the cage aud skip compartments. The sets were spaced irregularly. This was dne to the nature of the material, which at the surface was very reacherous, and farther down became very hard and strong. The hangers are of 1¼-inch common iron.

The design as adopted proved very practicable, and the only feature that has not met with universal approval, and abont which any misgivings were entertained at first, is the placing of the skips in the hanging. This, it was argued, would place an excessive load on the dividers carrying the skip roads, and also tend to weaken the constrnction at a time when the timbers would begin to decay. While recognizing the force of these objections, we maintain that with reasonably heavy rails the burden of snpporting the skips and the skip roads on a 60° angle is comparatively slight, and the opportunities for reinforcing or renewing any of these dividers are snch that the entire work could be done without causing the skips any delay whatever. The design lends itself admirably to the convenient and rapid handling of ore and timbers, and the pipes rest upon the foot wall fully protected from jar or strain.

ORE POCKETS.—On each main level two small pockets, each holding one skip load, are constrncted immediately in front of the skips, and into these the ore is dumped by means of self-acting tipples. A lever conveniently located is connected to a slide door, consisting of steel plate ½ inch by 2 feet 4 inches by 3 feet, and this is readily raised by the skip tender when the skip is in position for loading. The incline of the shaft brings the skip directly underneath the doors, and no waste whatever occnrs in loading.

EQUIPMENT.—Pnmp stations were cnt on the seventh and tenth levels, and two pumps installed in each. All these are compound dnplex pumps and provide a direct and relay reserve plant from the tenth level to the snrface. We are now installing a new triple duplex pnmp on the thirteenth level, and have added a pair of high-pressnre boilers for this work.

As a precaution toward insurance against fires, as well as to preserve the shaft timbers, a system of perforated pipes and galvanized iron baffle plates was placed in the hanging side, by which means a very small amount of water in continnons flow keeps the shaft timbers in a thoroughly saturated condition at all times.

The skips are of ordinary type for inclined shafts. They are of 72 cubic feet capacity, and equipped with single tread front aud double tread rear wheels 12 inches in diameter, of manganese steel, pressed on to 3-inch cold rolled steel axles, running in self-oiling babbitted boxes.

The cage is, we think, unique in some of its features, and was designed especially for this shaft. It travels on a track of 4 feet 3 inches gange on the foot-wall end of the compartment, and consists of a crosshead, to which are attached safety clntches, sills and hangers, carrying the wheels, axles, shoes, floors, etc. There are two floors, 6 feet 6 inches apart, supported in horizontal positions betweeu the hangers. Each floor is 10 feet 8 inches long and 4 feet wide in the clear, and the lower one carries a track of 1 foot 10 inch gauge, conforming to our mine and surface timber tracks. It is also fitted with a device for locking cars and trncks in place while on the cage. This is operated by either of two levers on the foot and hanging ends, respectively, of the cage floor. Gnards serve to keep the men in place while riding on this floor.

The upper floor will be similarly fitted in time, but with the engines now employed for handling the cage it is not deemed advisable to nse both floors for loads. It is sometimes very couvenient, however, to hoist rock or ore on this floor, and in snch case the mine car is pushed off the cage and dumped into the rock chute or either of the ore bins, as desired.

All timbers np to 10 feet in length are handled on small trncks, pushed into the cage from the foot wall side. These are loaded in the timber yard and nsed to carry the timber throngh the drifts on the levels without rehandling. Longer lengths of timber are swung by a crane, and lowered endwise throngh the npper floor of the cage to rest on the lower. The crane is also nsed to place the skips on and off the skip roads.

A length of 7 feet on each floor is available for men and this furnishes standing room for twenty-five to twenty-seven men.

The shoes run on 5x8-inch Norway pine guides, placed 4 feet 10 inches from the foot wall. These serve as back rails for the cage wheels.

The safety clutches are attached to the crosshead, and also run on these guides, and are depended npon to effectually prevent a rnnaway of the cage, should an accident occnr to the hoisting cable.

The wheels are of manganese steel, 16 inches in diameter, pressed ou to 3-inch cold rolled steel axles, rnnning in self-oiling babbitted boxes. The lower wheels are placed below the floor and braces run from the sills at this point to the hanging end of the floor to add greater strength to the floor supports at this end, and also to thoroughly brace the entire lower frame work.

The weight of the cage, with wheels and axles, is slightly over two tons.

HEAD FRAME.—The head frame was erected by the Wisconsin Bridge & Iron Co., Milwankee, Wis. It is of steel and of simple design. It contains two small ore bins, with a combined capacity of 100 tons, fitted with pocket stops of the style as described in Volume II of the "Proceedings" of this institnte by Mr. Wm. Kelly. To this we add a slight improvement, which enables the brakeman to operate the stop without leaving the railroad car. It consists of bending the handle or lever and attaching thereto a supplementary handle, which, in our case, is nothing more than a canthook stock. This hangs loosely over the car, within easy reach of the brakeman.

The landing platform is 42 feet above the ground, and the openings to the ore bins are opposite the skips. Small steel chutes carry the ore forward to discharge into these bins, and the grading is doue by a special grading truck, which travels crosswise under the chutes and deflects the ore to one side or the other as is desired. It also throws the rock from the skip to the side of the ore bins into a chute, which carries it to a rock car on a trestle 17 feet below the landing platform.

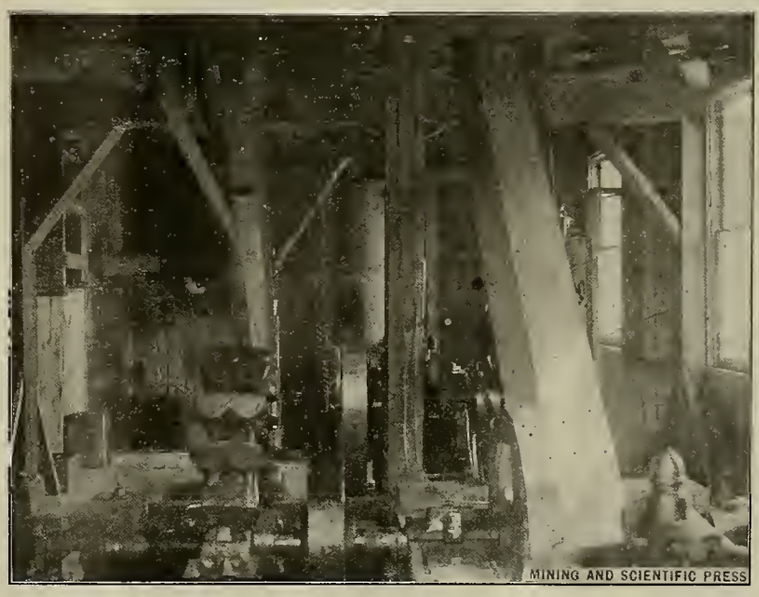
Some of the featnres of the landing platform are as follows: Either grade of ore may be hoisted with both skips and the cage, and dnmped into either of the ore bins or the stockpile car, as desired. Rock may be hoisted with one skip and the cage. When shipping and stockpiling are carried on simultaneously, both grades of ore may be hoisted for both pnrposes with both skips and the cage. All the work of this landing, including the grading of ores, the giving of signals and the tramming of rock, is done by one lander. The rock is handled by an antomatic side-dumping car, propelled by a small winze hoist, to which reversing gear was added. It is operated by the lander.

(TO BE CONTINUED.)

*Trans. Lake Superior Mining Institute.

Equipment of the Garnet Mine, Pony, Mont.

The Garnet M. Co.'s new power plant at Pony, Mont., has recently been installed. It comprises a 3-foot Pelton wheel, operated under 100 feet pressure, with two balance wheels and a hood for regulating, with a Replogle sectroidal governor. To the same pulley, on the countershaft, is belted a Weber special 5 H. P. gasoline engine, with battery, tnbe and gas engine igniter. The engine and wheel may be run together if desired. From the countershaft



Power Station, Garnet Mine, Pony, Mont.

is driven a 6 H. P. dynamo, with switchboard for meters, power and light connections; and a 30-inch blower with 8-inch run-around for blast or suction, with connections to the forge. All parts of all machines are readily accessible, with enough room about all of them. The building is 12x28. The wheel or engine will run three Durkee electric drills; one is now in use. The plant is compact, convenient and nearly automatic.

The accompanying illustration shows the interior of the power station. Work is progressing on the tunnel at the Garnet, a contract having recently been let. E. L. Ballou is manager.

Mining and Metallurgical Patents.

PATENTS ISSUED NOVEMBER 3, 1903.

Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

MINE TIMBERING APPARATUS.—No. 742,437; J. R. Hunter, Wilkesbarre, Pa.



Supporting frame, load-supporting carriage movable longitudinally of frame, drum mounted for rotation upon frame transversely of carriage, hoisting cable between carriage and drum, and means for actuating drum and operating thereon parallel to path of carriage.

CONCENTRATOR.—No. 742,889; J. J. Montgomery, Santa Clara, Cal.

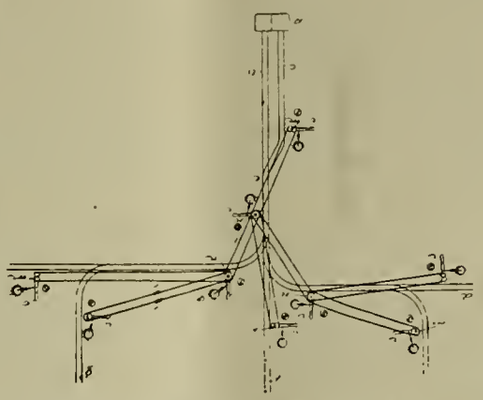


In concentrator, combination of concentrating table, means for vibrating table in direction of travel of material thereon, means for supplying material to one end of table, supports for table inclined to its surface at angle against direction of travel of material thereon, spring to compensate downward pull of gravity on table, discharges for tailings through table at points throughout its length, and discharges for concentrates at end of table opposite to that at which material is supplied.

METALLURGICAL PROCESS.—No. 742,830; O. W. Brown, Bloomington, and W. F. Oesterle, Marion, Ind.

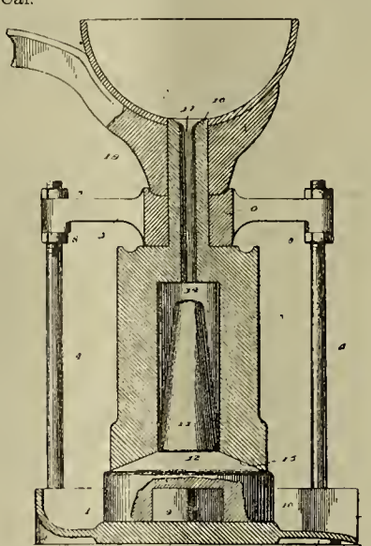
The proeess of simultaneously producing metallic zinc and carbide by mixing with zinc ore, carbon and oxide of a metal having greater affinity for carbon than for zinc, and heating mixture to temperature sufficient to produce products.

SIGNAL SYSTEM FOR MINES.—No. 742,962; N. K. Bowman, North Lawrence, Ohio.



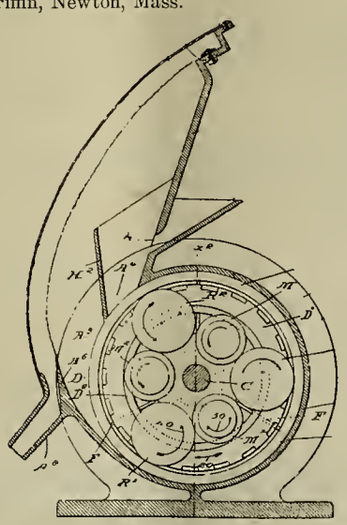
In signaling system for mines, combination with plurality of branch tracks running in different directions and connecting at different points and leading into main track, of levers located at several junctions and constituting visual signals and operating handles for system and adapted to be manually operated to indicate by their position safety or danger, and connections between levers to cause them to operate in unison, some of connections leading from intermediate station to several of stations.

QUARTZ MILL.—No. 742,966; J. Y. Byers, Descanso, Cal.



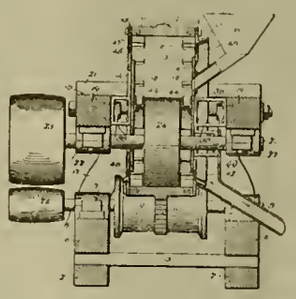
In quartz mill, combination with base having non-circular projection, of grinding member supported detachably upon base and having lower end expanded to form pulverizing surface, and provided in under side with non-circular recess extending into expanded portion and adapted to engage non-circular projection of base to retain grinding member fixedly in position upon latter.

CRUSHING AND PULVERIZING MILL.—No. 742,982; E. C. Griffin, Newton, Mass.



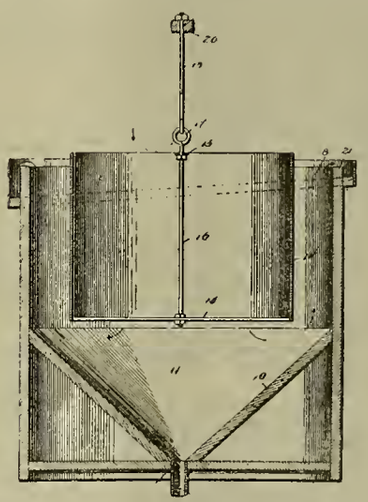
In pulverizing mill, co-operating fixed and rotatable annular dies, and pair of operatively contacting crushing rolls to travel upon dies, operation of rotatable die imparting planetary rolling motion to rolls.

MILL FOR CRUSHING ORES.—No. 743,014; A. B. Mouck, Fargo, N. D.



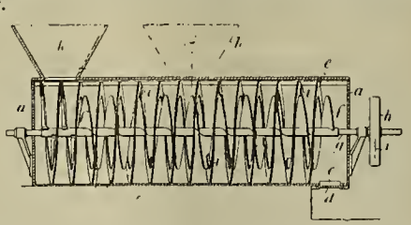
In crushing and pulverizing mill combination of drum having side plates with central openings, one of plates having flared annular flange on outer side, means to support and rotate drum, muller roller disposed in drum and having movable bearings, plates carried by bearings and forming closures for openings, feed hopper carried by one of plates, and discharge hopper also carried by same plate and having opening in its inner side edge of which is covered by flange.

ORE SLIME SETTLING AND CLASSIFYING APPARATUS.—No. 743,201; F. W. Sherman, Park City, Utah.



In settling apparatus, cylindrical tank having open top and conical bottom with settlings opening at lowest point of bottom, open ended cylindrical feed tube arranged concentrically within tank with lower open end terminated short of conical bottom of tank and upper open end projected above top of tank, area of feed tube being equal to that of annular space between feed tube and tank, cross bars at top and bottom of feed tube, central rod connecting cross bars, and hanger connected to upper end of rod to suspend tube within tank.

APPARATUS FOR MIXING MINERAL OR OTHER DRY SUBSTANCES.—No. 743,202; C. W. Speirs, London, Eng.



In apparatus for mixing substances, combination with stationary horizontal inclosing casing, of horizontal shaft extending therethrough and rotatable therein, two oppositely pitched spiral feeding devices secured to and rotating with shaft, one of devices having external diameter within internal diameter of other throughout its entire length, spiral feeding device of smaller diameter having greater pitch than outer and larger spiral.

A THIN selvage of clay between rock walls will act as an impervious dam and hold back a large volume of water if the enclosing rocks remain undisturbed. Two mines situated on the same vein, which have been intersected by a dike, may operate without the drainage of one effecting the other, so long as the dike remains undisturbed, but, when broken through, it places them upon a common drainage level.

Mining Summary.

SPECIALLY COMPILED AND REPORTED FOR THE MINING AND SCIENTIFIC PRESS.

ALASKA.

At the Alaska-Perseverance M. Co. mines in Silver Bew hasin, near Juneau, Superintendent Pearce says the Alexander tunnel is in 2400 feet. It is 8 feet wide and 7 feet high. The tunnel is a cresscut and is in ere.

ARIZONA.

Cochise County.

L. C. Shattuck ef Bisbee, part owner of the Rincen M. Co., reperts a hody ef copper ore struck in the tunnel on the Rincon mine, 22 miles north of Bensen. The tunnel is heing driven at 130 feet below the surface.

Maricopa County.

The Ben Hur M. Ce. has been reorganized at Phœnix and the directors are H. P. DeMund, W. Talhet, G. B. Richmend, W. H. Battin aud N. Oshorn. J. Oshorn is superintendent. Development work will he increased on the Ben Hur mine, which is 35 miles nerth ef Phœnix, in Cave Creek district. Tho porphyry-quartzite formation is cut hy a ledge which carries free gold. The discovery shaft shows 4 feet of ore which averages $10 per ton. At the meuth of the tunnel is a favorable millsite. The tunnel, 300 feet helow the apex, is in 100 feet.

Graham County.

The Shannon Co., near Clifton, reports continuing to treat 550 tons of ore daily, 250 tons of which goes through its concentrators. Fifteen tons of metallic copper is the company's daily output. On this hasis the ore is yielding 2.78% copper and the company is producing at the rate of approximately 11,000,000 pounds of copper annually. It is stated that Shannon copper is being made and laid down in New York at a gross cest of 8½ cents per pound.

Mohave County.

A half interest in the Kenney-Lapping claim, adjoining the Century mine on the south, near Chloride, has been sold to L. Lapping. The principal vein on the claim is said to he an extension of both the Century and Brunswick properties on the north, which carry veins of ore in silver, gold and copper. Development will he increased.

Pima County.

The Producer M. & S. Co. at Brownell, near Quijotoa, expects to have its 50-ton smelter completed this month. There has been cousiderable work done on these mines, the deepest shaft heing 200 feet. The ore is of copper, carrying silver and gold. There are thirty-five men at work. ——Tho Wolden G. & C. Co. en Quijotoa mountain will put men to work. A hoist is to he erected and the 200-foot shaft sunk to 500 feet. J. W. Gidding is superintendent.

Pinal County.

On the San Carlos strip, 10 miles ahove Dudleyville, the property of the San Carlos C. Co. has been honded hy the Saddle Mountain M. Ce., ef which G. B. Chittenden is manager. Development work is under way. A shaft on the Apachia claim, 120 feet deep, is in sulphide ore, and a tunnel on the Cannon Ball claim ef the O'Brion group has heen driven 180 feet and 150 feet of this shows sulphides.

Santa Cruz County.

The Apache mines at Salero are heing opened up again hy R. R. Richardson. He reports having sixty tons of ore ready for concentratien.

The Tres Amigos mill at Oro Blanco has been completed and will be started up this week. A. Lamb is superintendent.

At Oro Blanco the Old Glory mine has shut down temporarily, says Superintendent Baker. —— At the Golden Eagle (or McDonald mines), Superintendent Code says they will not use the Montana mill which was leased, but will buy a new mill. Development work is progressing.

Yavapal County.

An air cempressor has been put into the tunnel of the Cleveland mine, in Ora Bella district, 10 miles south of Prescott, to furnish air to the engines used to boist ore from the Grey Eagle shaft. Formerly there was a gaseline engine there, but it vitiated the air. The Cleveland mine is owned by P. Kearney of Prescott.

E. D. Seaton, owner of the Cumberland group, uear Prescott, has started operations. A gallows-frame will be built and the mill started, after heing repaired.

J. R. Liston, superintendent of the Wild Flower group of mines in the Bradshaw mountains, southeast of Prescott, says the Wild Flower group is composed of nineteen claims and is sinking a deuble-compartment shaft which will furnish an opening fer working twelve ef the claims. This shaft is dewn 130 feet. At 110 feet a cresscut was run on the ledge, opeuing up a bedy ef sulphuret ere 7 feet wide, which averages $10 geld per teu, hesides carrying copper and lead.

B. J. McDonald et al. are working the Mark Twain mine, near Prescott, and report having on the dump 800 tons of geld-

Near Mayer there are forty men at werk in the Bighug enyx quarries.——At the Hidden Treasure mine, near Prescott, grading for the 10-stamp mill and other reduction works has heen completed.

It is expected the Iron King smelter, near Jereme, will he hlown in hy Dec. 1st. There are sixty men at work at the mine, which numher will he increased to 100 when the smelter is in eperatien.

silver ore which carries $20 per ten. The pay ore is 6 feet in width. The Mark Twain is an extension of the Blue Dick. ——The Ora Bella mill is shut down temporarily to replace the hattery blocks. As seen as finished, work will hegin on the erection of an additional 10-stamp mill.

At the Oro Grande mine, in Black Rock district, near the Maricopa county line, near Wickenhurg, the 5-stamp mill is in eperation. Manager Upton prepeses building a larger plant.——It is reperted the Button mine at Minnehaha will he re-opened.

At the White mine, north of Wickenhurg, near the Maricopa county line, adjoining the Oro Grande mine on the east, work will be resumed, having been suspended during the summer.

The Mohawk M. & M. Co., which has heen working the Roach group on Pine creek, near Prescott, under bond, last week toek over the same, making final payment.

CALIFORNIA.

Amador County.

At the Bunker Hill mine, near Amador City, the mill in course of construction is covered, and machinery is heing put in place. Sinking has been resumed in the shaft.

At the Fremont Con. mine, 1 mile north of Amador City, forty stamps are dropping steadily in the mill, crushing five tens to the stamp per twenty-four hours, says Manager A. Goodell. The ore is coming from the Fremont ground, from the 600 to the 1000 foot levels. The sulphurots that have been shipped have yielded $120 per ton.——The Gover mine is not yet sending any ore to the mill, though ore hodies are being opened up.

At the Bay State mine, north of Plymouth, the additional 200 feet of sinking, from the 850-feot to the 1050-foot level has been completed and Superintendent Worthing will run a crosscut to the vein. The sinking has been doue with machine drills and three shifts of twe men each have made as much as 64 feet in a month, says the Amader Dispatch.

At the Shenandoah mine, uorth of Plymouth, Superintendent Thornton has men at work running a diamond drill to the west to prospect this formation.

The mill at the Pocahentas mine, near Drytown, is in operation. A shoot of ore with gold values is reported struck in the Pocahontas, running north, at 200 feet from the surface.

Calaveras County.

The Hercules-Horseshoe M. Co. has hought the California quartz mine in Indian Creek district, between Angels and San Andreas. Superintendent Shetling of the Hercules-Horseshee Co. has the 2-stamp mill, near Murphys, running steadily.

F. A. Mitchler has mon at work on the Last Chance mine west of Murphys and sinking is progressing. The mine is near the Buckhorn group, which will be re-opened. The Buckhorn group consists of the Red Gold, Buckhorn, O. K. and Christmas mines.

The Garihaldi placer claim on South fork of the Calaveras river has been leased to F. J. Juchter of San Francisco, and development work will be increased. The claim adjoins the Presten-Donovan placer mine.

The Johnston hydraulic mine on Willow creek, 2 miles from San Andreas, was sold last week at public auction to C. V. Gottschalk fer $3200.

S. T. Allen has honded the Veith and Pellaton placer mines, 1 mile south of Mokolumne Hill, for two years for $20,000. The hond also guarantees certain rights in the Lamphear quartz mine. Work will hegin this month.——The What Cheer mine, which has heen closed down for a month past, resumed operations last week.

D. Fricot has bought the Wade Johnson placer mine, southeast of San Andreas, with tail race and right of way fer tailings, also ditch, known as the Pope ditch, the Mammoth, Yaqui Camp, Alaska, Klondike and Seven Up quartz mines on said Johnson placer mine.

Del Norte County.

Manager J. S. Crawferd, with headquarters at Grants Pass, Or., reports increasing development work on the Cleepatra greup of copper mines on Diamend creek. Additional machinery and other equipment will he put in.

El Dorado County.

J. A. Parker, manager ef the New Highland G. & C. M. Co., says they will hegin operations on the Silva gold quartz mine at Georgetown this week.

At Kelsey Superintendent Dunten began eperatiens with the slate cable conveyer last week. Heretefere the slate produced at the Eureka slate quarry has heen hauled to Placerville hy team at a cost of 75 cents a square. By means of the cable slate will he transported to Placerville at a cest of 6 to 7 cents a square. The tramway is supported hy nineteen wooden frame towers and cresses the river at au elevatien of 500 feet, with a span of 2400 feet. It is eperated from the 13-foot water wheel at the quarry power house, and requires 6 H. P. empty and 20 H. P. with the buckets leaded. During the past year at the Eureka slate quarry several additional buildings have heen put up and an air compresser, electric lighting plant and 7000 feet ef power pipe line have heen huilt. In the pit they are 80 feet in depth and an acre in area. A tunnel has heen driven 1000 feet, opening into the bottom of the pit, for drainage, and will preveut the pit filling up as it did last winter. The quarry will be extended north and west. There are 115 men working at the quarry and an average of 40 squares a day is the output. This will be increased till the output is 100 squares (ahout thirty tons) a day.

Kern County.

The Butte mine, near Randshurg, is in operation with non-union men, says Superintendent McMahon.

B. Ostick has bought the remaining one-third interest of J. G. Porter in the Rainbow and Tipton claims near Randsburg.

The Queen Esther mill at Mojave is shut down on account of tho breaking of some of the machinery.——J. Gerner, superintendent of the Karma M. Co., says the mill will be in operation this month.

The Southern Pacific Railroad Co. has bought tho entire holdings of the Reed Crude Oil Co. and the San Joaquin Oil Co. operating in Kern county, and also the stock of the Bear Flag Oil Co.

The Nevada County Oil Co. has completed its well, No. 14, near Bakersfield. —— The Junction Oil Co. has completed another well on its property in the Kern river field, which is said te yield 200 barrels per day.——The Lackawanna is down 700 feet with its well No. 1 and has the water shut eff. They aro putting in a battery of four 80 H. P. hoilers.

Mariposa County.

Operations will be resumed at the Champion mine near Mariposa.

President L. J. Perhacs of the American Eagle G. M. Co., operating the Marble Springs mine, near Kinsley, east of Coulterville, says devolopment work will be increased. Additional huildings are going up.

Nevada County.

Manager Pusheck, from Chicago, Ill., says he will start up the Mountain Maid mine, near Grass Valley, next week.

Manager Root, of the New York-Pennsylvania mine, has bonded the Seven Thirty and Bowery claims, near Grass Valley, and renamed them the Hidden Treasure and Eclipse, respectively. He will put in machinery and start development work. The machinery will include a hoisting and pumping plant, compressor, etc. Plans have been completed to sink 300 feet helow the present shaft, which is down 180 feet. Steam power will he used, with crude oil as fuel.

It is reported that operations will be resumed at the Mountaineer mine, near Nevada City. J. Bender of Ohio, one of the principal owners, is on the ground.

Several stockholders of the Murchie mine, near Nevada City, have bonded the Ethel quartz mine in Washington district, 1½ mile from the Gaston Ridge mine. They have begun drifting on the ledge, opened a crosscut tunnel in 800 feet and will raise to the shaft, which is 110 feot deep, giving a total depth to the shaft of 300 feet. The ledge is 18 inches wide and averages $13 a ton. As seon as connections are made it is proposed to huild a 5-stamp mill.

At the Canfield gravel mine, in Blue Tent district, near Nevada City, men are at work building a 20-stamp mill, says Superintendent C. Graham. He expects to have the stamps dropping on gravel by Jan. 1. The tunnel is heing driven into the hill to tap the channel. Twelve men are working in the tunnel, which is in 700 feet, and it is estimated that 300 feet more will have to he run.

The plant at the Phelps Hill Dev. Co.'s group at Phelps Hill, near Grass Valley, was put in operation last week, says Manager C. A. Poage.

The centrifugal dredging pu mp fer he Brophy claim en Shady creek, near Nevada City, is on the ground. Twenty men are at work, under Superintendent C. L. Miller, building the flume and sluices and putting in pipe.

At the Heme quartz mine, on Deer creek, helow Nevada City, Superintendent D. J. McFall reports several surface imprevements made. The main huilding has heen remodeled and the heisting, pumping and milling machinery increased. The incline shaft is dewn 750 feet. There are two ledges in the claim, one ef them showing a thickness of 8 feet. The 30-stamp mill is running steadily.

The Conlon G. M. Co. has heen incorporated hy G. Beebe, P. Sickles, W. A. Chittenden, O. W. Becker and J. Risk, with principal place of husiness in San Francisce, te operate the Conlon mine near Grass Valley.

Placer County.

(Special Correspendence).—The production ef the Lost Emigrant quartz mine, at Canada Hill, to date, including two carloads ef ore shipped to the Selhy smelter and four months' run with a 2-stamp mill, is $20,486.21. The mine is owned hy F. L. Heath, J. Goulden, S. Jacohs et al. of Colfax, the first-named heing superintendent.

Colfax, Nov. 11.

The Bonnie Bee mine, near Dutch Flat, will reduce its working force this winter, says the Auhurn Repuhlican. The directors will wait until spring before making proposed mill improvements.

There are thirty men at work at the Gaylord gravel mine, near Auburn, the mill being in steady operation.

The Beulder mine, at Ophir, started up last week. They are overhauling the mill and hoist, says Superintendent Swears, formerly of Sheridan. They expect to work machine drills.——Tho Eureka-Hathaway mine has heen bonded to J. B. Truman et al., of Woodland.

Plumas County.

(Special Correspondence). — The 15-stamp mill of the Plumas G. M. Co., 2 miles from Greenville, has been completed and is expected to bo in operation this week. The mill is equipped with batteries of three stamps each (1000 pounds weight) and triple-discharge. The silver-plated amalgamating plates are 4x12 feet. The mill has five concentrating tahles. The ore bins have capacity of 1100 tons. An electric motor will haul ten ore cars in train from the main tunnol of the mine, power and light being furnished by a 37½ kilowatt generator. A 10-ton agitating cyanide plant is on the ground, to be used in treatment of concentratos. W. D. Lawton is manager.

Greenville, Nov. 10.

The Needed Wealth M. Co. has heen incorporated, with principal office at Carson, Nev., by J. A. Bassity, T. P. Fenton, G. F. Greon, C. H. E. Hardin, J. B. Martin and J. L. Moose of San Francisco, to develop and work the Pat Maloy quartz mine near Bucks Ranch, near Quincy.

A. E. Shiun, superintendent of the Bluff City mine, says he has bought the quartz mill on the Bell mining property north of Quincy, and will remove it and set it up at the Bluff City mine. Excavations are being made for the foundations. Beside the 10-stamp mill, the sale includes the 45 H. P. hoiler and engine.

Reperts from Granite Basin, near Quincy, say a new 10-stamp mill will be built on the See and Jolly mines.——The North America mine, near Quincy, says Superintendent E. G. Squier, is being put in order for next spring's piping, building restraining dams, etc.——The Union mine, owned hy the Tabor G. M. Co., will begin operations as soon as sufficient timber can he obtained.

The Five Bears M. Co. is preparing for development of their property on Centennial Hill, near Quincy. At the Genesee (or Gruss) mine the crushing of ore is confined to five stamps on account of the scarcity of water. As soon as sufficient water can he obtained all ten stamps will he dropped.

A consolidation of all the claims on Cooper Hill, near Genesee, has been effected, including the Green ledge, Pilet, Lodi, Barney Tutt mine, Daisy Bell and the Italia. The claims are said to be so situated that one main crosscut tunnel will tap thom all at dopth. Timber and water are available.

San Bernardino County.

The Giant Ledge G. & C. Co., whese properties are in the New York mountains, near Manvel, is having a route surveyed for an aerial tramway frem its mines to the railway at a point 29 miles from Blake.

Santa Barbara County.

The Elliott Oil Co., after several months of trying to sink a well with a retary drill

on the W. Rice place in Cat canyon, near Santa Barbara, has decided to give up the project, and Manager Elliott will put in a standard rig, says the Oil Reporter.

Sierra County.

J. McCarty, W. H. Corbiere, H. J. Wilder and A. Burgan formed a company to develop the mineral prospects on the McCarty ranch on the South Fork, 3 miles from Downieville, last week, and will run a tunnel to prospect the gravel which is said to exist there.

At the Columbia drift mine, 8 miles above Forest City, work on the tunnel will be resumed.——The San Jose company that has taken hold of the Young America mine will begin development work next week.——A shaft is being sunk on the Diadem mine, near Forest City, and ore has been found. It is a contact formation, says Manager J. M. Harper.

Siskiyou County.

Machinery for a 5-stamp mill is on the ground at Humbug, near Yreka, for the McKinley mine. Water power will be used.

Tuolumne County.

The Prudhomme M. Co. has been reorganized and operations will be increased in the spring, says the Independent, when it is intended to add five stamps to the mill. F. Prudhomme has given an option to the Prudhomme M. Co. on the Prudhomme quartz mine, near Carters, for $4000; 25% of the gross proceeds from ore milled are to be paid to Prudhomme, who is superintendent.

F. Danford of Los Angeles has bought the eastern extension of the Galena quartz mine, near Groveland, for $7000. Danford has also bought the Tuolumne Chief quartz mine (formerly the Boxer claim) and has a bond on the Galena claim for the Tuolumne Chief Con. G. M. Co.

The Big Casino M. Co., operating near Groveland, is putting the hoisting engine in place. The gallows-frame is up and the boiler set. The roller mill is on the ground. Superintendent O'Brien expects to resume full operations by Nov. 25th.

At the Mt. Jefforson mine at Groveland twenty stamps are dropping steadily on ore from the 100-foot and 500-foot levels.——The Longfellow M. Co. is putting in a 5-stamp mill. The water is being pumped out of the Longfellow shaft.——At the Providence mine, near Carters, forty men are at work. This week sinking will be resumed at a depth of 1164 feet in the incline shaft. It will go down 150 feet additional.

A. M. Divoll, for $10,000, has bought the Hiyahpoo quartz claim 4½ miles northeast of Columbia.——N. C. Merrill of Denver has bought a half interest in the Eva quartz mine, near Columbia.

The Carlotta and Pennsylvania mines, near Carters, have resumed operations under the management of J. C. Woods. Denver, Colo., men are interested.

The mill at the Vine Spring mine, near Columbia, will be enlarged and five stamps added. A cyanide plant, an assay office and boarding house are being built, says the Independent.

F. Danford of Los Angeles has bonded the Mt. Zion quartz mine, east of Groveland, for eighteen months. Operations will begin next week, says the Prospector.

It is reported that operations will be resumed at the Kanaka mine, near Groveland. Superintendent De Sallier is arranging to put men to work.

Summerville and Soulshyvillo union miners are reported to have run the Chinese out of the Black Oak mine and the town of Soulsbyville. The Black Oak mine at Soulsbyville was shut down on the 10th inst. as a result. Trouble has been brewing for some time on account of the employment of Chinese as ore sorters. About 150 miners went to the mine and demanded that Superintendent W. G. Scott agree to employ no more Chinese. He refused to accedo to their demand. The delegation then escorted the Chinese out of the camp, taking them to Sonora. The mine owners are determined to keep the mine shut down for an indefinite period.

Yuba County.

Barrier No. 2 on the Yuba river, below Smartsville, has been completed and the work will be officially inspected next week. The contractors have had 100 men employed, besides a number of teams. The work of opening a stone quarry for Barrier No. 1 is under way.

COLORADO.

A strike is on in the coal mines of Colorado, 10,000 men having gone out on the 9th inst. by order of the United Mine Workers of America. Of the idle men 6000 are in the southern coal fields, 2000 in the northern coal fields and 1800 in Fremont county. One hundrod mines have been closed. A few independent properties in the northern fields and elsewhere will not stop work, since the operators have agreed to concede the eight-hour day and also increase wages. Reports of the 11th say independent coal mines are one by one making terms with the strikers which is expected will have an influence with the two principal operating corporations. It is also said negotiations are pending between the Colorado Fuel & Iron Co. and the Victor Fuel Co. at Trinidad, the principal southern field, whereby a settlement may be reached by the end of the week. The United Mine Workers of America has furnished transportation to large numbers of the strikers to go to the Texas and Oklahoma coal mines.

Clear Creek County.

There are several development tunnels being driven in Idaho Springs district. The central tunnel of the Big Five Co., driving for Edgar, Belman, Dove's Nest, Bald Eagle and Calvin lodes, is progressing. Two tunnels of importance are driving at Fall river; one, the Lucania, which is cutting into Bellevue mountain at 750 feet, opened two veins, each 12 feet wide, but of low-grade mineral. The company has forty claims within the distance of 3000 feet. Considerable depth is being attained and the bore is going in at rate of 5 feet per day.

The Big Five Federation proposes to build a 100-ton mill below the mouth of the Central tunnel, near Idaho Springs, which will cost $40,000, says the Times. The dump rock from the tunnel is being graded down Clear creek and a bridge will be built across the creek. The ground below the mouth of the tunnel to the Jackson mill is owned by the Big Five. The mill will be built in units of 100 tons capacity, and the first unit will have a complete sampling arrangement. By April it is expected the Shafter mine will have been cut by the Central tunnel and the ore from this and the Edgar and other veins will assure a production to keep the mill busy.

W. E. Renshaw, manager of the Con. Gem M. Co., near Idaho Springs, says that prior to building the mill at the mouth of the Newhouse tunnel the capacity of the Newton mill will be doubled. This will be on the site of the old State ore sampler, which was bought by the Gem Co.

It is expected work will be resumed on the McKinney and other claims, near Georgetown, leased and bonded by Kelso & Co. The face of the drift shows streaks of iron and copper which assay in gold.

Conejos County.

La Jara G. M. & M. Co. has bought a group of claims on Mount Blanca, near Alamosa. The property will be worked in connection with the Commodore mine and shipments of ore will begin this week.

Custer County.

At the Bassick mine, near Silver Cliff, the output is 225 tons a day, which is treated at the mill near the mine. The value is said to be greater than formerly when the rock was shipped.——The tunnel being run to connect the Rappahannock and Free Coinage shafts is completed. A shoot of gray copper ore has come into the vein that assays 50 ounces silver, $10 gold and 6% in copper. The tunnel was driven 146 feet, requiring seventy-two shifts. The properties are at Rosita, and are operated under lease and bond by J. T. Shaeffor and Dr. Bain. The Delaware is also in the group.

El Paso County.

President C. L. Tutt of the United States R. & R. Co. says work is being resumed at the Colorado-Philadelphia chlorination mill in Colorado City to make a test as to whether the tailings at the Standard mill can be worked at a profit. He says several thousand tons of the tailings have accumulated, and there is a profit for them if a cheap process of extraction can be discovered. The Colorado-Philadelphia plant has been idle for the past year and a half. All other plants are working, but not on full time.

Fremont County.

The Union Oil Co. of Boston, Mass., has leased 17,000 acres in the Florence oil field and will start operations next week by sinking two holes to depth of 2500 feet.

Gilpin County.

B. G. Granville, of the Eagle mill and the Franklin concentration plant on North Clear creek, reports having bought the Buckley mine on Gunnoll hill, near Central City, and has started operations with J. Loughran as superintendent. Ore is being broken and hauled to the Eagle mill and development work is being mapped out.

Gunnison County.

Pearson and Eckbert will drive a tunnel on the Buffalo group in Box Canon district, near Pitkin.——The Pueblo group of four claims, 1½ miles west of Bowerman City, was sold last week to W. H. Trout et al., for $5000.——The Colorado S. & M. Co. has driven its north Hall gulch crosscut tunnel, near Pitkin, for 500 feet. They have struck water, which is thought indicates a contact.——The contractors are driving the Leonidas tunnel ahead on West mountain.

Hinsdale County.

The Golden Wonder mine on Gold hill, 4 miles from Lake City, is being developed by a crosscut tunnel, which is nearing the ore bodies, says the Times.——In Alpine gulch B. N. Ramsey & Co. are running a 500-foot tunnel to cut the U. P. vein. Two shifts are at work.

The Hotchkiss Mountain M. & R. Co., owning and operating the Black Crook group of mines on Hotchkiss mountain, near Lake City, is having 500 tons of ore run through the Golden Fleece concentrating plant to determine a system of concentration that will separate the ore, making three products—lead, zinc and iron minerals. The gold values are mainly in an iron oxide and in tests heretofore, in saving the lead and zinc, the high-grade ore was lost in the tailings. The company proposes to build a mill on its group.

The Red Rover M. & M. Co., owning the Lillie group of mines up Henson creek, near Lake City, will start up next week after a shut down of several months. The Lillie is equipped with a 60-ton mill. G. Staples of Lake City is superintendent.

San Miguel County.

J. Ekman, manager of the Calumet M. Co., operating on Bear creek, near Telluride, says he will keep men on development work during the winter. He has opened up ore showing free gold.

Teller County.

W. H. Gilbert, manager of the Milwaukee Leasing Co., operating on the Lo Clair claim at Anaconda, is shipping one carload of ore per week, giving returns of three ounces gold per ton. The shoot in the south drift has widened to one foot. When the shoot was first cut in the shaft at depth of 335 feet it was 1 inch wide. The vein is fluorite, sprinkled with sylvanite. Gilbert has twenty men at work and is drifting north and south on ore. Preparations are being made to put in a heavier plant of machinery, with air compressor and drills.

H. W. Mitchell of Colorado Springs, secretary, says the Hummor G. M. Co. has been organized and has taken over the property of the Humholdt G. & S. M. & M. Co., in Cripple Creek district.

IDAHO.

Blaine County.

The Idaho Con. M. & D. Co., Ltd., has been organized at Salt Lako City, Utah, with the principal place of business at Soldier, Idaho. Its directors are J. B. Gioske, F. Housman, J. D. Caldwell, W. H. Millard, J. H. Herrington and W. Wagoner. The company owns the Goldon Rule group of seven claims on the Big Smoky river, and the Sally Slim group of five claims on the South Boise river. They are argentiferous galena claims.

The Lipman Mines & Tunnel Co. has been incorporated at Salt Lake City, Utah. Manager M. H. Lipman says their holdings near Hailey and at Bullion consist of a group of mines adjoining the Red Elophant on the west, the Bullion and the Mayflower on the east. In their development he has driven into the group a distance of 650 feet, where a ledge was struck, the ores showing 28% lead, 240 ounces silver and $6 gold per ton. In addition to the first-class ore, the vein, 8 feet between walls, contains considerable milling ore, for the concentration of which a plant will be built. To gain depth of 1200 feet on the ledges, to drain them and to provide outlet for the ore, the company will drive a tunnel from Red Elephant gulch. H. M. Wells is president; and F. J. Kiesel, W. A. Nelden, F. Harris, M. H. Lipman, R. S. Wells and C. E. Hudson are directors.

Boise County.

C. Wilkie of Idaho City for a Portland, Or., company, has a bond on a group of five quartz claims in Gambrinus gulch, 7 miles northeast of Idaho City. The group includes the United States mine and the Washington mine.

Idaho County.

C. W. Ray of New York, manager of the Comstock G. M. Co. of Thundor Mountain, says the showing made by recent development work has proven satisfactory, and the company will put in a 100-stamp mill next season, reports the Weiser Signal.

F. Brown, superintendent and manager of the Jumbo M. Co., operating at Buffalo Hump, says 150 men will be employed in the mining properties of the camp during the coming winter, and 500 persons will winter there. Brown is interested in the development of the Del Rio, an extension of the Jumbo on the south. It consists of four claims, and the ore body has been opened at depth through the lower tunnels of the Jumbo.

Shoshone County.

Bedrock was struck last week by the Eagle Creek G. M. Co.'s hydraulic elevator at the mouth of Fancy gulch, near Murray, at a depth of 47 feet, says Superintendent J. F. Murphy. The bedrock consists of a crushed quartzite, which can be shoveled up for a depth of 18 inches.

It is reported the Blackhawk mine, which has been closed for a month, is resuming. The mine works twenty men. It is near Government gulch, near Wardner, and has a big body of silver-lead ore.

At the St. Louis & Idaho Co. mine near Burke, which adjoins the Hercules to the south, Superintendent Collins has run 146 feet in six weeks on the 325-foot crosscut tunnel being driven to the ledge. At a meeting of the stockholders it was decided to allow the Hercules Co. conditional right of way through the St. Louis & Idaho ground for their proposed 2½-mile tunnel from the mine to Burke, to be used in hauling ore from the mine to the railroad. This tunnel will tap the St. Louis & Idaho Co.'s two ledges at 1000 feet depth below the surface. The St. Louis Co. reserves the right to also use the traction tunnel for taking out ores.

KANSAS.

Cherokee County.

Twonty acres of the Tom Clark forty, where the lead shaft is located, near Baxtor Springs, have been leased by Wheaton & Goodwell of Joplin, Mo., and T. J. Morrow, of Baxter Springs, and work of opening up the ground was begun last week.

At Baxter Springs Goodwin & Wagner, backed by Kansas City parties, are sinking on their lease. They are down to the 50-foot level, where the first ore was struck. They have put in a steam plant, including machine drill. They will run double shifts. They will let a contract for a shaft 185 feet deep on the Bingham lease, south of the Perkins workings.——The Sunnyside has its boiler plant in operation. The mine is being unwatered and it is proposed to build a milling plant.

Porkins, Keashy & Co., near Baxter Springs, are sinking two shafts, one on the Crawfish land and the other on the Bluejacket tract, both of which they have under lease.

MISSOURI.

Jasper County.

W. G. Bryant and J. W. Durby have bought the Sperry-McLain M. Co.'s mill and mine at Neck City, says the Joplin News-Herald.

E. Carmount has bought the Haggard mine and mill on the Cornfield and J. B. Chattleton of Joplin is superintendent.——C. C. & G. H. Playter, G. T. Fletcher, C. B. Rice, T. C. Creighton and B. W. Lyon have incorporated as the Highland M. Co., to operate near Joplin.

A strike of ore has been made in the Tusing shaft on the Stewart lease, south of Zincite, says Superintendent Tusing. The shaft was down 128 feet. With M. Maholl and J. Peel, they have four lots, with a twelve-year lease.

At Ragville, near Duenweg, additional ore bodies are being opened up. On the J. Collings land, 2½ miles southeast of Duenwog, along the ridge from Oronogo to Granby, a mine is being developed by Fehr et al. High-grade lead and zinc ore is being raised from a drift at a depth of 125 feet. A drill hole 50 feet from the shaft shows 30 feet of ore. As soon as the ground is sufficiently opened up a mill will be built.——The Hardin and Keokuk mines are being developed, and at the mines on the Burch land two mills have started up.

Lawrence County.

The Sand Ridge plant at Aurora was in operation last week on tailings and dirt taken from the upper drifts. Work will be started this week on the lower levels. J. M. Maret of the Sandy Hill mine is also superintendent of the Sand Ridge.——The work of putting in the plant at the Big Bonanza mine at Aurora is progressing. The steam jigs and the boilers are in place. Work underground continues.

MONTANA.

Governor Toole has called a special session of the State Legislature to meet December 1 at Helena, to pass laws that will relieve the industrial condition in Montana, the result of the Heinze-Amalgamated litigation, which closed down all the properties of the Amalgamated C. Co. in the State. Because of this action, President W. Scallon, of the Amalgamated, says work is being resumed in all their properties. In Butte 6500 men are back, in Anaconda 2000 men are again at work in the Washoe smelter and at Great Falls the Boston & Montana smelter has started with 2000 men. The other properties of the Amalgamated in Idaho and Wyoming will be started up.

Beaverhead County.

A company of Pittshurg, Pa., men has bought a group of twelve copper claims on Birch creek, near Dillon, heing the Last Show, Gagnon, Standard, Mother Lode, Gold Leaf, Golden Treasure, U. S. Treasure, Lookout Fraction, Squaw, Indian Chief and Gladstone. G. M. Snow of Nampa, Idaho, is consulting engineer. The U. S. Treasury mine has produced iron ore which was used hy the Hecla Con. M. Co. for fluxing. The principal work has hoen done on the Golden Treasure claim. A shaft is down 150 feet, with 170 feet of crosscuts and levels and a tunnel 130 feet long.

Fergus County.

Work is progressing on the Victor group, at the head of Plum croek, near Kendall, says M. Dunn of Great Falls, part owner.

Superintendent C. T. Durrel of the Chicago-Montana M. Co. in Whisky Gulch, near Kendall, says they have begun crushing ores from the Big Six group in the Whisky gulch mill. He has mon at work on the aerial tramway from the Big Six to the mill. The tram will he 3900 feet in length. A 200-ton ore hin will be huilt at the mines.

W. G. Moore is operating a diamond drill on the Norman group, south of the Kendall bonanza, near Kendall. The drill is down 600 feet and it is reported to be in porphyry.

Jefferson County.

The flume huilt for the concontrator of the Cataract C. Co. in Cataract district, near Basin, is finished and water turned on in the mill, says the Basin Progress. The flume is 12,400 feet long and 600,000 feet of lumher was used in its construction. The water is takeu out of the Boulder rivor at Red Rock. There are two tunnels, one 80 feet in length and the other 25 feet, and two trestles of 350 foet and 380 feet, one crossing Sullivan gulch being 30 feet in height. The water has a fall of 2 inches in 100 feot, giving the current a velocity of 5 feet a second. The water was heretofore pumped from the river to the top of the mill.

The Basin & Bay State M. Co. at Basin last week leased the mine to the Jefferson County M. Co., which company includes some of the stockholdors of tho Basin & Bay State Co. Development will be increased and the concentrator put in operation.

The Basin-Comstock M. Co. has been incorporated by W. A. Kidney and A. S. Ray of Basin, H. Layne, C. Sturtevant and W. Banden of Butte, to operate near Basin.

Work is reported progressing on the smolter under construction on Jack creek, near Basin, for tho Cataract C. M. Co. It is expected to have the smelter in operation by Dec. 15th. Work has been delayed by lack of lumher. The buildings are up and work on the foundations for the furnace and machinery begun.

Mulvahill & Ely of Helena have heen granted a thirty-day extension of their lease and bond on the Daly properties at Wickes. Tbey are planning to put in a larger mill and have beon held back by a shortage of water, but expect to start building this month.

Lewis and Clarke County.

E. Hanschka aud G. M. Johnson, of Deadwood, S. D., have bought and bonded 400 acres of mineral 40 miles north of Helena, and expect to put up a mill in the spring. Timher and water are at hand. They will use stamps and plates, and a cyanide plant will also be added.

The Standard Ore Co. of Helena, J. C. Cory superintendent, which controls the Jay Gould group, near Helena, has decided to put in a 30-stamp mill, instead of the 20-stamp as at first proposed, as well as a cyanide plant.

J. R. Quigley, operating near Ophir, reports taking out molybdenite. A tunnel has been run 430 feet, and at 350 feet the vein was struck and has heen cut for 45 feet.

Madison County.

In running the tunnel by tho Garnet G. M. Co., near Pony, 200 feet from the mouth a blind vein was cut, 11 feet in width, with 2 feet of ore carrying gold and silver, and 9 feet of milling rock. This find is 300 feet from the 20-stamp mill of the company. A contract for an additional 1000 feet on the same tunnel has been let to D. Phillips of Basin, making the work, when completed, 1300 feet in length. Phillips is fixing up the ditch and will install an air compressor, receiver, drills, etc.

W. W. Morris is operating the Clipper and Boss Tweed mines, near Pony, under lease. The Strawberry 10-stamp mill, also owned by Morris, is being overhauled and put in shape to treat tho second-class ores. Electric power will operate tho mill and light the mino workings.

A strike is reported in the shaft of tbe Oregon mine, near Pony, under bond and lease to C. Wiedeman. He is building a 5-stamp mill and putting in a 25 H. P. gasoline engine. The structure is large enough for five additional stamps, which will he placed later. The tailings will be cyanided in the gulch helow the mill.

Missoula County.

R. Daxon of Wallace, Idaho, president of the Tarhox M. Co., operating on Packer creek, 2 miles north of Saltese, says he has increased the numher of men at work and are drifting west on the 400-foot level in the shaft. A crosscut of 100 feet from the hottom of the shaft proved the vein 26 feet wide, with 10 feet of concentrating ore. It runs 15 ounces in silver and 20% lead. It is proposed to build a 120-ton concentrator.

Silver Bow County.

The smelter of the Pittshurg & Montana C. Co. at Butte is expected to he ready to receive ore hy Jan. 1. C. M. Allen is superintendent.

NEVADA.

Douglas County.

The Nevada Placer G. M. Co., operating on the North Fork of the Carson river near Gardnerville, is concentrating 300 tons of gravel into hlack sand, which assays $100 per ton, says the Courier. The concentrators are handling twenty tons of gravel per day.

Esmeralda County.

At the Midway mine at Tonopah the east and west drifts on the 535-foot level continue to produce ore. The ore will he worked at the mill heing erected on the Midway ground. It is reported negotiations are under way to consolidate the Silver Top with the Midway group.

Last week L. L. Patrick made tho first payment of $5000 on the Combination group of claims, in Goldfield district—formerly the Grandpa region—25 miles south of Tonopah, whicb he has hought for $75,000. The property comprises thirteen claims, on all of which some work has heen done. A. M. Myers is superintendent.

The drift wbich is being driven for air toward the North Star mine at Tonopah is going ahead, and the North Star has put in two shifts of men driving west toward the Montana-Tonopah. Connection is expected to he made hy Dec. 1. The winze on the ledge, 200 feet north of the shaft on the 512-foot level, is down 30 feet and in ore. During month of October the shipments from tbe Montana-Tonopah aggregated 270 tons. The size of the ore house has been doubled and a second grizzly put in. The company will also put in a rock breaker, and in future shipments will consist of only one grade of ore instead of two.

It is reported the Adolf Weher mines on Cat creek, near Hawthorne, have been bonded to C. Brougher of Tonopah for $15,000. The property consists of a group of eight claims, which show ledges of free-milling gold ore running $6 per ton, says the Walker Lake Bulletin. Timber in abundance is on the ground, also water for milling purposes.

Eureka County.

(Special Correspondence). — The Williamsburg mine, on Adams hill, a former producer, is showing prospects of ore in the quartz-porphyry. The Williamsburg is being developed hy R. A. and W. Laird and Young Bros. on a lease. A hoisting plant has been built.

J. McNaughton, owner of the McNaughton mine, has taken out high-grade ore from depth of 600 feet and proposes to increase development work this winter. The McNaughton adjoins the Silver Conner, on which lessees are driving a tunnel to take ore from the main shaft near the third level.——M. Hartnett is developing the Industry mine, near the Diamond Co.'s mines in New York canyon.

E. P. Low will open up his group of claims south of Eureka.——Negotiations are under way with New York men who propose to buy the Silver Conner mine.

The proposed construction of the Western Pacific Railroad through Diamond valley, 8 miles north of Eureka, is encouraging mine owners in Eureka district. A cheaper froight rate on ores to Salt Lake would cause increase of mining operations.

Eureka, Nov. 10.

Lincoln County.

Superintendent A. B. Day of the Searchlight M. & M. Co., at Searchlight, has put on more men and work in progress consists of sinking the main shaft and of making air connections with the incline shaft. The main shaft has heen equipped with a wbip. The bottom is in ore.

Superintendent Harrington of tho Quartette M. Co. at Searchlight is developing his supply of water in order that ten stamps may be added and the mill kept running continuously. He will use the water in the Good Hope shaft. Manager Carper of the Good Hope will put in a pumping plant and raise the water to the surface; it will then he piped hy the Quartette Co. to its mill—a distance of 1000 feet. To further increase the supply a well has heen sunk at the foot of the tailings ponds and drifts are heing run from the hottom of the well to catch all seepage. It is not expected the mill at the river will he run this winter. The electric light plant is in operation. All the surface huildings have heen wired and also the main working shaft.

The Newport-Nevada M. Co. of Fay has made arrangements with the Shawmut & Nevada Co. wherehy they are to receive all the waste water from the Horseshoe tank on the summit, which will be used to operate the Homestake mill, says the Stateline Oracle.

G. E. Otis and the Cyrus Noble M. Co. have hought the W. H. Bainhridge interests in a group of three claims adjacent to the Cyrus Noblo group near Searchlight.

Nye County.

At the Hasbrouck mine, near Tonopah, machinery is on the ground and hoing set up. The working shaft, 125 feet north of the croppings of the main ledge, is down 30 feet and progressing. The tunnel, which is in 485 feet, will be completed within the next 40 feet.

Storey County.

The annual report of Superintendent J. R. Ryan of the Con. Cal. & Virginia mine, at Virginia City, shows the aggregate quantity of ore taken out during the year ended Sept. 30, 1903, was 4657 tons. There were carried over from the previous year ninety-nine tons of ore, assaying, on a hasis of gold value, $15.78 per ton. During the past year 3267 tons of ore were milled at the Kinkead mill, yielding $22.78 per ton. Thcre were sold to the Selhy S. & L. Co. 521 tons of ore, yielding $103.83 per on. In all the above, silver is calculated tat 1.2929 per ounce. There were 4880 ton of tailings sold, for which $868.08 was received.

White Pine County.

Manager P. H. Cannon of the Old Imperial M. Co. has men at work opening up a body of gold and silver ore in the Last Century mine, near Cherry Creek.

A. H. Vaugbn of Seattle, Wash., has hought the Ella J, Mabee, Burnt Timber, Shortly, Dubacon and Climax, silver-lead producing mining locations, on Mount Washington, 20 miles south of Osceola, says the Ely News, for $6000.

The Grand Deposit C. Co. has been incorporated by J. Stanton, J. S. Page and P. de P. Ricketts, to operate the Grand Doposit group of claims at Muncoy creek, near Cherry Creek.

The Midnight and north half of the Wild West claims have heen bonded and leased to F. Herrell et al., who are taking out ore from both claims, which are in Cocomungo, near Cherry Creek, says the Cherry Creek Minor.

NEW MEXICO.

Dona Ana County.

Considerable mining activity is reported around Victoria, between Hachita and Hermanos in Grant and Luna counties, says the New Mexican. A smelter and a railroad branch are proposed. Fourteen miles south of Victoria on hoth sides of the International line, a numher of copper prospects are being developed. A Denver, Colo., company is interested and has surveyed a railroad from Victoria to the mines, a distance of 14 miles. The district is being prospected for water with a view to building a smelter. F. K. Wyman and J. Corbett of Deming have started work on the Jessie and Helen claims in this district.

Grant County.

A strike of copper ore is reported made on the property of J. L. Bevers, between Hanover and Fierro, under lease to the Con. M. & S. Co., which .operates the smelter at Cerrillos.

The National G. & S. M. & M. Co. expects to have its smelter at Steins Pass running this week. The company owns the Beck mine, which carries values in gold and silver.

J. Sterling of Lordsburg, manager of tbe Consolidated M. Co., says they have bought a group of mining properties at Gold Hill, and will build a mill.

Lincoln County.

The Dividend M. & M. Co. will resume operations at Estey City next week. A reduction plant has been built. The water supply has heen short, but thoy will sink a well to the depth of 2000 feet if necessary.

Luna County.

The concentrator which was bought by the Sierra Florida M. Co., near Deming, bas been overbauled and additional machinery put in. It will he roady to start by next week.

Rio Arriba County.

The Ponnsylvania M. & M. Co. group of mines in Bromide district, between Hopewell and Tres Piedras, was sold last week at Tierra Amarilla at Sheriff's sale to W. J. Kennedy of Pittsburg, Pa. Work will he resumed on the Mineral Point mine at Tres Piedras. The Mineral Point has 5 feet of ore which runs $10 in gold, hesides silver and copper, says the New Mexican.

Sandoval County.

The Otero sulphur mills at Sulphur, 50 miles west of Santa Fe, are running at their full capacity, and twenty men are employed. Additional machinery will he put in to increase the capacity. The United States last year consumed 520,537 tons of sulphur, exclusive of sulphur recovered from fumes from roasting hlende. Three-fourths of that entire amount was imported in form of brimstone from Sicily and of iron and copper pyrites from Spain.

Santa Fe County.

Work on the Hazleton mine, near Golden, resumed this week. The Argo M. Co. has heen sinking a shaft on the Hazleton mine, which is now down 490 feet. At the 478-foot level a vein was found carrying free gold, hut the main ore hody, which is 3 feet wide, is refractory, and a reduction plant will be huilt. Sinking will continue.

Sierra County.

The main shaft of the El Dorado mine, near Hillshoro, is heing timbered hy the Bigelow G. & C. M. Co. A whim is heing set up and sinking will be resumed. The main shaft will he sunk to a depth of 500 feet.——The connections between the pumping station and the mill of the Ready Pay pipe line, near Hillshoro, has heen completed and the mill started up last week. The capacity of the water plant is 2000 gallons per hour and the water supply for ten hours is sufficient to keep the mill running twenty-four hours.

Taos County.

J. T. Erickson of Cripple Creek, Colo., P. E. Erickson, J. F. McMahon and J. E. Collior havo a bond and lease on the Westoby-Reed-Oldham interests in the Golden Treasure mine at Red River, giving them a controlling interest. Men will he put to work on the mine this week. It is near the Jayhawk, Gold Coin, Scarlet, Banner, Golden Calf and other claims.

OREGON.

Baker County.

W. C. Rutter, of Seattle, president of the Kittanning M. Co., operating the Big Four group, near Sumpter, says he will start a crosscut to be carried a distance of 700 feet to open up the vein, and will give depth of 500 feet.

The Fortune M. & S. Co., operating in Greenhorn mountains, near Greenhorn, proposes to put in mills on both the Humboldt and Red Lion mines. The plants will be 20-ton grinding mills. R. N. Jackson, of Baker City, is president.

The Geiser-Hendryx Co. is arranging to put in a heavier sinking plant for the Gold Pan mine, near Sumpter. A 10-stamp mill will also go in. The present hoisting machinery will be taken out and transferred to the Tabor fraction, operated by the same company. The vein at the Gold Pan at the 200-foot level on the inclino has been eut, showing a width of 16 feet.

Work has been hegun on the stamp mill for the Golden Wizard mine, near Sumpter, says Superintendent McPhee. It will be a 12-stamp mill, rapid drop, quadruple discharge, with amalgamation, concentration and cyaniding of the roasted concentrates on the ground. The stamps will weigh 1000 pounds each. In addition the plant will be equipped with five table concentrators.

Superintendent J. Reed says the Auburn Deep M. Co. will take up the bond it holds on the Auburn placers at Auburn.

The Pine Creek placer mine, 22 miles from Baker City, has been sold to E. F. Zinns et al. of Chicago, Ill., for $60,000, says the Sumpter Miner. Machinery for hydraulic and dredging operations is heing taken in.

C. R. Aldrin, manager of the Tempest mine on the head of Granite Boulder creek, near Greenhorn, says he has heen developing water power for future operation of the property. He has acquired water rights in Boulder creek and will develop 800 H. P. by fluming 1 mile. The fall is 400 feet. Devolopment work in the mine will be increased.

A 25 H. P. hoist is being set up by the Mammoth M. Co., near Bakor City, says M. Whelan, manager. The Mammoth is east of the Virtue mine and is developed to depth of 320 feet.

E. P. Bergman of Sumpter is developing the Ole Bull group of claims in Cracker Creek district. The main tunnel is in 100 feet and ore is showing. The group is near Hanover. —— A 12-foot vein of ore,

carrying $10 per ton, is reported opened in the north stope of tunnel No. 5 of the California mine in Cable Cove district, near Sumpter, says Manager Bellman. He is driving to the north of the old workings. —— Manager Costello of the Storm King group, in Cable Cove district, last week put on more men. The tunnel is going ahead on the ledge.

The Ladd Metals Co. of Portland is building a smelter at Homestead, on the Oregon side of the Snake river, near the Iron Dyke mine, to treat ores of that district and from the Seven Devils, Idaho, copper mines. The rebuilding of the Ladd Metals Co.'s smelter at Mineral City, Idaho, is about completed and is expected to be ready to blow in next month. The copper-gold-silver mines of the Mineral City camp are accumulating ore for treatment. Work on the Homestead smelter is delayed owing to difficulty in transporting machinery. A sampling works is also being built.

The Badger group of claims, near Blue River, has been sold for $15,000 to the Oregon Blue River M. Co. of Philadelphia, Pa., of which W. T. Wykoff is president. W. L. Beckner is superintendent. It is intended to equip the property and run a tunnel 300 feet. It is near the Sunset group, owned by Dodge & Runyard.

Douglas County.

G. H. Scott, A. Mutz, L. Dohbin and O. Mercer, having leased coal properties 3 miles from Roseburg, on the Southern Pacific railway, have incorporated the Fernio Coal M. Co., with H. Smith as superintendent. The lease was for twenty-five years. The coal is a lignite, and there are said to be several seams, varying in width from 3 to 7 feet. A steam pump is being put in to unwater the prospect holes. The Southern Pacific will put in a 3-mile spur.

Grant County.

N. E. Berkloy of Pendleton, interested in the Buffalo mine, near Granite, says operations will be resumed on the group this week.

O. O. Benson of Portland has men at work on his Gold Staudard group in Rabbit Creek district and reports breaking into ore. The Gold Standard adjoins the Gold Bug.

Jackson County.

Besse & Co. of Seattle, Wash., are putting in a 2-stamp quartz mill on the Pilgrim mine for prospecting a group of eight claims they have under bond known as the South Extension of the Pittsburg on Wagnor creek, near Ashland.

Josephine County.

The May Queen, Double Standard and Silver Standard quartz claims on Mount Baldy, near Grant's Pass, have been bought hy the May Queen M. Co. of Albany, N. Y., and development work is under way. The lodge on the May Queen is 5 feet in width, carrying values in free gold and sulphurets. There is a 2-foot shoot in this ledge from which quartz has been shipped to the smelter, giving returns of $26 a ton. A. A. Cameron of Grant's Pass is superintendent.

Malheur County.

In Morning Basin district, near Malheur, the Boston Co., which bought the Tarhall mines, is putting up several buildings and is erecting a hoist, the machinery for which is on the ground. The tunnels and underground workings are being timhered with 8x8-inch sawed timber. It is expected the company will build a 10-stamp mill. —— The California group, across the hasin from the Tarhall, owned hy Portland men, is heing worked continuously. Ore is heing taken out and stored for treatment; W. E. King, superintendent. Adjoining the California group is a property being operated hy an Oregon City company under the superintendency of P. Wells of Oregon City.—— The Rainbow is heing steadily worked and the ore taken out is hauled to a quartz mill 2 miles distant on South Dixie creek. The ore averages $40 to the ton.

Union County.

The Eastern Oregon M. & M. Co. has heen incorporated and proposes to build a 250-ton smelter at North Powdor, hetween La Grande and Baker City, on the O. R. & N. Plans are heing made to connect the smelter hy electric lines with the mines of the outlying districts. Water powor will be secured from Anthony creek, says the Portland Telegram.

SOUTH DAKOTA.

Lawrence County.

The Wauconda C. M. Co. is preparing to take out copper ore which will he hauled ½ mile to Woodville on the Burlington railroad a nd shipped to a smelter at Rapid City. The ore is said to average 8% in copper and $3 gold per ton. Superintendent F. Ames says in one shaft thoy have opened at a depth of 85 feet a vein of free-milling gold ore averaging $4 per ton. A hoisting plant is being built and a mill is also proposod.

UTAH.

October in the ore and bullion market closed on settlements aggregating $2,125,-395, exceeding all previous records, says the Salt Lake Tribune, though the tonuage from Tintic's principal producers was, for an interval, entirely overcome hy a fire underground. In addition to settlements in open market the copper plants operated by the indepeudent companies were productive of copper hullion containing gold and silver, for which $800,000 was received from the Eastern refineries, this making $2,925,395. The output of November is expected to exceed that of October, as the Tintic mines are again in operation, whilo the Boston Con. and Yampa of Bingham will next week begin forwarding several hundred tons daily. The copper output of the State during tho month reached a total of 3,356,200 pounds, carrying silver and gold. The product was distrihuted as follows: Bingham Con., 728,560 pounds; Highland Boy, 1,200,000 pounds; United States, 727,640 pounds; American, 700,000 pouuds. Total, 3,356,200 pounds.

The furnaces at Murray of the American S. & R. Co. exceeded their previous records during Octoher and reduced 42,-620 tons of ore. To handle the increasing tonnage which the miners are preparing to seud out the American S. & R. Co. will huild a copper plant besido that of its load blasts at Murray. The Newhouse mines at Frisco are ready for copper furnaces, as are also those of the Boston Con. at Bingham; while furnaces for reduction of the Yampa's copper-bearing ores are being rushed to completion.

The coal miners of Utah have been granted an increase of 10% iu their wages. Reports from the camps show that the advance has been goneral, the rate of pay being raised from $2.50 to $2.75 a day. The coal miners in Utah are reported to have heen unfavorable to the general strike movement started in Colorado this week. Utah coal minos employ 800 men.

Beaver County.

Manager Bettles of the Newhouse mines, near Frisco, says tho Wah Wah pipe line has been laid for a distance of 30,000 feet, and it will be completed hy Nov. 20. The line is laid with 14-inch pipe at each end and 12 inches in tho center, and the pipe works shipped the wrong dimensions first, which has delayed the work. The total length is about 37,000 feet. With the water delivered to the site of the proposed works at Newhouso work will proceed with construction of the smelting plant.

S. Nowhouse of Salt Lake City proposes to huild an electric power plant on the Beaver river, near Beaver City, to generate power for the Cactus mine and smelter at Frisco, says the Deseret News.

The Indian Queen M. Co. has been incorporated at Salt Lake City hy L. N. Morrison, E. E. Mork, J. M. Hansen and C. & K. Morrison, to operate the Indian Queen and Belcher claims, in Preuss district. near Frisco.

Juab County.

Shipments from Tintic district for month of Octoher were:

	Cars ore.
Bullion-Beck	2
Carisa	10
Centennial-Eureka	184
Eagle & Blue Bell	10
Eureka Hill	8
Gemini	15
Grand Central	94
Lower Mammoth	13
Mammoth	16
Swansea	17
South Swansea	28
Star Con	19
Yankee Con	18
Ten others, total	33
IRON ORES.	
Black Jack	21
Dragon Iron Mine	125
Noon Iron Mine	8
CONCENTRATES.	
May Day	2

The output of the Bullion-Beck, Centennial-Eureka, Eureka Hill and Gomini mines shows decrease, due to the fire which caused suspension for three weeks.

The office of manager having heen aholished by the stockholders of the May Day Co. at Eureka, the former duties of such will he attended to hy Superintendent Matthews.

Salt Lake County.

The Caitrow Co. expects to treat 150 tons of ore daily in the Winnemuc mill at Bingham, when it will remodel.

The Tilhurn M. Co. of Salt Lako City has heen incorporated to operate a group of six unpatented claims in Little Cottonwood mining district, near Alta, hy L. P. Palmer, Z. F. Scott, H. C. Edwards and F. O. Frick.——The Zenas M. Co. of Salt Lake City has heen incorporated hy Z. F. Scott, A. A. Barker, H. C. Edwards and F. O. Frick.

Tooele County.

The Greene Reduction Works will work over the tailings pond of the Sioux (or Farrel) mill at Robinson, which has been bought hy D. A. Depue.

Utah County.

The Signet G. & C. M. Co. of Salt Lake City has heen incorporated hy C. E. Steward, M. C. Moyer, A. W. Lister and E. E. George. The company owns the Siguet group of four claims, in American Fork district. The company has buildings up already and has started development.

WASHINGTON.

The gold receipts for the United States assay office at Seattle, Wash., for the first five years following its establishment, July 15, 1898, amounted to $73,364,790.18. F. A. Wing, assayer in charge, has compiled a statement of the receipts of the office for the five years ending July 15, 1903, as follows:

Nome, Alaska	$11,285,971.08
Balance of Alaska	2,654,037.79
Total for Alaska	13,940,008.87
British Columbia and Canada	3,428,780.47
British Yukon (principally Klondike)	51,812,114.37
Washington, Oregon, Idaho and Montana	1,153,856.47
Total	$73,364,790.18

For this period there were 25,000 deposits. The aggregate of gold weighed ahout 150 tons, avoirdupois. Since tho 15th of July of this year there has heen received at the Seattle assay office gold to the value of $8,581,000, which, added to the above total, makos the aggregate receipts to September 9th $81,945,790.

WYOMING.

Bighorn County.

The Bonanza Oil & Dev. Co., composed of local and Omaha, Neb., men, has hegun drilling operations to sink two wells in the Bonanza fields near Basin.

Carbon County.

Work is resuming at Three Forks camp on the State line, south of Battle. Galena and copper ores are heing opened up. The Three Forks M. & R. Co. is operating Three Forks, Battle Ax and a group covering 320 acres of placer claims. The Boston-Sierra Madre M. I. Co. is operating the North Fork group. The oro is chiefly galena, with gold, silver, iron and lime, though in places zinc replaces the galena hut carries equal values in the precious metals. The Boston company is making several improvements, including a shaft house and a heavier hoist. At Three Forks the altitude is 7600 feet above sea level. L. A. Pease is manager of the Boston company.

The Northwestern C. M. Co. of Grand Encampment has hought a three-fourths interest in tho Bacholor group of nine claims, lying 5000 feet west of its Forris-Haggarty group, and in the same formation as the Rudefeha mine.

Laramie County.

The Goshen Hole Fuel Co. has heen incorporated to exploit throe coal veins located in northern Laramie county, by W. Sturgis of Cheyenne, with M. Ryal and H. M. Thornton of Denver, Colo.

The Harvest Moon M. & M. Co. has heen incorporated hy G. A. Walker, H. T. Bruce and L. C. Treloar of Buena Vista, Colo., to operate in Laramie county and in Chaffee county, Colo.

FOREIGN.

AUSTRALIA.

Queensland.

At Rockhampton the Dawson Coal M. Co., adjoining the Dawson Island coal mine, has a diamond drill plant in operation. They will sink a working shaft. The Dunstan Co. is producing coal.

At the Mount Morgan mine at Mount Morgan exploration work continues with the diamond drills. During the quarter ended Sept. 30th 2000 feet of horing was done, chiefly towards tho west from the 650-foot level. Ores containing hoth gold and copper in payable quantities wore met with. Horizontal drilling will be stopped, and the ground below the 750-foot level will he tested. The quarter's output was 62,354 tons of ore, yielding 26,065 ounces gold. This is a decrease of 3266 ounces from that of the previous quarter, and $1.23 decrease per ton in average value. During the quarter 54½ tons of copper precipitate, estimated to contain 75% copper, were ohtained from the waste liquors. This is the mine's largest quarterly output of copper, which is expected to further increase.

An air compressor and machine drills have heen put in at the Columhia Extended mine at Gympie.

BRITISH COLUMBIA.

East Kootenay District.

T. R. Stockett Jr., general superintendent of the Crow's Nest Pass Coal Co., operating at Fernie, Morrissey and Michel, says now that the lahor troubles are over the regular daily output is 3400 tons of coal and 8000 tons of coke. Even without the new coke ovens, which are nearly finished, the output is more than the present demand, and there are 50,000 tons of coke on the dump awaiting orders. When the new coke ovens are in operation tho production will be 12,000 tons of coke daily. The October payroll of the collieries amounted to $147,850.

Slocan District.

J. Cory and J. Foster have a lease and hond on a group of claims comprising the Medford, Cinderella, Keiser and Keisor Fraction, along the C. P. Railway, half way between Sandon and Three Forks.

Vancouver Island.

Tho Western Fuel Co. of Nanaimo will put in a 400 H. P. air compressor, which is expected to be in operation by Jan. 15.

West Kootenay District.

R. G. McLeod of Seattle, Wash., has bonded the Spyglass mine, Poplar creek section in the Lardeau, for $35,000. Quartz carrying free gold and silver is reported found on this claim last month.

CANADA.

Alberta.

H. N. Galor of Phœnix, B. C., secretary of the International Coal & Coke Co., which is developing its coal measures at Coleman, on the Crow's Nest Pass Railroad, near Blairmore, says he has awarded the contract for tho erection of the first hattery of 104 coke ovens. The output amounts to 100 tons of coal daily, and shipments are heing made. The colliery inside of ten months is expected to be producing 2000 tons of coal daily. Three hundred additional coke ovens are to he built next spring, when the company will have 600 men on its payroll.

Cassiar District.

The extension of the area of alluvial deposits beyond the Pine creek watershed this season has increased the output of Atlin camp, says T. Lees, and has opened new territory. This summer a local company hegan to exploit the deposits of auriferous gravels which characterized the Upper Dixie watershed to the southwest of the Pine-Spruce valley. The Bull Creek Co. opened up tho stream of that name, under Superintendent A. Carmichael, who reports the following work done: Twenty-five hundred feet of ditch dug, delivery on the ground of 500 miner's inches of water, installation of a small hydraulic plant, and 350 feet of hose connecting the monitor with the pressure hox. Lumher and supplies were hauled over the mountains and a large quantity of gravel was piped through the sluices hefore tho season closed, with encouraging results. Operations will he resumed in the early spring.

HONDURAS.

United States Consul A. K. Moe, at Tegucigalpa, writes a discovery of coal is reported made in the mountains in the Department of Yoro, and the field has been named "El Porvenir." Examination and test samples of the coal taken from near the surface show it to be of coking quality. The foot wall is said to he formed of a silicate of aluminum and magnesium. The results of the examination seem to warrant the opening up of these properties. All coal used in Central America is at present hrought from the United States. The section in which the coal field is located is remote from railroads or other means of transportation, and the profitable operation of mines would requiro building of railroads to get the product to markets; hut present and prospective demands will justify the necessary expenditure if development of the field gives assurance of an adequate supply of coal of good quality.

MEXICO.

Chihuahua.

The Southern M. Co. of Kansas City, Mo., owning mines in La Dura canyon, 18 miles east of Morelos, will resume operations this week. The company has 700 feet of development work done on three of its properties and has a 3½-foot Huntington sampling mill. The ores are free milling gold. P. Murray of El Paso, Tex., is interested.

Superintendent Gasson of the Baltimore mine has development work started on the Kansas Boy mine at Santa Eulalia for F. Collinson of Clarendon, Tex., who has an option on the property, says the Enterprise.

Durango.

W. Pettit of Parral, Chihuahua, is reported to have bought fourteen claims near Inde for $120,000 gold. The ore is argentiferous galena, carrying some gold.

Oaxaca.

At Taviche the Compania Minera La Blanca de Taviche has heen organized

with W. A. Alexander, F. R. Warly, T. P. Keeler as officers. Work will begin this month.

The Elena M. Co. has been organized at Mexico City to operate the Elena group, near Tavicbe, with the following officers: W. W. Graham, D. Signorett, F. E. Gaines, G. W. Johnson, J. V. Bell, H. W. Howe, H. K. Black and J. A. Fraser.

NOVA SCOTIA.

The Commissioner of Public Works and Mines, in his annual report, says the gold fields of Nova Scotia extend from Canso to Yarmouth and cover (exclusive of the masses of intrusive granite) about 3000 square miles. The gold field strata, originally horizontal, have been folded into numerous undulations having a general east and west course and north and south dips. In these undulations, interstratified with the rocks, are the gold-bearing quartz veins. These veins, owing to the denudation of the crests of the anticlinals or undulations, are seen in long elliptical outcrops, while underneath are similar veins not seen at all on the surface. Where these lower veins, untouched by denudation, pass over the axes of the anticlinals, they thicken, forming "saddle backs," due to the favoring conditions of the strata. In addition to these intercalated veins, there are others cutting the strata, which have been successfully worked. Gold is found in the surface earth of several districts. Nova Scotia gold having a fineness of over 900 parts, occurs as free gold in quartz with sulphides of various metals. It is extracted in stamp mills, and the residuum treated for the gold lost in the mills. There are a number of districts scattered through the counties of Guysboro, Halifax, Hants, Colchester, Lunenburg, Queens and Yarmouth.——Indications of petroleum have been observed at Lake Ainslie, in Cape Breton and at Cheverie, Hants county.

ROUMANIA.

The development of the petroleum industry in Roumania is showing increased activity, being assisted by government regulations. During first six months of this year Roumania exported 52,485,328 kilogrammes of petroleum against 36,925,000 kilogrammes exported during corresponding period of last year. Of this quantity 13,716,397 kilogrammos have been exported to England, 12,363,000 kilo. to Germany, 9,930,000 kilo. to Austria-Hungary, 6,312,000 kilo. to France, 4,281,000 kilo. to Holland, 3,923,000 kilo. to Italy, and 1,103,000 kilo. to Bulgaria. The exportation to Bulgaria and Italy has increased. From April 1, 1902, to April 1 of this year 236,459 tons of petroleum have been refined in the country.

RUSSIA.

The 214 wells completed in the Baku oil field last year show an average depth of 1302 feet, and an average initial production of 292 barrels per well per day, against an average depth of 1086 feet, and an average production per well per day of 330 barrels for the 358 wells completed in 1901, says the Oil Reporter.

Obituary.

JOHN LYNCH, a pioneer miner of Nevada and California, died at Applegate, Cal., on the 28th ult. Deceased was a native of Massachusetts.

CHARLES CONNON, a mining man of Helena, Mont., died on the 9th inst. at Helena, after a brief illness. Connon discovered the Stray Horse mine, which he afterward sold for $60,000.

F. FRATES, who has been superintendent of the Ione Coal & Iron Co., on the railroad grant at Ione, Cal., for twenty-five years, died on the 31st ult., aged sixty-seven years. Decoased was a native of the Azore islands.

J. W. BEARD, a pioneer miner of Nevada, died October 29th, at Tuscarora, Nev. He went to Nevada in the late fifties and operated for several years on the Comstock. When Lander county was organized he became interested in the Newark mines, near Austin. In 1867 he went to Tuscarora, and was one of the discoverers of the district.

SUPERINTENDENT R. B. TURNER of the Koarsarge mine, near Virginia City, Mont., died on the 6th inst., being suffocated with seven miners while underground, as a result of the workings being filled with smoke from a fire in the surface buildings. Deceased had been connected with the Alder M. Co. for several years, formerly as superintendent of the Kendall mine, and then of the Koarsarge. He is survived by a widow and one son.

Personal.

L. HURD of French Camp, Cal., is in San Francisco, Cal.

J. W. PINDER has returned to San Francisco from Downieville, Cal.

J. H. MACKENZIE of San Francisco, Cal., is in Arizona on mining business.

E. J. KNAPP, a mine owner of Rampart, Alaska, is in San Francisco, Cal.

C. WONACOTT of Tonopah, Nev., is in San Francisco, Cal., on mining business.

G. Z. EDWARDS of Salt Lake City, Utah, is examining mines at Tonopah, Nev.

E. E. EVERETT is in charge of the Virginia City Mining School at Virginia City, Nev.

W. H. TIBBALS of Salt Lake City, Utah, is in Chicago, Ill., on mining business.

H. I. SEEMAN, manager of the Yankee Con. M. Co. of Denver, Colo., is in New York.

O. C. ZINNS is in charge of the 15-stamp mill of the Plumas G. M. Co., at Greenville, Cal.

E. GRAVES is superintendent of the Terenates Con. M. Co. at Parral, Chihuahua, Mexico.

H. SQUIRES has resigned as manager of the Golden Eagle (McDonald) mines, near Oro Blanco, Ariz.

T. C. GORRIE, recently superintendent at the Harvard mine, Jamestown, Cal., is in Haywards, Cal.

A. S. ELMORE, inventor of the Elmore system of ore concentration by oil, is in San Francisco, Cal.

P. A. WAGNER, interested in mining near Mackay, Idaho, has returned from there to Denver, Colo.

A. P. CANTERS is superintendent of the North Star M. Co. at Tonopah, Nev., vice C. McCarthy, resigned.

J. E. BAMBERGER AND J. D. WOOD of Salt Lake City, Utah, are in Galena, Nev., on mining business.

O. S. BUCKBEE is in San Francisco, Cal., from mines in Alaska, where he has been for several years past.

D. MCVICHIE, of Salt Lake City, Utah, manager of the Bingham Con. C. Co., is in San Francisco, Cal.

J. E. DOOLITTLE has returned to San Francisco, Cal., from an inspection of mines in Tuolumne county, Cal.

W. L. COBB, E. M., of San Francisco, Cal., is in charge of the Piute mine and mill at Piute, Kern county, Cal.

A. M. MYERS is superintendent of the Combination group of mines in Goldfield district, south of Tonopah, Nev.

G. H. ROBINSON, manager of the Tintic M. Co., returned to Salt Lake City, Utah, last week from New York.

W. L. REID, foreman of the Smuggler Union cyanide mill, has returned to Telluride, Colo., from Denver, Colo.

MANAGER C. W. WHITLEY of the American S. & R. Co. is in Leadville, Colo., from Salt Lake City, Utah.

G. S. PUTNAM has returned to Sutter Creek, Cal., from the Mina Espiritu Santo, at Cana, Darien, Colombia.

SUPERINTENDENT BAKER of the Old Glory mine, at Oro Blanco, Santa Cruz county, Arizona, is in the East on business.

H. G. A. BRUNNIER, superintendent of the Conlin mine, near Grass Valley, Cal., returned there last week from a trip to Iowa.

W. F. DEANER, manager of the La Plata mine, Leadville, Colo., is in the East on business connected with his company.

I. A. CAMMETT, of Denver, Colo., has gone to California, where he will spend the winter looking after mining and other interests.

R. H. PASCOE, formerly of Rossland, B. C., and Gem, Idaho, is superintendent of the Cornucopia mines, near Baker City, Or.

W. L. BECKNER is superintendent of the Badger group of the Oregon Blue River M. Co., near Blue River, Lane county, Or.

A. A. CAMERON of Grants Pass, Or., is superintendent of the May Queen M. Co., operating on Mount Baldy, Josephine county, Or.

JOHN ROSS JR., superintendent of the Wildman-Mahoney mine, Sutter Creek, Cal., is in Trinity county, Cal., making mine examinations.

C. M. ALLEN, former superintendent of the Colorado smelter, is smelter superintendent for the Pittsburg & Montana C. Co. at Butte, Mont.

W. R. THURSTON, who has been with the Mine & Smelter Supply Co., Denver, Colo., has been transferred to their El Paso, Texas, branch.

H. C. LAWRENCE, manager of the Sevier Con. mines, on Gold mountain, near Marysvale, Utah, is in Denver, Colo., on company business.

J. S. CRAWFORD of Grants Pass, Or., is in the East on business for the Cleopatra copper mines in Del Norte county, Cal., of which he is manager.

S. SMITH, manager of the Emma mine, south of Gwinmine, Calaveras county, Cal., returned last week from a two months' absence in Ohio.

T. H. OXNAM, manager of the Palmarejo and Mexican G. F., Ltd., returned to Los Angeles, Cal., last week, from their mines in Chihuahua, Mex,

C. MCCARTHY has resigned as superintendent of the North Star M. Co. at Tonopah, Nev., to devote his time exclusively to his own mining interests.

MANAGING DIRECTOR HOLDEN of the United States M. Co. returned last week to Salt Lake City, Utah, after an absence of several weeks in the East.

W. G. LAMB of Salt Lake City, Utah, for seven years secretary of the Silver King mine of Park City, has resigned and is succeeded by J. A. Malia.

G. STAPLES, of Lake City, Hinsdale county, Colo., is superintendent of the Red Rover M. & M. Co., operating the Lillie mines near Lake City.

C. M. HAMPSON, M. E., for a number of years with the Colorado Iron Works of Denver, is now with the J. G. Leyner Engineering Works of Denver, Colo.

CHARLES BUTTERS, manager of cyanide plants in Sonora, Mex., and at Virginia City, Nev., is in San Francisco, Cal., from London, Eng., via Salt Lake City, Utah.

A. J. MCMILLAN, of Rossland, B. C., managing director of the Le Roi and Snowshoe mines, is in the East, en route to England. He expects to stay until spring.

M. NAKAOJI, mining engineer of Tokio, Japan, is in Colorado inspecting the mining and milling methods of that State. He expects to install a cyanide plant in Japan.

L. VON PERHACS, president of the American Eagle G. M. Co., Inc., operating the Marble Springs mine, near Kinsley, Mariposa county, Cal., is in New York on business.

W. L. TURNER has resigned the superintendency of the Rawhide & App M. Co., Jamestown, Cal., and will erect a plant for the direct cyanidation of sulphurets near Knights Ferry, Cal.

M. M. O'SHAUGHNESSY has returned to San Francisco, Cal., from Hawaii, from construction of an extensive tunneling scheme of 10 miles of 7x7-foot tunnel, the work on which is being done by Japanese labor.

D. G. BOLTON, for the past nine years cashier and credit man in the Denver office of Fairbanks, Morse & Co., has resigned and accepted the position of secretary and treasurer of the S. H. Supply Co. of Denver, Colo.

FRANK BRADEN, general manager for Bergheim & McGarvey, of Galicia, Austria, is in California looking over the Los Angeles and Kern county oil fields for the purpose of investigating California methods of drilling and working the oil wells.

J. C. WELCH, formerly chief chemist and assayer at the Trail smelter, Trail, B. C., and recently superintendent at the Montreal & Boston C. Co.'s plant at Boundary Falls, B. C., is superintendent of the smelter of the Le Roi C. Co. at Northport, Wash.

CHARLES T. BISHOP, formerly with Ladenburg, Thalmann & Co., New York, and late paymaster of the U. S. Naval Service, has been appointed auditor of the H. W. Johns-Manville Co., 100 Williams street, New York, N. Y.

D. G. DAVIES' engagement with the Bismarck M. Co., Sheridan, Montana, terminates November 30. As general superintendent and constructing engineer, he has installed their mine and reduction machinery, including a 600 H. P. hydro-electric power plant.

MR. IRVING H. REYNOLDS will shortly retire from the Allis-Chalmers Co. and the duties of chief engineer will be assumed by the engineers in charge of the various departments, these engineers availing themselves of the advice of Mr. Edwin Reynolds, consulting engineer of the company.

Commercial Paragraphs.

CHILDS & CHRISTENSEN succeed to the business of Childs & Hansen, analytical chemists and assayers, 127 West First street, Los Angeles, Cal.

PARKER & JAMISON, assayers and chemists, 1721 Champa street, Denver, Colo., have bought the cyanide testing plant of G. E. Alexander and will hereafter conduct a testing plant in connection with their assay business.

THE J. Geo. Leyner Engineering Works Co. of Denver, Colo., are in their new quarters in the McPhee building, Seventeenth and Glenarm streets, occupying the ground floor and basement to the right of the entrance to the building, and have 10,000 square feet of fine floor space, with handsomely furnished offices. This progressive company will put in a line of hoisting engines in connection with their compressors and drills, and propose to carry a complete line of mining machinery.

A USEFUL and handsome pocket memorandum book is issued by Arthur Koppel, manufacturer of narrow gauge railway materials, 66–68 Broad street, New York. It is shaped to fit the vest pocket. Twenty-six pages are devoted to data on various subjects, the rest of the pages are blank for memoranda. The cover is of celluloid, with a picture in the center of a standard steel side dump car, dumping to both sides, which is one of the many different styles of cars manufactured by this firm. A copy will be sent upon request, also a complete catalogue of railway materials, to all interested parties.

UNDER date of the 4th inst, the Lagonda Mfg. Co., Springfield, Ohio, are in receipt of the following letter: Gentlemen:—Our superintendent and engineers are delighted with the reseating machine. They can clean all our headers, caps and nuts on our 400 H. P. water tube boiler in about two hours, and expect to do it sooner. It is a great saving of time and a big improvement over the old way of cleaning. The important part of it is when you put back your caps you have a perfect joint and don't have a leaky cap. It is certainly a very important and useful invention for cleaning water tube boilers. Yours truly, The Ansted & Burk Co., J. W. Burk, manager.

THE Holthoff Machinery Co. of Cudahy, Wis., is extending its plant with the intent of more than doubling its former capacity and to manufacture in addition to mining machinery, boilers, pipe lines, Loomis-Pettibone gas producers and Crossley gas engines. B. Guggenheim of New York recently purchased a considerable share of the stock of the Holthoff Machinery Co. The company is now building an extension to the boiler shop 200 feet by 117 feet; also an extension to the machinery shop of about 250 feet by 110 feet; is putting in the foundation for a new foundry, and expects to have these extensions and new buildings completed early in 1904. It is also their stated intention to put in a new power plant and to have a modern built establishment, with intention of employing from 1500 to 2000 men.

Books Received.

Bulletin No. 27 of the State Mining Bureau of California, entitled "The Quicksilver Deposits of California," by Wm. Forstner, E. M., has been issued by State Mineralogist L. E. Aubury. It comprises technical and popular description of all of the quicksilver deposits in this State. The book is accompanied by maps and numerous illustrations, comprising 273 pages. Price, paper, 75 cents; 8 cents postage additional. California State Mining Bureau, San Francisco, Cal.

Catalogues Received.

Catalogue R, issued by the Mecklenburg Iron Works, Charlotte, N. C., gives good illustrated description of their various makes of mining machinery.

Catalog D, 1903, from the Blaisdoll Co., Los Angeles, Cal., gives illustrated description of the Blaisdell cyanide vat machinery, with incidental mention of the Robins Conveying Belt Co.'s machinery.

Latest Market Reports.

SAN FRANCISCO, November 13, 1903.

METALS.

SILVER.—Per oz., Troy: London, 27⅛d (standard ounce, 925 fine): New York, bar silver, 56¼c, refined (1000 fine): San Francisco, 56½c; Mexican dollars, 46@47⅛c San Francisco, 45½c New York.

During the week silver has depreciated from 59⅝c to 56½c, showing the direct effect of the withdrawal of the Government from the market as a large purchaser.

COPPER.—New York: Standard, $13.50; Lake, 1 to 3 casks, $13.50; Electrolytic, 1 to 3 casks, $13.65; Casting, 1 to 3 casks, $13.00; San Francisco: $15.00. Mill copper plates, $17.00; bars, 18@24c. London: £56 7s spot per ton.

The copper market shows no improvement. It was thought that the closing of the large producers at Butte, Mont., would cause a rising price; but as it now appears that the Butte mines are to resume, the effect on the price of the metal is not apparent.

LEAD.—New York, $6.50; Salt Lake City, $3.50; St. Louis, $4.00; San Francisco, $4.50, carload lots; 4¼c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5½c; pig, $4.75. London: £11 16s 3d ₱ long ton.

SPELTER.—New York, $5.75; St. Louis, $5.10; London, £21 ₱ ton; San Francisco, ton lots, 6¾c; 100-lb. lots, 7c.

TIN.—New York, pig, $25.75 @ 26.00; San Francisco, ton lots, 27½c; 500 lbs., 28c; 200 lbs., 28c; less, 28½c; bar tin, ₱ lb., 30@32c. London, £115 5s.

PLATINUM. — San Francisco, crude, $18.00 ₱ oz.: New York, ingot, $19.00 ₱ Troy oz. Platinum ware, 75 @ 80c ₱ gram.

QUICKSILVER. — New York, $46.00@47.00, large lots; London, £8 7s 6d; San Francisco, local, $43@44 ₱ flask of 76½ lbs.; Denver, $49.50. Export, $42.50@43.00.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

SOLDER. — Half-and-half, 100-lb. lots, 18.75c; San Francisco, Plumbers', 100-lb. lots, 15.50c.

ZINC.—Metallic, chemically pure, ₱ lb., 50c; dust, ₱ lb., 10c; sulphate, ₱ lb., .04c.

NICKEL.—New York, 50@60c ₱ lb.; ton lots, 40@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30@34c.

ANTIMONY. — New York, Cookson's, 7½c; Hallett's, 6¾c; San Francisco, 1000-lb. lots, 8c; 300@500-lbs., 8½c; 100-lb. lots, 10½c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, $15.85 @16.10; gray forge, $13.50; San Francisco, bar, 3c ₱ lb., 3½c in small quantities.

STEEL. — Bessemer billets, Pittsburg, $27.00@29.00; open hearth billets, $28.00 @30.00; San Francisco, bar, 7c to 12c ₱ lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer	$17 00@18 00
Foundry Northern 1	16 50@17 00
Northern 2	16 00@16 50
Northern 3	15 50@16 00
Southern 1	14 35@——
Southern 2	13 85@——
Southern 3	13 35@——
Forge	12 85@——
Charcoal	17 00@18 00
Billets, Bessemer	28 00@29 00
Bars, iron	1 45@——
Bars, steel	1 75@ 1 80
Rails, standard	28 00@30 00
Rails, light	28 00@34 00
Plates, boiler	1 90@ 2 00
Tank	1 75@ 1 80
Sheets, 26 store	2 90@ 3 00
No. 27	2 90@ 3 00
No. 28	3 00@ 3 10
Angles	1 75@——
Beams	1 75@——
Tees	1 80@——
Zees	1 75@——
Channels	1 75@——
Steel melting scrap	12 50@13 00
Relaying rails	23 00@25 00
Dealers forge	11 50@12 00
No. 1 railroad wrought	13 00@14 00
No. 1 cast, net ton	12 00@13 00
Iron rails	17 00@17 50
Car wheels	17 00@18 00
Cast borings	4 75@ 5 00
Turnings	10 00@10 50

LUMBER. — (Retail): Pino, ordinary sizes, $24.00@25.00; extra sizes higher; redwood, $28.00@30.00; lath, 4 feet, $4.50 @5.00; pickets, $21.00; shingles, $2.50 for No. 1 and $2.25 for No. 2; shakes, $13.50 for split and $15.00 for sawed; rustic, $28.00 @35.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, $3.35; Cut, $3.55; 10d to 16d, Wire, $3.45; Cut, $3.35; 8d Wire, $3.50; Cut, $3.50; 6d and 7d, Wire, $3.60; Cut, $3.60; 4 and 5d, Wire, $3.70; Cut, $3.70; 3d, Wire, $3.85; Cut, $3.85; 2d, Wire, $4.10; Cut, $4.10. Special rates for carload lots.

LIME.—Santa Cruz, $2.35; Rocho Harbor, $2.35 ₱ bbl.

CEMENT.—Imported, $2.50@2.75 ₱ bbl.; California carload lots, $2.25 f. o. b. at works; small lots, $2.50 ₱ bbl. in sacks, 4 sacks to bbl.

GENERAL SUPPLIES.

OILS.—Linseed, boiled, bbl., 49c; cs., 54c; raw, bbl., 47c; cs., 52c; Lucol oil boiled, bbl., 44c; cs., 49c; raw, bbl., 42c; cs., 47c. Kerosene—Pearl, per gal., 22c; Astral, 22c; Star, 22c; Extra Star, 26c; Eocene, 25c; Elaine, 28c; Water White, in bulk, 15½c; Mineral Seal, iron bbls., 19c; wooden bbls., 21½c; cs., 25c; Mineral Sperm, cs., 26½c.; Deodorized Stove Gasoline, bulk, 17c; do., cs., 23½c; 86° Gasoline, bulk, 21c; do., cs., 27½c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19½c; Lard Oil, E W. S., bbl., 85c; cs., 90c; Neats-foot Oil, pure, bbl., 75c; cs., 80c; Sperm, crude, 50@60c; Natural White, 70c; Bleached, do., 75c; Whale Oil, cs., 50@55c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2.00 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11c ₱ set; 14 oz., 40s., 10c.

COAL. — San Francisco, coast, yard prices: Wellington, $8.00; Seattle, $6.50; Coos Bay, $5.50; Southfield, $8.00. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8.00; Cumberland, $13.00; Cannel, $8.50; Welsb Anthracite, $13.00; Rock Springs, $8.50, long ton; Colorado Anthracite, $14.00. Coke, $10.50 per ton in bulk, $13.00 in sacks; Sunnyside, $8.50, long ton.

CHEMICALS. — Cyanide of potassium, 98%–99%, jobbing, 23@24c ₱ lb.; carloads, 23@23½c; in tins, 30c; soda ash, $2.00 ₱ 100 lbs.; hyposulpbite of soda, 3@3½c per lb.; caustic soda, in drums, 3@3½c ₱ lb.; Cal. s. soda, bbls., $1.20@1.40 ₱ 100 lbs.; sks., $1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potasb, 10c in 40-lb. tins; roll sulpbur, 2½@2½c; powdered sulphur, 2@3c; flour sulphur, French, 3½@3½c; alum, $2.00@2.25; California refined, 1¾@2c; sulphide of iron, 8c ₱ lb.; copper sulphate, 5¼@5¾c; chloride of lime, spot, $2.50@2.75; sulphuric acid, in carboys, 66% B, 1¾@2c ₱ lb.; nitric acid, carboys, 8c ₱ lb.

BONE ASH.—Extra No. 1, 5@6c ₱ lb. No. 1, 4@5c.

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6½c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails, ¼c ₱ lb. above keg price; in 1 and 5-lb tin cans, 100 lbs. per case, ½c. per lb. above keg price. Dry Lead—In bbls., 1 ton and over, 6½c; do. in kegs, 7c.

RED LEAD.—500 lbs. and over at one purcbase, ₱ lb., 6½c; less than 500 lbs., 7c.

LITHARGE.—Pure, in 25-lb. bags, 8@9c ₱ lb.

BORAX.—Concentrated, 6@7c ₱ lb; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

MANGANESE.—Pure, ₱ lb., 60c.

SODIUM.—Metal, ₱ lb., $1.00.

BISMUTH.—Subnitrate, ₱ lb., $1.75.

MERCURY.—Bichloride, ₱ lb., 90c.

MOLYBDENUM.—$2.00 ₱ lb.

CHROMIUM.—90% and over, ₱ lb., $1.00.

PHOSPHORUS.—American, ₱ lb., 75c.

SILVER.—Cbloride, ₱ oz., 90c@$1.00; nitrate, 55c.

ALUMINUM.—No. 1., 99%, small lots, 37c ₱ lb.; 100 lbs., 35c; 1000 lbs, 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

URANIUM.—Oxide, ₱ lb., $3.50.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

STAMP AFFIXING DEVICE.—No. 743,263. Nov. 3, 1903. J. J. Fargue and R. W. Smith, of San Francisco, Cal. All assigned to R. W. Smith. This invention relates to a device for affixing stamps to letters and packages. It consists of a receptacle or carrier for the stamps, which are contained thereon in long strips, a mechanism for withdrawing the stamps from the carrier and transferring them into a horizontal position above the point where they are to be attached, mechanism for detaching a single stamp from the strip, mechanism for moistening the surface, and mechanism for pressing the stamp upon the moistened surface.

FOLDABLE HOLDERS FOR RAILWAY FOLDERS.—No. 742,958. Nov. 3, 1903. J. L. Blair, San Jose, Cal. This invention relates to improvements in receptacles for holding railway folders, time cards, advertising cards and the like. Its object is to provide a foldable container of pasteboard or equivalent material which shall be cheap in manufacture and which may be knocked down into a flat condition for transportation. It is designed particularly as a substitute for the ordinary open-ended tin boxes used in railway depots, hotels and other places to hold folders and other advertising matter.

PNEUMATIC DEVICE FOR CLEANING CARPETS, FLOORS, OR THE LIKE.—No. 742,880. Nov. 3, 1903. A. Lotz, San Francisco, Cal. Assigned to Sanitary Compressed Air & Suction Dust Removing Co. of San Francisco, Cal., a corporation. This invention relates to improvements in means for cleaning and renovating carpets, upholstery, and like fabrics and for washing and cleaning marble, mosaic or other floors. Its object is to provide a device of simple construction in which the dirt and dust will be carried away by suction, but in which there may be a constant inflow from the surrounding atmosphere or into which there may be directed a stream of water concentrated over and impinging upon a limited portion of the area to be cleaned, the inflow from said inlet or the inflow of water coacting with the suction induced through the discharge pipe to cleanse the surface thoroughly, in the case of an air blast removing all the dust from the room, as well as from the carpet, and in the case of a water jet sucking up the water from the floor, leaving the floor perfectly dry an instant after the apparatus has passed over it.

OIL BURNERS.—No. 743,267. Nov. 3, 1903. J. Frodsham, Bouldin Island, Cal. One-half assigned to Robert Hickmott, of Ross Valley, Cal. This invention relates to an apparatus for the preparation and combustion of hydro-carbon oil. It consists of a mechanism into which oil may be introduced in conjunction with steam or heated air and a mixing chamber for these products, with a burner through which they are delivered to the point of consumption.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING NOVEMBER 3, 1903.

743,131.—REMOVING TIRES—H. Atwater, Vacaville, Cal.
743,373.—MEDICAL APPARATUS—E. Bachelet, Tacoma, Wash.
743,373.—MEDICAL APPARATUS—E. Bachelet, Tacoma, Wash.
742,958.—HOLDER FOR FOLDERS—J. L. Blair, San Jose, Cal.
743,055.—WATER MOTOR—L. E. Boqvist, Senttle, Wash.
742,965.—OIL BURNER—Brunner & Patterson, Haywards, Cal.
742,966.—QUARTZ MILL—J. Y. Byers, Descanso, Cal.
743,151.—BOOKKEEPING—E. E. Crandall, Los Angeles, Cal.
742,848.—SAWMILL—E. Dyer, Bandon, Or.
743,263.—STAMP AFFIXER—Fargue & Smith, S. F.
743,267.—OIL BURNER—J. Frodsham, Bouldin Island, Cal.
742,855.—HOSE SUPPORT—J. G. Garrett, S. F.
743,075.—BAND FOR CASINGS—I. B. Hammond, Portland, Or.
743,167.—LOADING APPARATUS—C. J. Ingard, Port Townsend, Wash.
743,002.—PISTOL—W. B. Knohle, Tacoma, Wash.
743,003.—BOLT CUTTER—N. Lamh, Yreka, Cal.
742,880.—CARPET CLEANING APPARATUS.—A. Lotz, S. F.
742,889.—CONCENTRATOR—J. J. Montgomery, Santa Clara, Cal.
743,310.—CHEST PROTECTOR—S. A. Moulton, Campbell, Cal.
743,019.—PIPE WRENCH—D. Nelson, Reno, Nev.
743,096.—NUT WRENCH—H. D. Pelie, Ione, Cal.
742,916.—OIL BURNER—H. L. Sherwood, Oakland, Cal.
742,944.—CAR COUPLING—G. Wiley, Vallejo, Cal.

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A COMPETENT MILLMAN OF 10 YEARS' EXperience would like to take charge of a mill in any part of the country, understanding cyaniding thoroughly. Wife would like to take charge of boarding house at same place. Address W. G., care of Mining and Scientific Press.

AN ASSAYER AND CHEMIST WITH TWELVE years' experience in mining, milling, smelting and cyanide work desires a position. Best of references. Address Box 379, Central City, Colo.

CIVIL ENGINEER AND SURVEYOR, WITH thorough experience in mine surveying and mill construction, also R. R. and hydraulic surveying, desires position. Instruments furnished and references given. Address W. E. C., this office.

FIRST-CLASS STATIONARY ENGINEER; 25 years' experience in mills and mines. Address Frank Wagner, Brooklyn Hotel, San Francisco.

MINING ENGINEER AND METALLURGIST, with sixteen years of practical experience as superintendent, manager and consulting engineer of mines and mills, desires position on or after January 1st. Speaks Spanish fluently. Address P. O. Box 77, Durango, Mex.

MINING ENGINEER OF GOOD STANDING, with twelve years' experience in mines and mills, wants position as expert. School of Mines graduate. Address V. X., this office.

PRACTICAL EXPERIENCE IN METAL MINing, installing and operating steam boilers, engines and mining machinery, together with a thorough course in mining engineering at the Scranton schools, enables me to be thoroughly competent to take hold of a new property and develop it by the latest scientific mode of mining to a paying basis. Can furnish A1 reference. Open for engagement after January 1st, 1904. THEO. T. SWIFT, Muskegon, Mich. Lock Box 113.

SOBER YOUNG MAN DESIRES POSITION AS Mill Man. Has had six years' practical experience in amalgamating and concentrating, and a fair knowledge of the operation of engines. Will give best of references upon application. Address C. L. B., care this office.

SUPERINTENDENT WANTS POSITION WITH substantial company. Practical miner, millman, assayer and cyanide expert. Address Supt., this office.

WANTED BY AN EXPERIENCED MINING Engineer and Manager, a position as mine manager in gold, silver or copper proposition, with a first-class corporation. Have had 35 years' experience in U. S. and Mexico; prefer Mexico. Speak Spanish, German, French and English. Am well acquainted with Mexico, and am employed now. Desire a change between November and January 1st, 1904. Salary expected not less than $5000 per annum. Can furnish the best of references. Address "Mine Manager," care of Mining and Scientific Press, San Francisco, Cal.

WANTED—POSITION BY AN EXPERIENCED Analytical Chemist, Assayer and Millman. References furnished. Address H. T. S., this office.

YOUNG GRADUATE OF A GOOD MINING school desires position in a mine where there will be chance for advancement. Good assayer, chemist, surveyor, and draughtsman. Address G. R., care of Mining and Scientific Press.

It Pays to be interested in the economy of your plant. If you have a steam plant you should know that the

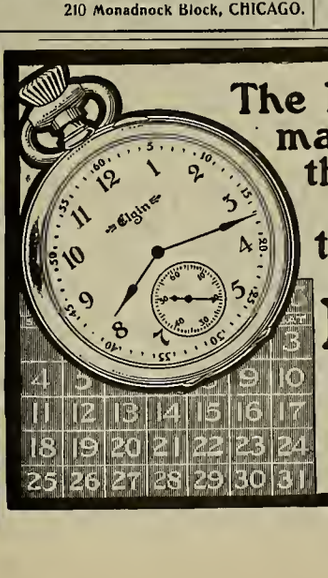
CROSS OIL FILTER

will save you 50% in lubricating oil bills, because it cleans the oil you usually throw away as useless. Have you got the Filter? If not, send for one on trial 30 days, and if not satisfactory return at our expense.



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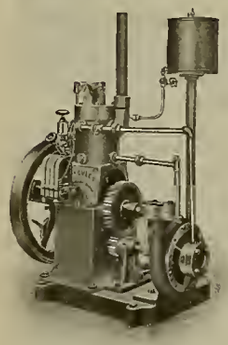
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A Self-Contained Cyanide Pump and Engine.



Capacity 75 to 150 Gallons per Minute.

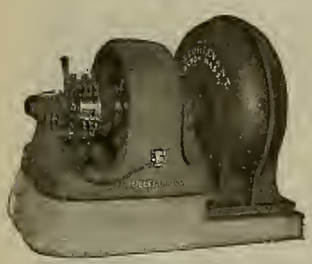
YOU GET—
A first-class Gasoline Engine.
A 2-inch Centrifugal Pump.
A Heavy Iron Base for Engine and Pump.
Cut Driving Gears.
Fuel Tank and all connections.
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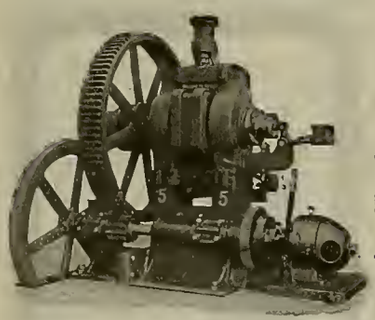
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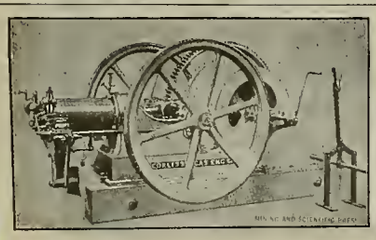
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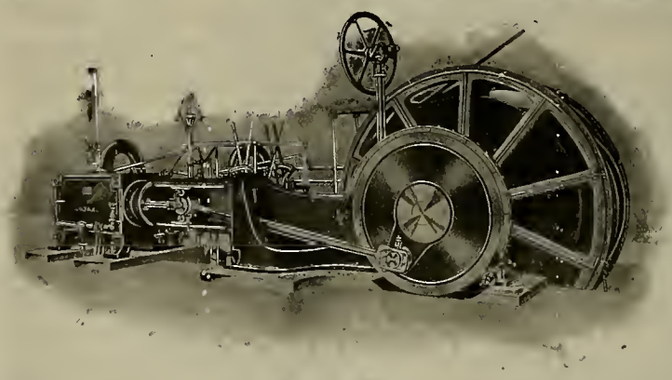
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Whole No. 2261.—VOLUME LXXXVII. Number 21. SAN FRANCISCO, CAL., SATURDAY, NOVEMBER 21, 1903. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Invention in the Cyanide Process.

The cyanide process is one of the most interesting of all of those known to metallurgical science. For many years prior to its practical application in the treatment of ores it was known that dilute solutions of cyanide of potassium would dissolve minute particles of gold. Patents were taken out for a process to treat ores by this method, and since the first patents were taken out there has been a score or more of patents issued in the various countries of the world for modifications of the original process. No other process has stimulated the inventive faculties of those engaged in its practice to such an extent. The devices for the chemical manipulation and mechanical handling of the pulp are numerous, and many of these processes are successful on certain classes of ore, while others are equally so on other ores.

The one element which has presented the greatest difficulty, aside from certain base minerals contained in ores which render them difficult of treatment by the cyanide method, is the satisfactory working and mechanical handling of slimes. These are treated at the various works in a variety of ways. In one locality sliming the ore is avoided as far as possible. In another no objection is found in slimes. At one mill the slimes are separated from the sands and each class is treated separately; the former by percolation, the latter by one of the numerous schemes devised by the ingenious operators. At another mill slimes and sands are treated together and the operators report no particular difficulty. The fact that this is so, proves that the ores of various mining districts differ in a marked degree, but that this physical difference is not always perceptible to the eye.

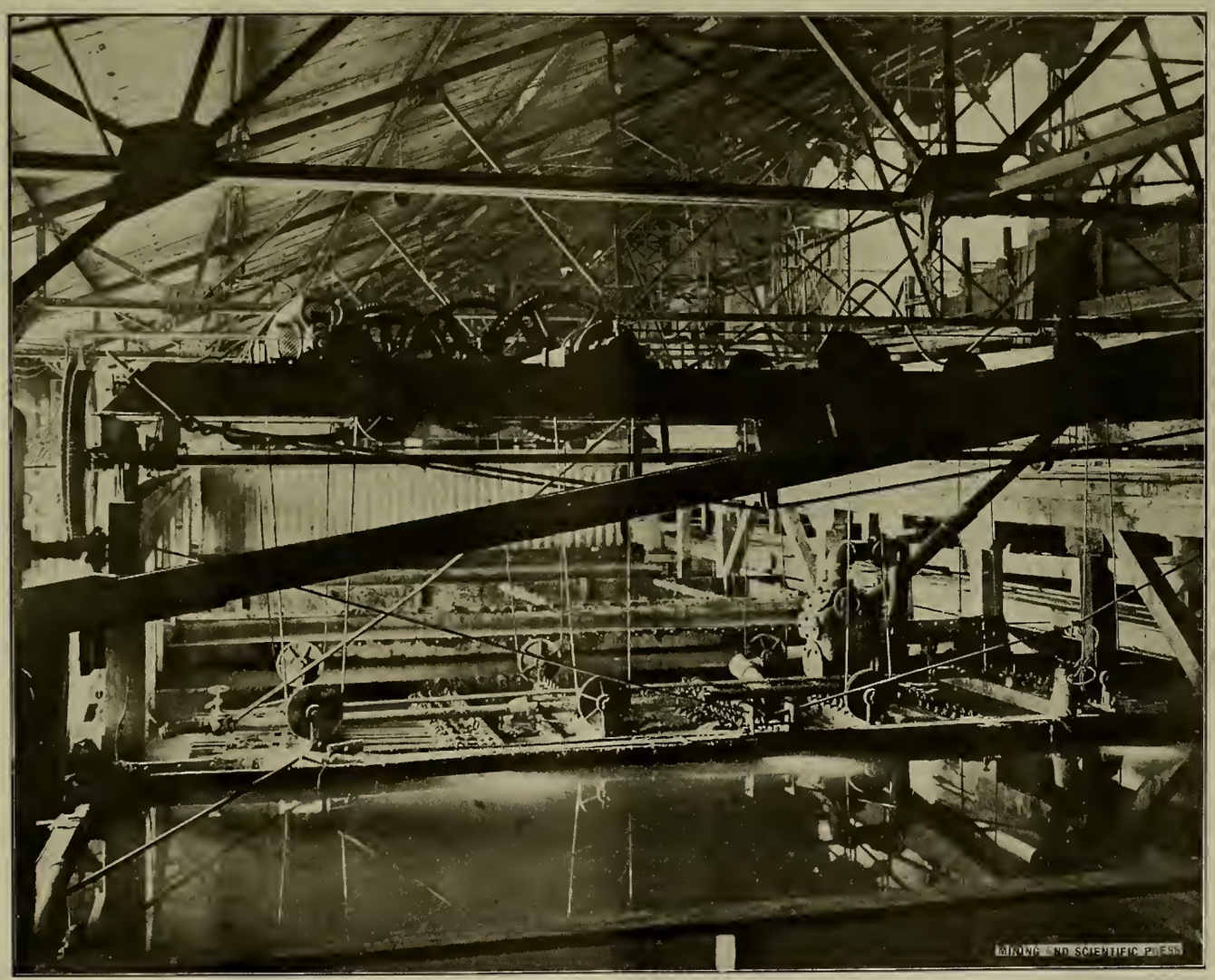
The principal difficulty in treating slimes and sands together is reported to be due to the fact that an even distribution of the two classes of material is difficult to obtain. A slight interference in the flow of pulp into the tanks, any temporary stoppage in the supply from the mill, results in the formation of a thin "floor" of more or less impervious slimes on the bed of saud beneath. A series of such interferences usually results in producing several thin sheets in succession, intercalated with the sands, rendering percolation slow if not impossible. To overcome this difficulty various kinds of distributors have been devised and are in successful operation. Where the sands and slimes are separated before treatment the sands rarely offer any difficulty in the passage of solutions, but the slimes problem is an ever present one, and numerous and ingenious are the devices improvised and applied in attempts to successfully meet the troublesome problem.

Decantation of solutions has been successfully practiced on talc ores where the slimes were of infinitesimal fineness. By successfully is meant commercial success, though the tailings may still contain 40% or 50% of the original values. Where decantation is practiced the solutiou is clarified by the addition of lime to the charge. As a matter of course this leaves a thick sludge in the bottom, which contains gold-bearing solution. The only way in which an additional portion of these values can be economically saved is by adding weak solution and reagitating and resettling the charge, and again decanting the liquor.

To treat slimes, and also to hasten percolation, one of the first devices employed was the vacuum filter. This was arranged by building a false bottom containing the filter in a steel tank, and attaching the vacuum pump to the chamber beneath. This resulted in successful treatment of some kinds of material, but with slimes the layer on the filter generally became too thick and dense to permit a long continued passage of the solution, so the charges had to be reduced to thin sheets to hasten the operation, but this was found to greatly reduce capacity.

The filter press was next tried and in some districts this device in one or the other of its manifold forms is in successful use. In others its employment is said not to have been attended with satisfactory results. One of the latest devices is that illustrated on this page. It is simply a novel application of the vacuum pump to the treatmeut of slimes, and presents a large superficial area, which the original vacuum filters did not afford. The mechanism and operation of this ingenious method of slimes treatment are described elsewhere herein.

Experimentation is constantly in progress and newer and present unheard-of devices may be expected in the future in the practical working of the cyanide process, for the field is broad.



Interior of Mercur Mill Slimes Plant, Tooele County, Utah, Showing Moore Filters.—See page 334.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market Street, San Francisco, Cal.
Telephone, Davis 771.

ANNUAL SUBSCRIPTION.

United States, Mexico and Canada.....$3 00
All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

BRANCH OFFICES:

NEW YORK CITY, 720 Park Row Bldg. BOSTON, 27 School St.
CHICAGO, 1115 Monadnock Block. DENVER, 606 Mack Block.

J. F. HALLORAN.....Publisher

SAN FRANCISCO, NOVEMBER 21, 1903.

TABLE OF CONTENTS.

ILLUSTRATIONS: Page.

Interior of Mercur Mill Slimes Plant, Tooele Co., Utah, Showing Moore Filters.....331
Interior of Mercur Mill, Tooele Co., Utah, Showing the Moore Filter in Act of Transportation.....334
Cyanide Tanks and Filter Press, Sultan Mine, Yavapai Co., Ariz.335
Milling Plant, Sultan Mine, Yavapai Co., Ariz.....335
A 15,000-Gallon Oil Tank for Sultan Mine, Yavapai Co., Ariz....335
Top View of the Pinder Concentrator.....338
The Pinder Concentrator Mounted on Base.....338
Universal Shaper.....339
Mining and Metallurgical Patents.....341

EDITORIAL:

Invention in the Cyanide Process.....331
A Department of Mines.....332
Advantages of Technical Education.....332
F. A. Heinze Discounting Miners' Checks.....332
The Labor Situation.....332
Dunsmuir Must Discontinue Employing Chinese Miners.....332
Lack of Cars at Fernie and Michel, B. C.....332

MINING SUMMARY.....342-343-344-345-346

LATEST MARKET REPORTS.....347

MISCELLANEOUS:

Concentrates.....333
The Moore Process at the Consolidated Mercur Gold Mines.....334
Equipment of the Sultan Mine, Arizona.....335
Consumption of Zinc in Cyanide Plants.....336
Determination of Gold and Silver in Cyanide Solutions.....336
Shaft Sinking and Equipment at the Ashland Mine.....337
The Development of Water Powers.....337
Resurvey of Cripple Creek District.....338
The Pinder Concentrator.....338
Use of the Mine Model.....338
Relative Value of Fuels.....339
Kunzite—A New Gem.....339
Universal Shaper.....339
The Electric Furnace in Metallurgy.....339
California Miners' Association.....340
Mining and Metallurgical Patents.....341
Personal.....346
Obituary.....347
Commercial Paragraphs.....347
Catalogues Received.....347
New Patents.....347
Notices of Recent Patents.....347

The Department of Mines.

The creation of a Department of Mines as a branch of the Federal Government has long been earnestly sought by several mining States of the Union, but thus far efforts in that direction have been unavailing. From the apathy of Eastern miners in this important matter it would seem that the Western miners are the only ones who realize that such a department, with its representative in the Cabinet, would be beneficial to the mining industry. The Department of Agriculture and the Department of Commerce each were the outcome of the same long-fought battle waged against strong opposition before the justice of the demands was recognized. Mining is the fundamental industry of our country. No nation can become great and remain great that has not mining as a foundation upon which to upbuild all other industries. The iron industry of the United States leads the world. Its coal, copper, gold and oil output is greater than that of any other country. The industry represents the investment of hundreds of millions of dollars. An industry so great and so deserving is entitled to recognition by the Federal Government, but there is a persistent opposition to the creation of such a department in some directions which can only be overcome by organized effort of all sections. The individual, unaided effort of a single State receives but scant courtesy when demanding from the Congress of the United States recognition in a matter so important as the creation of a new department in the Federal Government; but a united demand from the miners of the country would be recognized and would receive consideration. There are several States having organized mining societies representing the industry. Oregon has a State Association; California has three separate organizations—the State Miners' Association, the Petroleum Miners' Association and the Southwestern Miners' Association—which includes southern Nevada and a portion of Arizona. In South Dakota is the Black Hills Miners' Association, and Colorado has a Mine Operators' Association. If these Associations combine with other similar organizations and appoint delegates to a convention to make the demand upon Congress undoubtedly such concert of action would have far greater influence in bringing about a favorable consideration of this great need of the mining industry than the efforts of the States singly, which have heretofore been made. The California Miners' Association, during its sessions in San Francisco the past week, determined to abandon the effort to secure the creation of a Department of Mines, and announces its willingness to accept in lieu a mining commissioner.

Advantages of Technical Education.

In no sphere of life is the possession of technical education more advantageous or necessary than in the field of mining and metallurgy. For years and decades the practical miner, the one who prides himself upon his lack of technical knowledge, which in his vocabulary is encompassed in the one word "theory," has failed to advance. He does all things as his father and his grandfather did before him, on the general principle that that which was good enough for his ancestors is good enough for him. Within the past twenty years this old-time practical miner has been slowly forced into the background and in his place is found the technically educated man, who with a world-wide knowledge of his business is equal to almost any emergency that may arise. This is an age of progress, and in no branch of industry is it more marked than in mining. Appreciating the situation, thousands of miners everywhere are endeavoring to broaden their knowledge of the industry by reading and study, and the result is that in the mining industry there is growing up an army of men who are each year becoming more competent to undertake the various branches of their profession.

The necessity for this course is being forced upon them. Mining methods have changed materially within recent years, and so also have metallurgical methods. The miner sees this, and he realizes that it is not always the old-time miner who has introduced the successful innovations, reduced cost and increased the output, but the new miner, with world-wide knowledge and fertility of resource born of experience—not altogether his own. The Western United States, Australia and South Africa have furnished a practical school, where unusual conditions were found and had to be met—novel situations in mine and mill. The old-timer would have undertaken these varied problems in the old-time manner and he would have failed, or at best have made but moderate success. They who are not broad-minded enough to appreciate the situation and seize the opportunities that come within their reach, must surely fall behind in the race, while the more energetic will grasp these opportunities as they pass and will push onward to success. All miners cannot attend college, but they can get much valuable information from text-books, from the transactions of technical societies, and from the mining press. The papers contributed to the various technical and semi-scientific societies associated with the mining industry, form one of the best educational features of the age, and miners should not fail to avail themselves of these opportunities to inform themselves of what is going on in other parts of the mining world than that which immediately surrounds them.

DISCOUNTING the checks of the miners employed by him is one of the latest developments in the thrifty methods of F. A. Heinze, the Butte, Mont., copper miner. Formerly the miners were paid off monthly, but Mr. Heinze, evidently having the convenience and comfort of his employes in mind, decided to pay them weekly. As in the commercial world it has become the custom to deduct "2 per cent for cash," Mr. Heinze concluded to apply this idea to his employes' pay checks. They had been in the habit of paying as much as 5 per cent to the merchants of Butte for the favor of cashing their checks, which Mr. Heinze probably considered usurious, and, stepping into the breach himself, acted in the capacity of a philanthropist and deducted only 2 per cent per week. For this act of charity he was severely criticised, and, feeling hurt about it, has announced that hereafter workmen would receive their pay monthly, as heretofore. The miners' union has protested and now asks that weekly payments be resumed, and say they are willing to stand the 2 per cent reduction to receive their money weekly.

The Labor Situation.

The mining industry in Colorado is not all that could be desired under existing conditions. The organized miners seem to want to rule and not to work. In several districts idleness is forced on willing and unwilling men alike. The strike of the coal miners has caused a suspension of work in the iron and steel plants of the Colorado Fuel & Iron Co., and these idle iron workers are acting as strike breakers, going into the coal mines to work. In Cripple Creek district it is now quiet, about 85% of the miners working being non-union men. The militia have all been sent home excepting about 200. In the Telluride district signs for trouble multiply, and in view of the possible need for State militia in the coal mining districts Governor Peabody has asked that Federal troops be sent to Telluride upon the first breach of the peace. Attempts to settle the disputes in the northern coal mines of that State have in most instances failed. One of the notable incidents of the past week is in the strike of the coal miners at Castle Gate, Utah, who quit work in sympathy with their Colorado brethern. As winter is approaching and there is no large surplus of coal on hand the public will be innocent sufferers, and it is safe to say the coal miners will find little sympathy in that direction in consequence. In California the Black Oak mine in Tuolumne county remains closed, but the miners at that property, although members of the union, do not favor the action of the strangers who invaded their camp from a neighboring town, driving away the Chinese laborers, which action resulted in closing the mine. It is reported that a clash between the Black Oak miners and the outsiders who interfered is imminent.

In Arizona labor conditions remain practically unchanged, the miners and mine operators of Yavapai county each remaining firm. There are numerous mines at work in that county.

In Nevada, at Searchlight, the mines have mostly resumed and more men are daily being added to the working force. In this camp the union men have lost their strike.

IN British Columbia a decided effort is being made by the Government to force Dunsmuir to discontinue the employment of Chinese in his coal mines, the idea being that their presence underground is a menace to miners of other nations. Of this fact there is no doubt, as is well recognized in the United States, where numerous mine managers have adopted the rule that no men shall be employed underground who cannot understand and speak the English language as well. Many foreigners can understand much English before they can speak it intelligibly. The presence of this class of laborers in mines constitutes a grave danger to all who cannot understand their language, for in the event of impending danger they invariably speak to one another in their native tongue, and only by their actions can English-speaking miners become aware of the threatened peril. In previous efforts to oust the Chinese from Dunsmuir's mines he carried the case to the London judiciary, getting a decision in his favor there, since which time a new law has been passed dealing with the matter. Dunsmuir proposes to fight these renewed efforts of the Dominion Government in the same manner as before. When action is brought against him in the provincial court, he will appeal to the Dominion court at Ottawa, and, failing there, will carry the case before the judicial committee in London.

AT Fernie and Michel, British Columbia, an unusual condition prevails in a lack of a sufficient number of cars to haul away the coke manufactured there. At present 4000 tons of coke are awaiting shipment. The smelters have been well supplied with coke, but have no surplus on hand, and will soon be obliged to close unless the railroads can furnish the necessary cars. At Leadville, Colo., the production of the mines has been decreased 1000 tons daily by reason of a car famine.

CONCENTRATES.

MICA is employed in building up commutators for electric machinery. Sheets are also used for insulation.

✱✱✱✱

CHLORINATION in the Southern States is conducted at a lower cost than on the Pacific coast, owing to lower cost of labor and supplies.

✱✱✱✱

NUMEROUS nuggets of horn silver (silver chloride) were found about 1900 in placers near Antelope Hill, Yavapai county, Arizona.

✱✱✱✱

QUARTZITE, although a sedimentary rock, metamorphosed by pressure or the infiltration of silica or other mineral in solution, often contains gold, silver and other metallic minerals.

✱✱✱✱

HOISTING ROPES of hemp or other fiber is not in general use in mines, though in a few mines where the mine water contains considerable acid, which attacks iron and steel ropes, hemp ropes are used.

✱✱✱✱

THE working of gold ores by amalgamation after roasting without grinding is usually unsatisfactory owing to the fact that the gold becomes coated with a film of iron oxide or other substance.

✱✱✱✱

UNDERHAND STOPING is not commonly practiced except in small veins of rich ore. At one time it was the almost universal practice, but it was found to be more expensive than the overhand method.

✱✱✱✱

BY the proper arrangement of a mirror, sunlight may be thrown into mine workings. Photographs of tunnels have been taken by this means which were superior to those taken by means of flashlight powder.

✱✱✱✱

AT some mines the mine water is suitable for use in mills; but in others there is mineral in solution, which is detrimental to amalgamation, causing the quicksilver to "sicken" and float on the surface of the water.

✱✱✱✱

WHERE a large volume of water is encountered in driving a tunnel, it can be most effectively taken care of by constructing a covered flume beneath the track. This will permit the largest amount of water to flow away with the least amount of grade.

✱✱✱✱

THE expedient of precipitating metallic copper from mine waters containing copper in solution, on iron and tin scrap, has often been resorted to with greater or less success. The precipitating boxes and amount of scrap iron should be commensurate with the amount of water passing through them.

✱✱✱✱

WHERE native copper and native silver occur together in nature, each metal is remarkably pure, not being alloyed as might be supposed. In the Lake Superior copper region copper and silver were found associated in the early days of mining in that region. Similar occurrences are reported from southern Arizona.

✱✱✱✱

THE quantity of water per ton of ore treated in a mill where coarse concentration is practiced is variable, but is usually estimated at 4000 gallons. Where clay is present in the gangue, a larger amount is necessary than where the gangue is clean quartz. Where necessary, the water may be settled, pumped back and reused with a loss of 25% to 30%.

✱✱✱✱

IN concentration sizing by screens of variable mesh effects a separation of particles according to their relative size. In hydraulic classifiers and on the various shaking table and belt concentrators the separation is due to difference in specific gravity. A combination of the two methods usually accomplishes the most complete and satisfactory results. A plant can be arranged to accomplish this automatically.

✱✱✱✱

A DEEP MINE PUMP may be operated by steel rope from above if the pump construction admits of it. A pump rod may be placed in a shaft having a changing angle of inclination by placing a triangular "bob" at the angle of the shaft. This "bob" is set upon its apex, the two other corners being attached to the upper and lower rods respectively. By this arrangement Cornish pumps may be operated in a crooked shaft.

✱✱✱✱

BASALT is a dark, heavy basic rock, including the varieties dolerite and anamesite, the former coarse grained, the latter the medium fine grained, basalt proper, being of the fine or microcrystalline variety. Metallic minerals are seldom found in basalts. On Sulphur creek, Cal., cinnabar and quicksilver are found in the basalts, overlying fissures containing these ores, and in a few localities copper ores are found locally in basalt.

✱✱✱✱

JIGS are almost universally employed for treating coarse material, and there is a great variety of size, shape and means of operating these devices. In some—the older kind—the screen upon which the mineral rests is vibrated by direct connection with an eccentric by a rod. In later designs a plunger is operated in this manner, communicating the vibration to the screen through the medium of water, the plunger being on one side and the screen on the other of a partition. The operation of the plunger causes the mineral on the screen to be lifted slightly with each vibration, whereby the heavier particles settle through the gangue toward the bottom. The concentrates discharge either through the screen or are carried off through an opening near the level of the screen; the lighter particles, moving horizontally, pass off at the top. The jig is fed and discharges continuously.

✱✱✱✱

GOLD which is brittle cannot be manufactured into either coins or jewelry. It can be rendered malleable by the admixture of a small amount of oxide of copper, or with a mixture of nitre and borax, when the foreign metals are oxidized and pass off in the slag. Brittle gold may also sometimes be refined by melting and adding to the melt a small amount of mercuric chloride (corrosive sublimate), which converts the base metals to chlorides, which are then volatilized.

✱✱✱✱

WIRE ROPE TRANSMISSION is resorted to when the distance over which the power is to be transmitted is too great for leather or rubber belts—more than 100 feet. The speed of ropes in transmission plants should not exceed 1200 to 1600 feet per minute over small sheaves. The depression of the rope will be about 3 feet in 100 on the driving side and about 5 to 6 feet per 100 feet on the slack side. Special ropes are made for transmission of power which are less flexible than hoisting rope.

✱✱✱✱

IN some jigs a layer of coarse, heavy particles is spread over the screens to prevent a too rapid discharge of the valuable ore passing through. The number of vibrations vary with the class of material being treated, ranging from 50 or 80 strokes with coarse ore ($\frac{1}{4}$-inch diameter) to 300 to 400 with fine material. The length of stroke also varies with the number of vibrations. Jigs are usually run in series to secure the most satisfactory results. These devices are used more commonly for dressing base metal ores, and to a limited extent on gold ores.

✱✱✱✱

OBSIDIAN is a natural glass of volcanic origin. It varies in color from colorless, through shades of gray, red and brown to black, and some kinds are green. Some of black kinds owe their color to a multitude of microscopic inclusions. Some varieties contain crystals of various minerals, particularly those of mica and feldspars. Large masses of this rock are found in the Yellowstone Park. The silica present varies in the different varieties from 60% to over 80%. Pumice is a frothy sponge-like variety of rhyolitic obsidian. It is usually light in color.

✱✱✱✱

BLISTER COPPER is the product of the smelter which runs from 96% to 99% pure. It is the product of the converter. Black copper is a furnace product which results from the smelting of oxidized copper ores and may run from 90% to 97% copper. Black copper, together with copper mattes, is further purified by the work of the converter. Copper matte is the product of the furnace and contains a varying percentage of copper and sulphur together with iron and some silica. The matte usually produced at pyritic smelters runs from 45% to 60% copper.

✱✱✱✱

THE presence of arsenic in ores is often indicated to the eye of the prospector by a peculiar greenish-yellow stain to be observed in quartz croppings and at shallow depths below the surface. Where this color is observed arsenical iron sulphide is usually found in depth. In gold regions this class of ore is often rich in gold, but is difficult to concentrate. In view of this the ore should not be crushed finer than necessary, to prevent as far as possible sliming of the arsenical ores. Arsenic usually turns the amalgamating plates black, when frequent dressing becomes necessary.

✱✱✱✱

INDICOLITE is a bluish-black tourmaline. Tourmalines vary their color with their composition. The dark varieties contain considerable iron and the light kinds but little. The minerals influencing the colors are iron, manganese, sodium, calcium, potassium and lithium. Boron is present in most varieties. The colorless, greenish and red kinds usually contain lithia. The dark varieties fuse with comparative ease and the lighter with difficulty. The red varieties, when transparent and free from flaws, are of great value as gems. The finest specimens resemble rubies.

✱✱✱✱

COLORADO has a law against the use of steel or iron tamping bars, the text of which is as follows: "No person shall, whether working for himself or in the employ of any person, company or corporation, while loading or charging a hole with nitroglycerine powder or other explosive, use or employ any steel or iron tamping bar; nor shall any mine manager, superintendent, foreman or shift boss, or other person having the management or direction of mine labor, allow or permit the use of such steel, iron or other metal tamping bar by employes under his management or direction."

✱✱✱✱

IN order to get the highest possible grade of bullion, the amalgam from stamp mills should be thoroughly cleaned by grinding the amalgam in a wedge-wood mortar with abundance of quicksilver to free it from particles of metallic iron, sulphurets and other foreign substances. It should then be carefully and completely retorted. The most satisfactory results are obtained when the miner melts his gold and pours it into a bar before selling it to the mint or other buyers of gold. There is always a loss in melting the sponge gold from the retort, owing to the presence of small quantities of quicksilver and other foreign matter in the sponge.

✱✱✱✱

DURING 1902 the Mount Lyell copper mines of Tasmania treated about 1000 tons of ore daily. Besides this, a large amount of fluxes are also charged to the furnaces. The total amount treated in the company's furnaces from June 25, 1896, to March 31, 1902, was: From the company's mines, 1,160,684 tons; purchased ores, 154,923 tons; fluxes bearing metal, 33,023. Total tonnage, 1,348,630 tons. The largest gold mine in the world at present known is the Homestake of South Dakota, where about 3600 tons are treated daily. The next largest is the Treadwell mines of Douglas Island, Alaska, where the average tonnage crushed is about 4700 tons daily.

✱✱✱✱

CADMIUM is commonly associated with ores of zinc, and its presence is indicated during the extraction of the zinc from its ores by a brown-colored flame, called "brown blaze," at the beginning of distillation and before the characteristic green flame of the zinc is seen. Cadmium is more easily vaporized than zinc. If a mixture of cadmium and zinc be dissolved in dilute sulphuric acid and the solution treated with hydro-sulphuric acid gas, a bright yellow precipitate of cadmium sulphide is obtained. This, dissolved in strong hydro-chloric acid, with addition of ammonium carbonate, will precipitate cadmium carbonate, from which metallic cadmium may be obtained by distillation with charcoal.

✱✱✱✱

NO system of ventilation is without objectionable features. Furnaces are efficient to an extent commensurate with their size and volume of heated air rising from it. Fans of whatever description are not perfect. Natural ventilation afforded by connecting underground workings which have their outlet at different elevations is the most efficient and satisfactory, but not always convenient to obtain. A mine that is artificially ventilated at 500 feet depth by means of fans may be poorly ventilated at a depth of 1000 feet if the same plant be employed, for a mine can outgrow the capacity of a given sized ventilating plant, and this fact is often lost sight of in the development of a mine, and as the workings grow more extensive the ventilation steadily becomes worse.

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TWO kinds of copper oxide are known, the sub-oxide Cu_2O and the oxide CuO. A third oxide in a hydrated state is composed of four parts of copper and one of oxygen. The black oxide of copper is known as cupric oxide and contains less copper than the cuprous or red oxide. The dark blue crystals commonly seen in many cabinets and known as blue vitriol is copper sulphate or bluestone. It is manufactured by roasting copper pyrites with a free access of air, when it becomes converted in part into cupric sulphate with iron sulphate; the latter is decomposed by the heat, becoming ferric oxide. When the roasted ore is leached with water the copper sulphate goes into solution, the ferric oxide remaining undissolved. The blue crystals are obtained by evaporating the solution of copper sulphate.

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LOSSES of quicksilver in mills may sometimes be remedied by keeping the lower end of the outside plates dry—that is, not sprinkling mercury on them at all. The quicksilver escaping from above is caught on these plates. Careful mill men run the upper portion of the plates as near the proper condition (that of pasty amalgam) as possible; the central section is kept "wet"—that is, supplied with more than the normal amount of mercury—with the view to catching amalgam and gold that may be scoured from the upper section; the lower end hard, as explained above, to catch any globules of mercury that may roll down from above. While some mill men contend that a long run of plates—more than 12 feet—is unnecessary, experience shows that a long run is advisable in many mills for the purposes above indicated. In this way good plate amalgamation can be done and large losses in quicksilver lessened, if not prevented entirely.

✱✱✱✱

THE mercury traps used at the mills of the Homestake Co. in South Dakota were not all of one size. Inside traps were made of wood, with copper-lined bottom, 14 inches long, 17 inches wide and 24 inches deep, this divided into four compartments by three wrought iron sliding plates, placed parallel with its short sides. These plates are 2¼ inches apart, the center one extending to the bottom of the box, the others reaching within 3 inches of the bottom. The pulp flows under the first compartment, over the middle one and under the third one, flowing out through a launder built into the side of the box. The trap on the outside is larger. It is also of wood, is 48 inches long, 14 inches wide and 48 inches deep. It has three partitions set 10½ inches apart, reaching from the bottom of the box up to within 1½, 3 and 4 inches below the level of the inlet, the outlet being 6 inches below the inlet. In the middle, between two wooden partitions, is let down a sliding wrought iron plate ⅜ inch thick, reaching to within 3 inches of the bottom of the box. At the Caledonia mill the traps are much smaller, having one trap for each battery of five stamps. The size of traps must be proportional to the amount of material passed through them within a given time.

The Moore Process at the Consolidated Mercur Gold Mines.

Written for the MINING AND SCIENTIFIC PRESS by GEORGE MOORE.

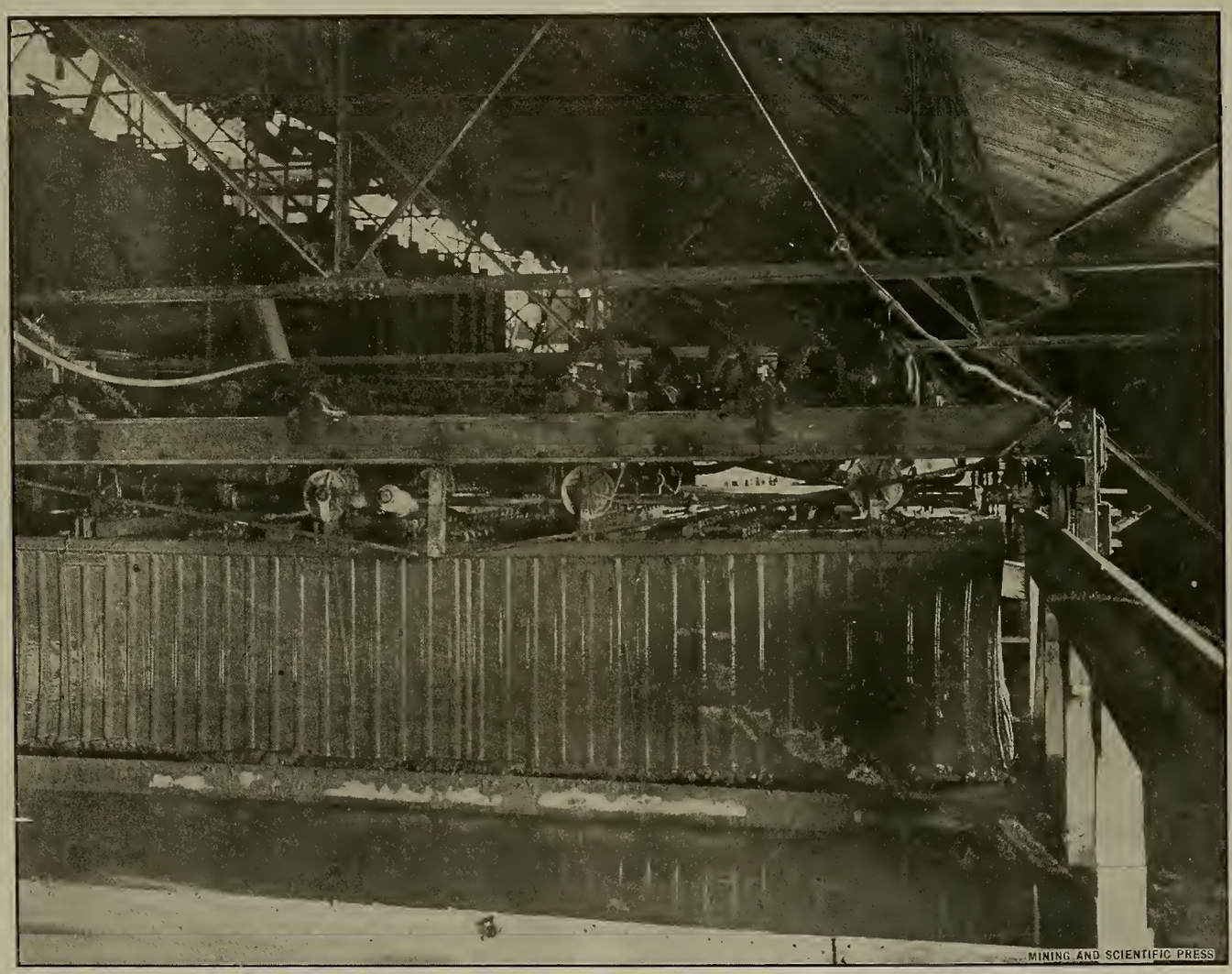
This process was designed by the inventor to meet a difficulty almost universal, or at least international, in the cyaniding of ores; that is, the slimes difficulty by which probably 90% of all ores are seriously affected. The methods at present in vogue for the treatment of slimes are crude in the extreme, the decautation and the filter press methods being the only ones heretofore attempted in a large way. Both of these have very serious objections and both are useless for low-grade ores. The filter press method has largely displaced decantation and is, especially in South Africa and Australia, very extensively in use. In both of these countries the ores are of a sufficient value to stand the cost of operating and the loss by imperfect washing. In this country most of the larger gold mines produce ores of such low grade that the use of filter presses or of the decantation method is simply out of the question.

The writer had full experience in the operation of filter presses at the Sunshine mine, where the ore averaged less than $3 per ton, and there encouutered the difficulties with which every filter press operator is familiar, that is, the cost of manipulation and the imperfect washing of the gold solution from the cakes. There were four three-ton presses, and the labor cost of operating was 60 cents per ton of slimes, while an average of 40 cents of soluble gold was left in the cakes. The latter difficulty is due to the fact that in filliug it is impossible to preveut a partial separation of the coarser slime particles from the finer. Thus the resistance to the flow of wash water varies in different parts of the cake and the water naturally takes the course of least resistance and a large part of the cake is not washed. To overcome this difficulty operators in South Africa resort to "double filter pressing," that is, they stir the cakes from the first press into an emulsion with water or solution, and repeat the filteriug operation. This of course doubles the operating cost, already too high.

The accompauying illustrations show some of the Moore process filters in operation at the Consolidated Mercur mill. The filters consist of a series ot parallel plates 4 inches apart. Each plate is 20 feet long and 4 feet high, and is simply a light frame work with canvas on both sides. A suction pipe passes through the top at the center down to within a half inch of the bottom, while two blowing pipes also enter at the top, each one half way between the center and ends, and exteud barely through the top. Eighteen of these parallel plates are firmly attached to channel irons crossing their tops, thus forming one "basket" of filters, that is, one unit. We thus have in one machine a total filtering surface of 2880 square feet. On top of these plates, and connected to their suction pipes by a 3-inch cross header pipe, rests a 5½-inch and 8-inch by 7-inch vacuum pump of the Dean patteru. The whole basket hangs by eight wire cables from an electric crane which raises aud lowers the basket and carries it from one compartment of the tank to another. This tank has three compartments, containing slimes, weak cyanide solution and wash water. Just beyond the wash water compartment is the discharge point, simply an open space under which the tailings cars stand to receive their load.

In operation, the filter basket is lowered in the slimes compartment and the vacuum pump is started. The slimes are agitated to prevent settling. After the suction has proceeded from one to two hours, varying with the character of the slimes and with the thickness of the emulsion, there is a coating of slimes on all parts of the filtering surface of from ¾ inch to 1 inch in thickness, representing from nine to twelve tons of slimes, dry weight. During this time the pump is continuously discharging the clear gold solution. The motor on the crane is then started and the basket with its load is lifted out of the slimes compartment, this operation requiring forty seconds. The crane is then moved along its track until over the weak cyanide compartment and the basket is lowered. Twenty minutes in this tank and ten minutes iu the wash water tank is sufficient for a complete displacement of the valuable solutions. During all this time the pump is in operation and the vacuum produced prevents the cakes from dropping off during the transferring. Having arrived at the discharge point the vacuum pump is stopped and a blast of air turned in to a pipe connecting with the blowiug pipes of each plate. The air passing through the cloth from within the plates dislodges the waste slime cakes, and, deprived of all their soluble gold, they drop at once into the cars below, so that from nine to twelve tons are discharged and loaded in about a minute. Each filter handles about seventy-five tons per day and one man operates the four filters, so the cost of labor is about 3 cents per ton. The wear on the cloth is almost nothing, cloths in use six months in the experimental plant showing no deterioration. The power required is very small, a 7½ H. P. motor does the raising of the basket and is in operation only four minutes during each cycle of two hours. The vacuum pumps are run by air and hold a vacuum of from 18 inches to 20 inches of mercury. The discharged solution is as clear as spring water.

The advantages of this system are obvious; first, a saving of from 40 to 60 cents per ton in labor; second, a saving of a like amount in extraction; third, a saving of over 50% in the cost of installation. The saving on extraction is due to the fact that, while the filter is in the slimes tank and the suction in operation, an equalizing action is taking place rendering all parts of the cake of equal resistance to the flow of solution and wash water, so that when placed in the washing tanks a perfect displacement of solutions is accomplished. For example, we might consider that it would be possible for one spot on the 2880 square feet of slime cake to have more of the coarser slimes, or fine sands, than the other parts; then there would be less resistance to the flow at this point; therefore, the flow would be accelerated here, the slimes would be brought up and would cover this point more rapidly than the other parts until, by this increased coating, the resistance to the flow would become the same as at all other points. This equalizing influence is, in fact, so continuously in operation that at no instant is there any less resistance to the flow at one point than at all other points. Thus, when lifted out from the slimes compartment, the entire basket of filters is in perfect condition for washing, and, in practice, we extract all of the soluble gold.



Interior Mercur Mill, Tooele County, Utah, Showing the Moore Filter in Act of Transportation.

At the Consolidated Mercur mill all of the ore is first passed through revolving cylinders where the slimes are washed from the sands. By this operation the benefit to the sands, as shown in the extraction, fully equals the benefit to the slimes; for, consisting only of the coarse granular particles, percolation is carried on rapidly and better displacements and washings accomplished. The tailings from both the sands and the slimes are assaying from 40 to 45 cents, a saving of 80 cents per ton over the old system, which on 1000 tons per day is a heavy item.

At the Dexter mine at Tuscarora, Nev., slimes

which have been considered so rebellious that they had not been treated by any existing systems are now being handled by this process, the tailings often carrying only 20 cents per ton in gold. Experiments carried on in the Black Hills indicate that the slimes there can be treated very rapidly, cakes ¾ inch thick having been built up in ten minutes. A 100-ton plant is now being built by the Allis-Chalmers Co. for the Buxton & Big Bonanza property in that district.

Equipment of the Sultan Mine, Arizona.

NUMBER II.—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by CHARLES E. BUNKER, Construction Engineer.

The water supply for the mine, mill and cyanide plant is developed on the Santa Maria river by sinking a shaft on the bank of the river 56 feet deep, from which a drift is run horizontally directly across under the river bed for a distance of 270 feet, and below the bed from 10 to 15 feet. The drift cuts through sand, cement, gravel and conglomerate waste, and is of sufficient size to form a large reservoir. It may be well to state that the rivers of southern Arizona are dry at certain seasons of the year, due to the immense evaporation; however, in this particular case, the sand beds are thoroughly saturated with water, and it was due to the latter fact that it was possible to develop a sufficient water supply. Thirty-seven feet below the collar of the shaft is a station 7 feet 6 inches wide by 7 feet 6 inches high by 12 feet long. In this station is situated a 6x10-inch Stilwell-Bierce & Smith-Vaile triplex hydraulic pump with a 20 H. P. electric motor to operate it, which runs at a speed of 600 revolutions per minute, and is geared to the pump so as to drive it at a speed of forty revolutions per minute. This is an inductiou motor with "squirrel-eage" armature, and is connected up with a starting compensator and oil-break switch. The pump and motor are on one bedplate, which rests on a concrete foundation.

The current is conducted from the generator at the power house through three No. 8 iusulated copper wires at a tension of 2500 volts, to three transformers at the well house where the current is transformed down to 600 volts. Thence it is conducted to the pump through the uecessary fuse blocks, switches, etc. The three cylinders are on one bed plate. The plungers are directly connected to one shaft with cranks set at an angle of 120°. The capacity of the pump is rated at 150 gallons per minute.

The water is conducted to the mill tanks, a distance of 1 mile, and a differeuce of elevation of 500 feet, through a 6-inch spiral iron pipe, connected with shoulder bolted joints. The well will furnish about 80,000 gallons of water every twenty-four hours for a period of three to five hours.

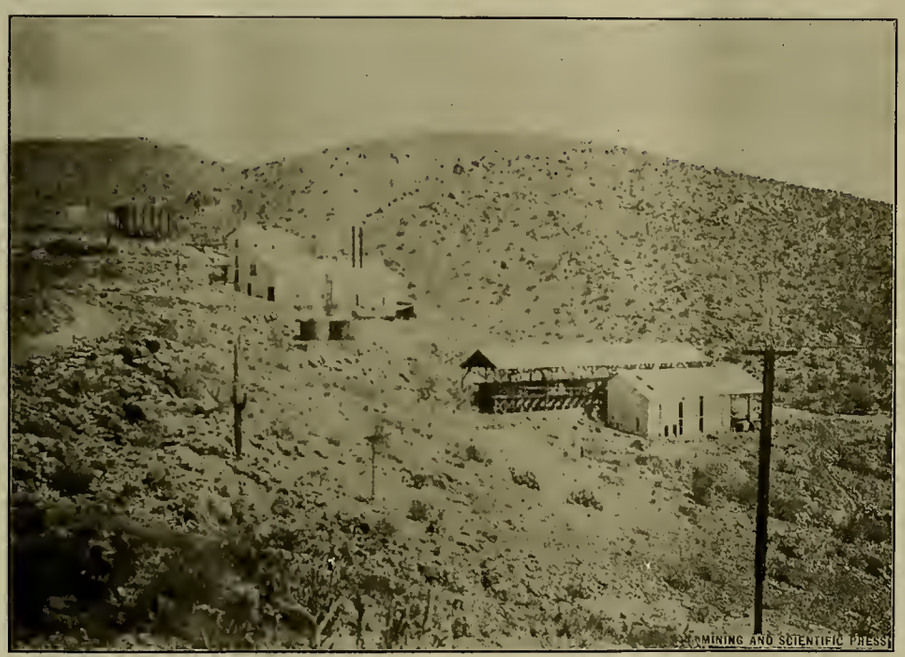
The cyanide plant is under two roofs—the leaching tank and filter press building in one, and the precipitating room, pump room, retort room and assay office in the other. The upper building is 150 feet long and 30 feet wide, open on all sides and roofed with No. 26 corrugated irou. The lower building is 90 feet long and 40 feet wide, enclosed on all sides and roofed with corrugated iron. The solutiou tanks are not under cover. The tanks throughout the plant were shipped "knocked down" and erected by tank riveters on the foundations on which they rest.

The plant consists of a strong and weak solution tauk 10 feet in diameter aud 14 feet deep, each with a capacity of 11,500 gallons, or forty-seven tons of solution; five leaching tauks each 24 feet in diameter and 5 feet deep, the capacity of each about sixty tons; two gold tanks, each 10 feet in diameter by 6 feet deep; two solution sump tanks 10 feet in diameter by 4 feet deep; two agitating slimes tanks 10 feet in diameter by 12 feet deep; one cleau-up tank 4 feet in diameter by 3 feet deep, and one 15,000-gallous capacity water sump tank; also a pressure tank, or montejus, 42 inches in diameter by 12 feet long for charging the filter presses, two filter presses each with a capacity of twenty-oue 36x36x3 inch cakes; one Stilwell-Bierce aud Smith-Vaile 3x5x7 solution pump; one 6x4x6 duplex vacuum pump, a Fairbauks-Morse duplex 6x4x6 pump, for pumping back clear water from the sump tank, and washing the cakes in the filter presses, and two double-compartment iron precipitating boxes with twelve compartments each.

Each leaching tank is provided with four bottom-discharge gates; an automatic filling distributer, and an overflow launder around the top of the tank. The filter frame in each tank is made of 1¼-inch square strips laid 1 ineh apart at right angles aeross 1x3-inch strips spaced 15 inches apart on the bottom of the tank. These wooden gratings are made in four sections, and fit within 1 inch of the inside periphery of the tanks. Over the bottom strips are stretched the eanvas filter cloths securely held at the sides and openings by 1-inch rope — around which the canvas cloth is rolled—and both are driveu tightly between the tank side and gratiug. On top of the eanvas filter is placed a filter of cocoa matting for the protection of the lighter cloth. Below the leaching tanks extend three wooden launders for dis-



Cyanide Tanks and Filter Press, Sultan Mine, Yavapai County, Arizona.



Milling Plant, Sultan Mine, Yavapai County, Arizona.



A 15,000-Gallon Oil Tank for Sultan Mine, Yavapai County, Arizona.

tributing the wash water and the strong and weak solutions to their respective reservoirs. The water, air, and strong and weak solutions are conducted through the plant through 3-inch iron pipes.

The precipitating-room is 36x40 feet in size, and divided into three floors. The strong and weak gold tanks are on the upper floor, and the two sump tanks are on the lower floor. Above and extending over the sump tanks is the zinc precipitation box floor, 20 feet by 36 feet, covered with linoleum. The zinc boxes are double-compartment iron boxes with twelve compartments each. Attached on the lower side of each box are the slimes launders for removing the zinc slimes at clean-up. Covering these launders are hinged sheets of iron provided with hasps and staples for locking them down. On the sump-tank floor is the clean-up tank into which pipes lead from the slimes launders. The precipitating room is ceiled throughout with double beaded ceiling, and is lighted by skylights and double windows.

The surface equipment of the Sultan mine is one of the most complete in the country, and has been highly commended by mining men who have visited the property. That the Sultan mine, after years of "ups and downs," is on the eve of a success which will place her among the list of bullion producers, there seems little doubt.

The Sultan mine stands as an object lesson to others of what may be accomplished in the desert of Arizona when mining is undertaken with enterprise, capital and ability.

Consumption of Zinc in Cyanide Plants.*

NUMBER IV—CONCLUDED.

Written by WALTER H. VIRGOE.

Table No. 4 shows half a dozen experiments illustrating this point.

standpoint, a glance at the figures showing the chemical losses of zinc on any cyanide plant are quite sufficient to prove that the accumulation of zinc in cyanide plant solutions is not limited by the deposition of zinc as $ZnCy_2$, for the loss of cyanide involved by such reaction would be enormous.

Referring to the preceding figures, it will be observed that on the sands plant there was a chemical consumption of 1201.9 kilos, or 2644 pounds avoirdupois in four months. Assuming this zinc to be thrown out as the single cyanide of zinc, a loss of cyanide is involved of 5288 pounds, or about 2 pounds of KCN per ton of ore treated.

On the slimes plant the chemical loss was 288.7 kilos, or 635.14 pounds, and as 1481 tons were treated, this means a cyanide consumption of .85 pound per ton.

Inasmuch as the average consumptions on the two plants are about 1.5 pounds and .6 pound, respectively, we note how very unsatisfactory this attempted solution of the problem is.

If the figures be taken from another plant treating chloridized ore in the territory of Tepic, Mexico, over a period of two months, as follows, interesting data upon this point are afforded:

Tonnage treated, 3174.4.
Cyanide consumed, 4890.6 pounds, or 1.54 pounds per ton.
Zinc consumed, 3816.5 pounds, or 1.20 pounds per ton.

	Pounds.
Weight of raw product produced	6441.38
Weight of fine bullion produced	5265.09
Difference	1176.29

An analysis of the product showed that it contained 6.85% of zinc; hence, 444.23 pounds of zinc were cleaned up in the product during the period of two months, and since the total amount of zinc used was 3816.5 pounds, the chemical loss must have approximated 3372.27 pounds, which, if thrown out of solution as $ZnCy_2$, would have entailed a further cyanide consumption of 6744.54 pounds.

TABLE NO. IV.—TABLE SHOWING THE EFFECT OF THE ADDITION OF ZINCIC-POTASSIC-CYANIDE TO ORDINARY CYANIDE SOLUTIONS IN LABORATORY TESTING WORK.

Test No.	Weight of Ore, grm.	Weight of Sol'n, grm.	Reagents Before Use. KCN, %	KCN as $ZnCy_2$, per cent.	Total KCN per cent.	Reagents After Use. Total KCN, %	Cyanide consumption, lbs.	Heads. Au	Ag	Total	Tails. Au	Ag	Total	Per Cent of Extraction. Au	Ag	Total	Remarks.
1.....	500	500	.40	.00	.40	.36	.8	$11 16	$1 73	$12 89	$1 86	$0 74	$2 60	83	57	79.8	In tests Nos. 1, 2, 3, the solutions as they drained off the ore were passed through zinc. The material treated was a very pure quartz ore in each case. The tests Nos. 4, 5, 6, the effluent solutions were not passed through zinc.
2.....	500	500	.35	.05	.40	.39	.2	11 16	1 73	12 89	2 27	77	3 04	80	55	76.4	
3.....	500	500	.30	.10	.40	.39	.2	11 16	1 73	12 89	2 27	83	3 10	80	52	75.9	
4.....	500	500	.40	.00	.40	.31	1.8	11 16	1 73	12 89	1 86	60	2 46	83	65	80.9	
5.....	500	500	.25	.15	.40	.33	1.4	11 16	1 73	12 89	1 86	66	2 52	83	62	80.4	
6.....	500	500	.20	.20	.40	.37	.6	11 16	1 73	12 89	1 86	73	2 59	83	58	80.0	

NOTE.—These tests represent results of leaching experiments conducted on a basis of four days' treatment.

The charges, which were placed in glazed leaching jars, were under percolation for four days. The solutions that come off tests Nos. 1, 2 and 3 were allowed to drip into a small flask of zinc shavings and drip by overflow into a glass beaker. The solutions from tests 4, 5 and 6 were not passed through zinc. This probably accounts for the consumption in the first three tests being smaller than in Nos. 4, 5 and 6.

The data furnished by this sheet serve to indicate that the presence of zinc-potassic-cyanide in solution tends to greatly reduce the consumption. Tables Nos. 1 and 2 are also interesting in this respect.

One of the most interesting problems in cyanide work is the question relating to the deposition of zinc from plant solutions. I believe the generally accepted idea is that the zinc is thrown out as $ZnCy_2$ 2KCy, and this I observe is the theory advanced by Schnæbel in his book on "Metallurgy," Vol. 1, page 835, where he gives the following equation:

$$2\,H_2O + Zn\,(NaO)_2 + K_2ZnCy_4 = 2\,ZnCy_2 + 2\,NaHO + 2\,KHO,$$

and adds: "These reactions limit the accumulation of zinc in the solution."

The author does not believe such a reaction does take place, nor that any reason exists why it should take place. On a cyanide plant more zinc will be found in the strong solutions than in the weak solutions, and it would appear that there is no chance of $ZnCy_2$ being thrown out in a strong solution of cyanide, or, in fact, in any solution containing free KCy; neither is it to be expected that $ZnCy_2$ would be thrown down in a strongly alkaline solution. The author questions whether $ZnCy_2$ is ever actually thrown out of a cyanide solution in practical operation, for, presuming that the solution contained no free cyanide, and that all the free alkali was being used to hold zinc hydrate in solution, or in other words, was used to form that very unstable compound, zincate of potash, we should still have this further reaction to fall back upon:

$$Zn\,K_2O_2 + 2\,Zn\,Cy_2 + 2\,H_2O = 2\,Zn\,(OH)_2 + ZnCy_2.2KCy.$$

Moreover, looking at the matter from a practical standpoint, it is unnecessary to produce further data to prove the fallacy of the supposition of the deposition of zinc from solution in this way.

The author has observed that solutions of KCy containing zinc that have been in contact with ore, with which lime has been mixed, will gradually deposit in the sump tanks a quantity of light, white precipitate which forms first as a scum on the surface of the solution, and which consists of lime and zinc, perfectly free from combination with cyanogen. This precipitate consists of carbonate of lime and zinc, and since precipitated carbonate of zinc is soluble in an ordinary solution, the author has little doubt but that the salt thrown out is a compound carbonate of zinc and lime, which is insoluble, and which is formed by the action of the carbonic acid gas of the atmosphere. This precipitation of zinc on a plant will be taking place not only on the surface of solutions in the sumps, but also in the solution exposed to the atmosphere on the charges under treatment in the leaching tanks, and affords the true reason for the non-accumulation of zinc in solution.

The following equation probably describes the reaction that takes place:

$$ZnCy_2\,2KCy + 2Ca(OH)_2 + 2CO_2 = ZnCa(CO_3)_2 + CaCy_2 + 2KCy + 2H_2O.$$

We see, therefore, that lime appears to play a very important part in keeping cyanide solutions free from zinc. A discussion of the advantages in other directions does not come within the scope of this paper, but it may be pointed out that its presence in solutions prevents the existence in solution of alkali carbonates or bicarbonate of lime, which so frequently gets thrown out in the zinc boxes as carbonate owing to the action of the generated potash if the solutions are deficient in alkali, which is liable to be the case where plant solutions are made up with water heavy in bicarbonate of lime. The author has known cases of zinc box screens becoming clogged with this deposit of lime, and even cases where the precipitate was caked from this cause and only removed with difficulty from the boxes.

One matter suggests itself with reference to zinc-box metallics: Since the solution and precipitation of zinc from a cyanide solution in practice does not involve any loss in cyanide, it might prove to be an economical matter in a plant producing few metallics to replace these metallics in the boxes on trays, placed horizontally so that the solution can flow beneath and above them; these metallics should gradually dissolve, and by this means the production of material requiring the expense of acid treatment might be avoided.

The question whether zincate of an alkali can exist in the presence of free KCy is interesting. In a paper read before the Colorado Scientific Society in April, 1895, N. Andersen states that it does not exist and that the following reaction takes place:

$$Zn(OK)_2 + 4\,KCy = ZnCy_2.2\,KCy + 4\,KHO.$$

Again, Alfred James, in discussing a paper entitled "Notes on Residual Cyanide Solutions, and a Method of Examining Them," published by Chas. Ellis, in 1897, gave some evidence in support of the above reaction taking place. There appears to be no evidence tending to the contrary, and Andersen's equation is probably reliable. Consequently, a plant chemist may be safe in regarding the zinc contents of his plant solution present as zincic-potassic-cyanide, provided the results of titration with excess of soda show that there is sufficient cyanide in solution to permit of the zinc being in this condition, and, therefore, by deducting the amount of cyanide necessary to convert the known amount of zinc present into zincic-potassic-cyanide from the amount shown by titration with excess of alkali and the indicator, the amount of free cyanide is known.

This examination of a plant solution should be made every few days—at the very least once a week; many operators would then become alive to the fact that they are using zincic-potassic-cyanide alone as a solvent, and would understand why their extractions, especially in the case of silver, are lower than they should be. More especially is this likely to be the case with dilute slimes plant solutions, which solutions are in need, if anything, of more careful watching than strong solutions because, being very dilute, it requires but the solution of very little zinc to convert all the free KCy into zincic-potassic-cyanide, and the further solution of zinc can only occur as a zincate of an alkali, and it can be very well understood that the addition of free cyanide to such a solution must first convert this zincate of alkali into a double salt before the solution can contain any free cyanide at all.

Where poor precipitation from slimes plant solutions occurs it is necessary to know whether there is enough free cyanide in solution to dissolve the zinc hydrate produced by electrolytic action on the surface of the shavings in the boxes, and the addition of free cyanide is absolutely no criterion that this is the case.

An excess of alkali in the form of lime is absolutely necessary in all solutions, and sump tanks should be wide and shallow, rather than narrow and deep, and not so closely covered in as to prevent the free access of the atmosphere. In estimating zinc in a cyanide solution, it is preferable to decompose the solution with HCl and boil off the HCy fumes before evaporating to dryness, because if this be not done the zinc contained in the evaporated residue is found to be in an exceedingly insoluble form, being in combination with some organic acid resulting from the decomposition of the cyanide solution during the evaporation, and requires careful and long digestion with concentrated sulphuric acid before it can be all made to dissolve.

*Jour. Chem. Met. and Min. Soc., S. A. (Condensed.)

Determination of Gold and Silver in Cyanide Solutions.

TO THE EDITOR:—Those who have occasion to assay cyanide solutions in order to determine the amount of gold, silver, etc., in solution, will find that the following method will greatly facilitate their operations:

Draw off 100 to 500 c. c. of the cyanide solution.

Place some sawdust or porous cotton in an iron pan or any convenient iron vessel.

Pour the solution gradually upon the sawdust and allow it some time to be absorbed by the latter.

Apply heat gradually to the iron vessel until all the solution is evaporated and the sawdust reduced to carbon. The residue, mixed with the proper fluxes, is transferred into a crucible and then assayed in the ordinary way. Should the volume be too large, it can be quartered down.

Should it be desirable to make an estimation for the base metals, the same can be made volumetrically or gravimetrically, with the precaution of washing the carbon with distilled water.

This simple method of absorbing the cyanide solution offers the advantage of being rapid and enables the operator to treat a larger volume of solution, which is important, as the percentage of gold in a small amount of solution is in most cases so minute that it can only be found as a trace, which renders the assay practically valueless, so far as quantitative determination is concerned, because this trace of gold could only be calculated by redissolving the gold in aqua regia and applying the sensitive "Cassius-color" test, with which not all assayers in this country are familiar.

The above-described method is not claimed as a scientific discovery, but may be appreciated by practical cyanide operators in America.

ROBERT GRAUER, Metallurgical Chemist.

Shaft Sinking and Equipment at the Ashland Mine.*

NUMBER II.—CONCLUDED.

Written by H. F. Ellard.

Stockpiling.—When stocking ore, one of the chutes above mentioned is reversed so that the ore is discharged into two cars on parallel tracks. These run to two trestles, 60 feet apart, and are propelled by a haulage plant of the "four-loose-reversible-drum" type, situated in the engine house and connected to the cars by ropes and sheaves in the ordinary way.

The cars are automatic as to the opening and closing of their doors. They have a capacity of four tons each, at a speed of 1000 feet per minute. They are operated independently, but by one man. A suitable indicator on the haulage plant shows the position of both cars at all times, and both cars may be propelled in either direction at the same time.

Sinking.—Ground was broken Sept. 23, 1901, and has been carried on at intervals since that date. The shaft was completed to the 13th level, a distance of 1032 feet, on June 30th last. The work during the first few weeks was tedious, owing to an excessive raiufall and consequent caving of the hanging side, and to the customary delays in getting timber, hoist, headframe, buckets, etc., in position for work. Our pumping charges were very light, only thirty gallons of water per minute being handled in addition to the occasional floods above mentioned. Once fairly started very fair progress was made. The timbering was very carefully done, one wall plate only was broken by blasting, and the shaft presents a thoroughly workmaulike appearance. No serious accidents and no fatalities occurred during the progress of the work. For the first 87 feet sinking was carried on in the regular way. Four miners were employed on each shift, and they drilled, shoveled or timbered as was required. They worked eight-hour shifts and were paid $2.50 per day.

Below this point with the exception of 47 feet included in three winzes the entire length of the shaft was penetrated by raises. These were about 6x6 feet in size, and placed as nearly as possible in the center and toward the foot-side of the shaft. There were six of these in all, varying in height from 112 to 200 feet.

The customary chutes at the bottom of the raises were dispensed with, and floors and openings the full width of the rock compartments were maintained to allow free discharge of the coarse rock. A pole across the opening served as a stop in each case.

It was necessary to put in six crosscuts from the old workings to the line of shaft, a total distance of 1037 feet. In addition to the sinking crew two other gangs were employed most of the time, one raising and the other preparing the crosscut on the level below.

Until the shaft went into commission, July 1, 1902, a foreman, our regular timber boss from the mine, spent most of his time at the work and looked after the framing and placing of sets, the moving of pumps, the care of tools, supplies, etc. After this time the work was carried on continuously, one, two or three shifts being employed as conditions at other points warranted.

The sinking and timbering were done on the "Company Account" plan, the drifting and raising were done by contract.

Two Ingersoll-Sergeant rock drills, 3½-inch cylinder, were used. The air pressure was generally from 80 to 90 pounds, and 1¼-inch air hose was used. From 20 to 24 holes from 10 to 14 feet in depth were drilled for each cut and 50% powder was used exclusively. Ammonia powder was used in raises and at all points where the ventilation was poor.

Progress.—The work was necessarily carried on in sections, and in most cases very satisfactory results were attained.

The following table gives a summary of the work by sections, giving the length of same, the force employed, the time required to complete, and the time lost by sundry causes. This last item refers to the time lost by the entire force employed on one shift.

*Trans. Lake Superior Mining Institute.

Cost.—The following statement shows the cost of the work:

	Per Foot— Labor.	Supplies.	Total.
Sinking and stripping down	$12 15	$1 05	$16 20
Raising	6 19	1 64	7 83
Timbering	4 00	8 38	12 38
Skips, cage and ladder roads	1 74	2 45	4 19
Miscellaneous charges*	1 06	1 07	2.13
Total	$25 14	$17 59	$42 73

* Including cost of temporary hoisting equipment and underground ore pockets.

SUMMARY OF SUPPLIES.

	Per Foot.
Explosives	$2 60
Iron and steel	1 31
Pipe and fittings	18
Timber and lath	8 15
Steel rails	1.50
Miscellaneous supplies including fuel and air	3 52
Total as above	$17.59

The sinking and raising accounts include the cost of handling the material on the levels, hoisting and disposing of it on surface; also cutting out the plats on the levels. The timbering account includes the cost of timbering the plats (stations).

It will be noticed that the timbering is a very expensive item, and I give herewith the cost of materials for one complete set:

MEMORANDUM OF COST OF TIMBER FOR NO. 9 SHAFT, ONE SET.

	Feet, B. M.		
2 pieces 12x12-18 pine	432		
2 pieces 12x12-12 pine	288		
1 piece 12x12-16 pine	192		
Total	912 at	$19 00	$17.33
2 pieces 10x12-10 tamarack	300 at	13 50	2.70
1 piece 6x12-12 tamarack	72 at	13 50	97
1 piece 4x12- 5 tamarack	20 at	18.00	36
2-inch hemlock	545 at	11 50	6.27
2-inch tamarack	180 at	14.50	2.61
250 wedges, each		01¼	3.13
1 cord soft wood			2.25
			—$35 62
65 pounds 1¼-inch iron		$2 00	$1 30
35 pounds 1¼-inch washers		1 85	65
13 pounds 1¼-inch nuts		04½	68
10 pound spikes		2.45	25
			— $2.88
			— $38 50

To this we have to add the framing, teaming and shop labor, amounting to approximately $10 per set, making a total charge on the surface of $48.50 per set.

There are 198 sets of this size, and seventeen sets of 14x14-inch timbers in all, the heavier timbers being used in the more treacherous ground near the surface.

To S. R. Elliot, engineer, and Captain G. A. Andersou, in charge of the work, much credit is due for the accuracy and excellence of the work performed.

SUMMARY OF THE WORK ON SHAFT No. 9, GIVEN IN SECTIONS.

SECTION.	Length, feet.	Force, Men.	Employed Shifts.	Time to Complete, Weeks.	Time Lost, Hours.
1. Sinking from surface	87	13	3	9	101
2. Raising from 2d level	125	4	2	6	28
3. Stripping down and timbering to the 2d level	135	13	3	6	12
4. Raising from 5th level	143	4	2	9	16
5. Stripping down and timbering to 5th level	143	3	3	6	20
6. Sinking winze below 5th level	20	6	3	1	12
7. Raising from 7th level	129	4	2	7	8
8. Stripping down and timbering to 7th level	153	13	3	5	..
9. Raising from 8th level	110	6	3	20 days	..
10. Stripping down and timbering to 8th level	110	13	3	5	7
11. Sinking below 8th level	13	6	3	1	..
12. Raising from 10th level	157	4	2	11½	27
13. Stripping down and timbering to 10th level	157	12	3	7	8
14. Sinking below 10th level	14	12	3	1	..
15. Raising from 13th level	200	4	2	13	48
16. Stripping down and timbering to 13th level	230	12	3	10	20
Total raising 864 feet in 50 weeks, or 2.88 feet per day					
Total sinking 1032 feet in 50 weeks, or 3.44 feet per day					

Copper Resources of China.

When we cousider the available supply of copper, says Electricity, it would be interesting to find out what place China usually occupies as a possible future source to draw upon; yet it is known that, amoug many other valuable mineral deposits in that mysterious country, copper is not by any means the least important, although its production has beeu developed by only the most restricted aud primitive means.

The usual manner of getting ore has been to follow a lode from the surface into the ground as long as possible without going to the expense of siuking a shaft or making a tunnel. The miuers have usually been left to do as they please uuderground, Government officials and private capitalists considering it beneath their diguity to explore the caves dug at their expense or order. The miners have, as a rule, been treated badly, aud have taken their reveuge by trying to ruin them—usually by gettiug out only the very poor ore, until the capital invested is exhausted, and leaving columns of best-paying ore standing, which they usurp for their own benefit after the mines have been abandoued.

Copper is abundant in Ho-hoi Hsien, Wu-ting Chih-li Chow, Wei-hsi, T'ing, Yung-chang Fu, K'ai-hua Fu and Tung-ch'uan Fu, which has the richest deposits of copper in any part of Yunnan. Indeed, blocks of pure copper are said to exist in the last-named locality, which have defied all the ingenuity brought to bear on them for ages to demolish or remove. Japanese miniug experts are uow beiug introduced into these localities and the deposits are rapidly being reduced to marketable metal.

The copper deposits in Chao-tung Fu are immense. Many mines have been opened and worked.

The Development of Water Powers.*

Consulting engineers are in the habit of estimating water powers solely on the basis of the amount of power which is available for 365 days in the year, of twenty-four hours for each day. Perhaps they are wise in so estimating, as the mistakes they may make in underestimating the usefulness of the water power are very often counterbalanced by the mistakes they are also making in the cost of its development and the possibilities of the market. But, however advisable it may be for a consulting engineer to neglect altogether the variable power a river is capable of furnishing, it is necessary in this discussion to consider the limits of variability which one should allow for development of a water power.

New England mills are equipped with both steam and water power, and there is probably no body of men in the country more familiar with variable water power than this. Water powers not continuous require an equivalent steam power equipment of engines, boilers and men, with full interest charges, and, in consequence, such powers only affect a saving equivalent to the fuel consumption of the steam engine. This, with continuous power and coal at the average New England price, amounts to approximately $36 per year, and, in consequence, it is not reasonable to contemplate the development of excess power beyond the continuous flow of the stream where the generation of the excess power involves capital and operation charges in excess of $36 per year. Furthermore, I do not consider that it is safe to estimate that this means that one should expend as much as $600 per horse power for the development of excess power. An organization which can only net 6% on the investment which it has made for machinery and equipment had better use its money in a banking business and go out of manufacturing. In fact, it is my opinion that it is unwise to develop the variable power of a river where the expenditure for this portion of the developing exceeds, on the basis of twelve months' supply of power, $200 per horse power, or, in other words, $100 per horse power for six months power, or about $150 per horse power for nine months power. I am confidently of the opinion that it is economical to develop the variable power, where the continuous power does not exceed in cost $300 per horse power and the variable power does not exceed $200 per horse power, based on a continuous rate.

A statement has been made, and I believe that such a statement is hard to disprove, that the development for continuous power at a cost not exceeding $300 per horse power produces energy at a rate with which steam plants can not compete successfully, no matter what the cost of fuel, and I am further of the opinion that where the excess power for a development does not cost more than $200 per horse power, it more than pays for the saving in fuel alone, and that this condition warrants the development of this excess power and the installation of a steam plant to be operated only during the time of the deficiency of water. As these opinions may not be easily justified in the installation of the plants having less than 1000 H. P. minimum capacity, and as the majority of mills and water powers to which the argument might apply are of less capacity than this, it may, at first sight, seem that the arguments which have been presented have no particular or general interest; but before you hastily arrive at this conclusion, I beg to call your attention to the fact that I have already stated and hold that as the business of a banker is not, in my opinion, legitimate business for a cotton mill, I hold, reasoning along the same lines, that the development, generation and distribution of power is no more the business of a cotton mill than making investments of a banking character would be.

The most notable example that has come to my attention of the wastefulness of low-head development is to be found at Holyoke, where the canals consume space which should be available for good factory sites and where they are losing from 20% to 25% of the entire power developed by reason of the inefficiency of many low-head wheels in series. I claim that it would not be correct to object that in such a case as that of Holyoke the inefficiency of electrical machinery and transmission would more than counterbalance the increased efficiency of the water wheels, since we all know that the introduction of the electrical drive will of itself overcome the loss from belting amounting to more than the inefficiency of the electrical machinery, and whatever increased efficiency there could be gained by the high head would be clear gain and increased power.

I do not intend in any of these instances to question the judgment of the builders of the mills or the developers of the water powers. The last generation certainly presented evidences of having at least as good a quality of brains as we have to-day; but I claim that simply because our forefathers worked out their problems as they did, makes no reason for our slavishly following their footsteps when the work that they and we have done in other lines produces new conditions which make it necessary in the future to meet their disadvantages. The changes the past twenty years have made in the design of water wheels and improvement of electrical machinery and steam

*Abstract of paper by F. A. C. Perrine, read before New England Manufacturers' Association.

engines renders to-day available the use of high water heads and long-distance transmission and auxiliary steam plants, not only without a necessary decrease of efficiency, but actually with an increase of efficiency and an improvement in the quality of the product.

The present day marks an era of consolidation and specialization, and all that has been said is in direct line with this tendency and is hardly more than calling attention to the fact of the improvements in hydraulics and hydraulic machinery, electrical generation, transmission and application, and the great change now made possible in the methods of power application over anything that has been seen heretofore in New England.

The advantage of these principles has been widely appreciated in the regions of the Rocky mountains and beyond, and by their application the manufacturers in these regious have succeeded in overcoming their very great disadvantage of inaccessibility and expensive fuel, even where they have had to run flumes and ditches from 5 to 50 miles in length and have had to transmit power to such great distances that the limit I have set of 35 miles seems to the Western engineers so short that they do not hesitate at rendering available powers that are at least 100 miles from a possible market.

Resurvey of Cripple Creek District.

Few field operations of the United States Geological Survey have created more local interest than the resurvey of the Cripple Creek, Colo., district. The original survey was made in 1893 and 1894 by Messrs. Whitman Cross and R. A. F. Penrose, assisted by E. B. Matthews. At that time comparatively few mines were in operation and none of them had gone deeper than 400 or 500 feet. Since then the number of mines has greatly increased and there has been remarkably extensive underground development throughout the district. Several shafts are now down over 1000 feet. These new conditions have made a resurvey of the district eminently desirable, if not absolutely essential to the economic development of the properties. So desirous were the chief mine owners of the district that the work should be done, and promptly, that the sum of $3500, equal to half the allotment necessary for the work, was raised among them by private subscription. This was turned over to the State Geologist, J. W. Finch, and work was begun by Waldemar Lindgren and F. L. Ransome of the United States Geological Survey. They are assisted in the field work by L. C. Graton and A. M. Rock. The field work is now about three-quarters done.

The district surveyed is about 5½ miles by 7 miles in extent. It is a district of concentrated values, all the prominent mines lying within a radius of 2 miles. Among the most importaut and best known properties are the Portland, Stratton's Independence, Vindicator, Golden Cycle, Isabella, Elkton, Mary McKinney and El Paso mines, and those owned by the Woods Investmeut Co. and the Stratton estate.

The geology of the district was well worked out in the survey of 1893 aud 1894, and in its main features will not be changed by the present investigation. Much new detail, however, will be added and considerable light will probably be thrown upon the nature and occurrence of the ores. The district, as was made known by Cross and Penrose, is located in and around the throat of an old volcano. The ore bodies are encountered in the volcanic breccia or in the granite enclosing it.

An interesting problem necessarily untouched by the original survey is the question of deep drainage. It is important to determine the source of the water that embarrasses operations in the lower levels of the mines, and to ascertain the manner in which it is stored in the rocks and the conditions that govern its movement when tapped by tunnels, with a view to suggesting the best scheme of general drainage for the district. It is expected that the El Paso, Mary McKinney and Elkton mines will be greatly benefited by the new El Paso drainage tunnel, but as this drains the El Paso mine only to the 600-foot level, it is clearly not a final solution of the drainage problem, even for this part of the district.

IN concentration sizing by screeus of variable mesh effects a separation of particles according to their relative size. In hydraulic classifiers, and on the various shaking table and belt concentrators, the separation is due to difference in specific gravity. A combination of the two methods abcomplishes the most complete and satisfactory results. A plant can usually be arranged to accomplish this automatically, but where this is not possible bucket elevators may be utilized for the same purpose.

The Pinder Concentrator.

The Pinder concentrator is essentially a pan, or batea, in the form of an involute, the surface being covered with brown linoleum, on which are fastened brass or copper riffles radiating spirally from the direction of the center outwardly and around toward the rim. The pan is 8 feet 9 inches across at the narrowest part. There is a spiral gradient of 1 inch in the surface of the pan, which extends all around, beginning at the widest part under the feed box. The floor also inclines to the center, forming a concave surface.

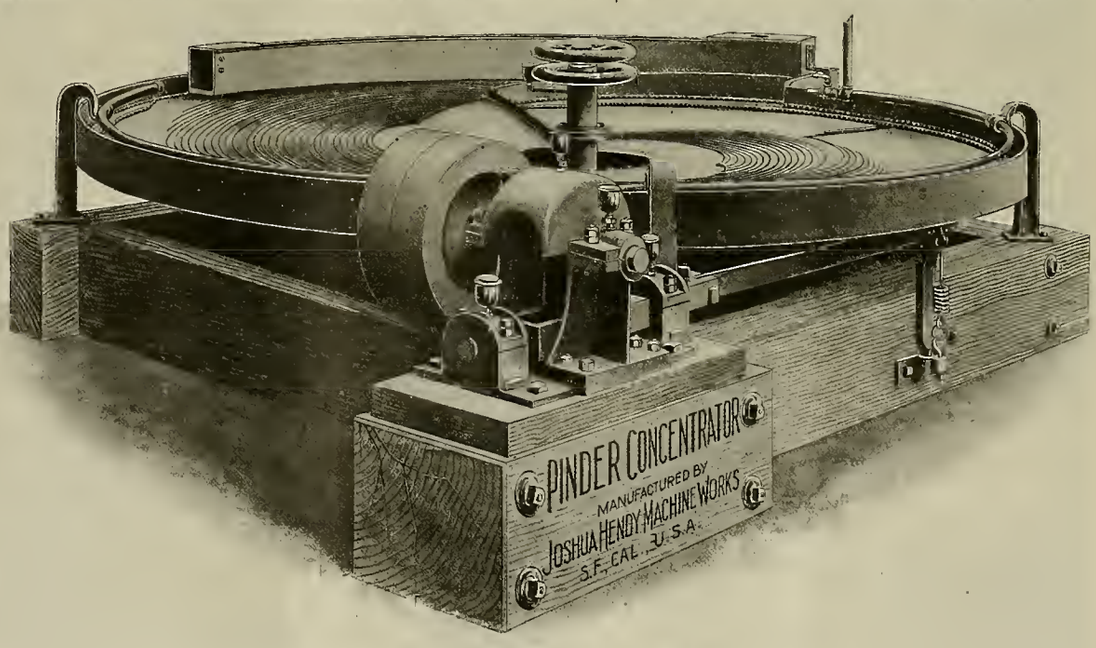
This pan is coustructed, say the manufacturers, so as to render it flexible, the bottom being made of seasoned redwood staves ¾ inch thick, and laid radially from the center (flexibility being obtained by allowing ⅛ inch interval between staves). The inner or narrow end of each stave is bolted to the center casting, and the outer end to a steel rim or band, ¼ inch by 5 inches.

The riffles tacked on to the linoleum are fifty-six in number and ¾ inch apart, the feather ends terminating in regular sequence nearly in a circle, so as to leave a clear smooth space between the ends and the rim of the pan. The wash or clear water is conducted by a pipe ¾ inch iu diameter around the outer edge of the pan. There are two discharge slots for concentrates, one at the end of the forty-second riffle and the other at the end of the entire system of riffles.

A steel post, 2¼ inches in diameter, acts as pivot as well as center support of the pan, passing through a sleeve in the center casting. Screwed to the top end of this post is the adjusting gear, by which the center of the pan is raised or lowered, changing the degree of incline of the surface of the pan. The tailings discharge is through the center of the pan. The distance of travel from feed to discharge is 27 feet. The machine should be run at 240 strokes per minute. The accompanying cuts show the main features of this machine, which is manufactured by the Joshua Hendy Machine Works, San Francisco, Cal.



Top View of the Pinder Concentrator.



The Pinder Concentrator Mounted on Base.

Use of the Mine Model.

TO THE EDITOR:—I note in your issue of October 17 au article entitled "New Use for a Mine Model." I quite agree with you that these models are of great use in mining, as I have been using them here the past year. Our model is made of plaster of Paris and has answered our purpose admirably. The scale is 100 feet to 3 inches on model. The model is made in horizontal sections, 1½ inch in thickness, to represent 100-foot levels, and between levels to show stopes; at levels the sections lift up on the floor line, the drifts and crosscuts being carved on the bottom of the section and raises and winzes in their proper

places. When the sections are assembled they show the hills in which the mine is situated in miniature and perfect in contour.

EDWIN H. DAVISON,
Mine Superintendent.

San Fernando, Mexico, Nov. 12.

Relative Value of Fuels.

Written for the MINING AND SCIENTIFIC PRESS by WM. H. KRITZER.

As in many mining districts managers have the choice of using either wood, coal or oil as fuel, a comparison as to their relative value is of interest. No fine distinctions between good wood and bad wood, coal of superior or inferior quality, or the several fuel oils, is made, but it is assumed that a good grade of either kind of fuel is employed, and that the arrangements as to grates, size of heating surface, disposition of dampers, etc., are suitable, and that as good results are obtained from each variety of fuel as ordinarily result from their use when in competent hands. With these conditions understood, and placing oil at $1 per barrel, the following tables are of interest:

TABLE SHOWING THE RELATIVE VALUE OF FUEL PRODUCTS.

Value of oil being $1.00 per barrel, equivalent to one ton of coal, ranging from $12 to $4 per ton.

Value of coal per ton	Pounds of steam generated by 1 pound of coal	Pounds of steam that 1 ton (2240 pounds) of coal generates	Barrels of oil required to generate the same number of pounds of steam produced by 1 ton of coal	Oil $1 per Barrel. Value of oil equivalent to 1 ton of coal	Oil $1 per Barrel. Money saving
$12.00	12.50	28,000	4.92	$4.92	$7.08
11.50	11.90	26,833	4.71	4.71	6.79
11.00	11.45	25,667	4.51	4.51	6.49
10.50	10.94	24,500	4.30	4.30	6.20
10.00	10.42	23,333	4.10	4.10	5.90
9.50	9.90	22,167	3.89	3.89	5.61
9.00	9.38	21,000	3.69	3.69	5.31
8.50	8.85	19,839	3.48	3.48	5.02
8.00	8.33	18,667	3.28	3.28	4.72
7.50	7.81	17,500	3.07	3.07	4.43
7.00	7.28	16,333	2.87	2.87	5.13
6.50	6.77	15,167	2.66	2.66	3.84
6.00	6.25	14,000	2.46	2.46	3.54
5.50	5.73	12,833	2.25	2.25	3.25
5.00	5.21	11,666	2.05	2.05	2.95
4.50	4.69	10,499	1.84	1.84	2.66
4.00	4.17	9,333	1.64	1.64	2.36

1 gallon oil weighs 7.6191 pounds.
42 gallons (320 pounds) oil equal 1 barrel.
1 pound oil generates 17.8 pounds steam.
1 barrel oil generates 5696 pounds steam.

EXCESS COST OF COAL AS AGAINST OIL.

Oil equivalent to 1 ton of coal.

Per bbl.	%	Per bbl.	%
$1.00	144	.70	248
.95	157	.65	275
.90	171	.60	306
.85	187	.55	344
.80	205	.50	388
.75	225		

WOOD AND ITS EQUIVALENT IN COAL AND OIL.

1 cord (128 cubic feet) of wood.	Weight in lbs. per cord	Pounds of coal equivalent to 1 cord of wood	Barrels of oil equivalent to 1 cord of wood	Pounds of steam 1 cord of wood generates
Hickory	4,500	2,000	2.92	10,660
White Oak	3,800	1,710	2.50	14,253
Red Oak, Beech, Black Oak	3,250	1,450	2.12	12,078
Pine	2,000	891	1.31	7,422

Kunzite—A New Gem.

The lilac-colored spodumene crystals lately discovered near Pala mission, in San Diego county, Cal., is described by the gem expert, George F. Kunz, after whom the mineral is named, as follows:

"A recent remarkable discovery of unaltered lilac-colored spodumene has lately been made in California. The crystals were obtained 50 feet from a deposit of colored tourmaline—itself of notable interest—1½ mile northeast from Pala, San Diego county. This new discovery is less than a mile northeast from the celebrated rubellite and lepidolite locality at that place, where recent developments have brought to light immense quantities of amblygonite, the latter species occurring by the ton, while the lepidolite is estimated by the thousand tons. The locality is thus unequaled in the world for its abundance of lithia minerals. The rubellite crystals found here are entirely embedded in lepidolite, and until recently it was found impossible to remove them to show their form. They were, however, often polished with the lepidolite, the rubellite appearing as radiations of pink in a darker gangue of a lilac-colored lepidolite. This year, however, the crystals of rubellite have been rubbed out, as it were—that is, made to stand out by removing the lepidolite matrix by means of brushes and cleaning tools, thus forming a beautiful group of crystals.

"At the new locality colored tourmaline crystals have been found that are remarkable in size and beauty, although they have been much broken in taking them out. Some are 1 foot long and 3 inches in diameter, with a red crystal core (rubellite) and a blue exterior (indicolite), separated by a pale intervening zone.

"The spodumene crystals are beautiful in their color tones, varying in striking contrast from a deep pink-purple lilac, when taken at a depth, to a pale, almost colorless, tinge, evidently due to weathering or to the action of the sunlight.

"These spodumene crystals are of extraordinary size, transparency and beauty, and are unrivaled by those from any other known localities. The following are the weights and dimensions of six of the principal crystals:

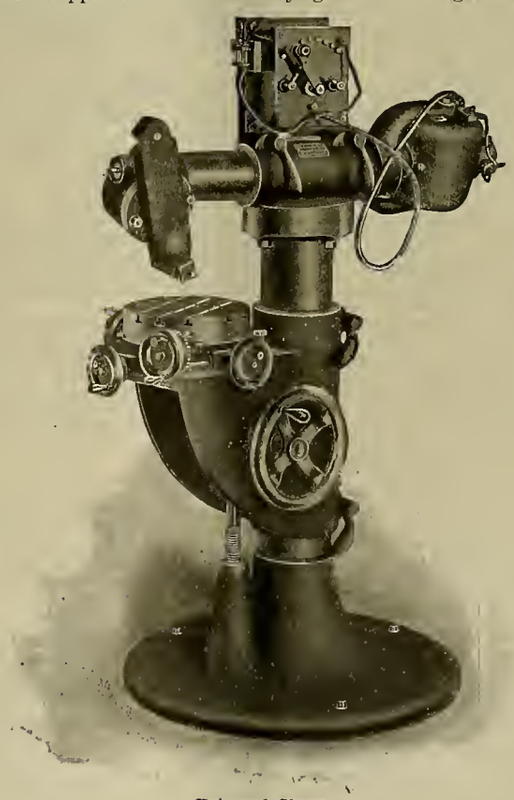
	Weight, Grams.	Weight, Ozs. Troy.	Dimensions—Centimeters.
No. 1	528 7	17 1	17 by 11 by 1
No. 2	528 7	17 1	22 by 8 by 1.5
No. 3	297	9 55	19 by 5.5 by 1 5
No. 4	256 0	8.25	23 by 4 by 2
No. 5	310.5	10.95	13 by 6 by 2.53
No. 6	239.5	7.70	18 by 4 by 2

"Some crystals of spodumene purporting to come from Hermosillo, Mexico, were shown to the writer. They are identical in habit, but much smaller than those from Pala. It is quite possible that they may have come from the same locality, and that no such occurrence exists at Hermosillo. There is no doubt, however, that the crystals from Pala belong to the locality ascribed to them. In either case no such spodumene crystals have ever before been found at any known locality. They are entirely distinct from the green crystals found at Stony Point, Alexander county, North Carolina, described by J. Lawrence Smith, and from the transparent yellow crystals found in Brazil and described by Pisani."

Large amounts of lepidolite (a lithia mica) have been mined at Pala for the lithia minerals contained, and in quarrying this the slender pink tourmalines (rubellite) have also been obtained, they occurring in groups of radiating crystals of rich pink color in the violet-colored, silvery lepidolite, forming cabinet specimens of great beauty. Gem tourmalines also occur near Hemet valley, in the San Jacinto mountains, in Riverside county, and at Mesa Grande, in San Diego county, California.

Universal Shaper.

The Universal Shaper, illustrated herewith, is stated by the manufacturers, the Cochrane–Bly Machine Works, Rochester, N. Y., to be adapted to intricate punch and die work, metal pattern and jig, making work possible thereby to be planed at any angle. It will be noted that the head of the column which supports the arm carrying the working head is graduated and may be clamped in any position about the column. The arm has an out and in adjustment allowing the working head to be brought to any position over the table. The working head may be adjusted to any angle about its axis which is at right angles to the arm, and the arm may also be adjusted to any angle about its axis, thus giving every possible angle. The ram is driven by a worm and wheel direct connected to a motor at the end of the arm. The stroke of the ram is adjustable. The clapper block may be adjusted to any position about the end of the ram; tools may be clamped either on the end or side.



Universal Shaper,

The Electric Furnace in Metallurgy.*

Written by ALBERT HELLER.

The temperature of the electric furnace is easily controlled during fining by the adjustment of the electrodes by hand. It can be increased to a point far above the temperature of the open hearth furnace, converter, or crucible furnace, and it is even possible to obtain a heat sufficient to volatilize the iron. By the process of electric fining, reactions can therefore be produced which are impossible in the open hearth. The process is carried on in the same manner as in the open hearth, that is, the same oxidizing agents are used, but the salient advantages are due to the mode of heating, which is neutral, and to the generation of heat above and on the surface of the molten metal. These are two essential points which, from the metallurgical point of view, constitute the difference between the method of fining by electricity and that currently employed. For this reason the steel obtained by a rational electric process, combined with modern metallurgical practice, is possessed of properties comparable with those of crucible steel. The decarburization should be effected preferably with the aid of metallic oxides, in particular with oxide of iron. If a blast is employed a rapid waste of the electrodes ensues; further, the oxygen of the air blast, after burning the greater portion of the more oxidizing elements, of which carbon is the chief, then reacts upon the iron, forming particles of oxide of iron which, being disseminated throughout the mass, rapidly change its quality. On the other hand, the oxygen of the oxide of iron, being in stable combination, is only freed by the energetic reducing action of the carbon. The ore process, therefore, appears to be that which is best applicable to the electric open hearth.

The dephosphorization and desulphurization of the metal bath are also facilitated by the character of the source of heat. The elimination of sulphur can be effected without difficulty owing to the ease with which a reducing action is promoted. Otherwise the conduct of the operation of fining by the electric method presents no further points of sufficient interest to report. The formation and removal of the slag also present no particular features of interest. Slags differing in character are of course formed successively where desulphurization takes place.

The final additions are made, as in the ordinary process. The only point to be noticed in regard to these is the economy which can be effected in the case of rare metals by the prevention of loss due to their oxidation while making the additions.

For the application on a large scale of the process just described the furnaces should be placed in line, just abreast to each other. Two fining furnaces are preferably arranged in front of each smelting furnace, each of which will receive the metal alternately, while fining is being completed in the other. A more practical arrangement suggests itself in cases where a large amount of power is available. The charges of all the reducing furnaces could be run off into a single ladle on a bogie traveling along the front of the battery of furnaces. The metal thus collected could be fined direct by bringing the ladle beneath an arrangement of electrodes similar to that described, or it might be teemed into a fining furnace of a capacity sufficient to receive the whole. Two such furnaces would then serve the whole battery of smelting furnaces; for if the latter were tapped every three hours, there would be six hours available for fining, tapping and repairing the hearth and walls.

An electric metallurgical works laid out on this plan, having available a force of 10,000 H. P. on the shaft of the turbines, could produce sixty tons of steel per day, of which fifty tons would be yielded by the smelting furnaces working on 55% ore and ten tons by the smelting of scrap. As far as possible the power should be generated by alternating monophase dynamos subdivided into groups of 1000 H. P. each. Of these eight would supply current to the smelting furnaces, and the other two would be devoted solely to the operation of fining.

*Abstract Proceedings of Iron and Steel Institute.

WHEN agricultural land has been patented no one has the right to enter the tract for the purpose of prospecting, even though there may be sufficient evidence on adjoining land to warrant the belief that there is valuable mineral on the agricultural land. The idea that one may so enter an agricultural patent, and then settle damages on condemnation proceedings, is erroneous.

California Miners' Association.

Beginniug on the 16th inst. and continuing nntil the evening of the 18th, the twelfth annnal convention of the California Miners' Association was in session in San Francisco, Cal. The sessions were attended by a nnmber of delegates from the mining counties.

An address of welcome was made by Governor Pardee in behalf of the commonwealth, and Mayor Schmitz addressed the convention representing the city of San Francisco.

President C. M. Belshaw reviewed the work of the association in past years and suggested certain changes in its operation with a view to making its work more direct and efficient. Among other subjects touched npon Mr. Belshaw suggested that the association volnnteer to act as an arbitrator between employer and miner in the adjustment of labor difficulties.

A number of papers were read by members of the association, including one by Dr. C. T. Dean, secretary of the California Petroleum Miners' Association, in which he stated that in 1900 the consumption of California petrolenm was 4,000,000 barrels; in 1901 it was 8,000,000 barrels, in 1902 it had risen to 13,692,514 barrels, and he anticipated that in 1903 it wonld reach 23,000,000 barrels, aud predicted that 1904 would see it increased to 30,000,000 barrels.

Mark B. Kerr, superintendent of the Jnmper Syndicate at Stent, Tuolumne county, read a paper on conservation of water in the high Sierras for mining uses and subseqnent employment of the same water in the valleys for irrigation.

An address on preservation of forests was made by J. J. Murray of Trinity county, who said that under the existing methods the forests could not be preserved; that the debris was allowed to accumulate year after year, and when a fire did once start it was extinguished only when there was nothing more to burn. Prior to 1848 the Indians burned the debris annnally in a systematic manner, and nntil this was again done the forests would always be in danger from fires.

J. A. Filcher, one of the World's Fair Commissioners, addressed the convention, explaining the purpose of the commission, and urging every miner to assist in making the best possible display. The committee has adopted a novel method to secnre valnable specimens, for which they propose to pay cash, the intrinsic value being determined by specific gravity method or otherwise. When the exhibition is closed these specimens may be sold and the money thus invested recovered. This scheme, it is hoped, will result in securing a rich exhibit, and remove the objection which has heretofore existed on the part of miners to loan rich specimens which were never returned.

During Tuesday's sessions of the convention a number of papers of a practical and technical kind were read. Samuel Shortridge addressed the convention, urging upon the Association persistent and untiring effort to secure a department of mines in the Federal Government, which sentiment was heartily applanded.

Members of the California Debris Commission addressed the convention ou the present status of hydraulic mining in California.

"Compressed Air in Mining" was the snbject of an interesting paper by E. A. Rix.

S. B. Christy of the University of California spoke on "Cyaniding Anriferous Sulphides Direct," giving interesting and valuable data and the resnlt of experiment along this liue.

F. A. Leach, superintendent of the United States Mint in San Francisco, Cal., read a paper on "Modern Mint Methods," in which the varions processes through which bullion is received from the miner passes npon reaching the Mint, to determine its value. Several practical suggestions were made to those depositing bullion, the most important being that they cast their bnllion into bars before bringing it to the Mint, thereby avoiding disappointment in losses.

E. C. Voorhies read a papcr on the "Use of Fuel Oil in Chlorination of Gold Ores," which showed the snperiority of crude petroleum over other kinds of fuel in this branch of metallnrgy.

"The Mother Lode in Amador County" was the title of a paper read by W. H. Storms, in which the structural features of the mines in that county were described.

C. H. Dunton of Placerville read a treatise on "Slate Making," in which he described the Eureka slate quarry in El Dorado county, Cal., and the methods of prodncing a commercial product there.

F. W. Griffin read a paper on "Gold Dredging in California and Elsewhere," dealing with a description of the various types of dredgers and their operation.

H. P. Stow of Forbestown, Butte county, read a paper descriptive of "An Improved Canvas Plant," in which he described his experience in concentratiug snlphides after vanners. It contained much detailed and valuable information on the subject.

On Wednesday, the third day of the convention, the sessions were enlivened by the renewal of the old fight between the miners ou one side, represented by its Association, and the farmers of a certain section of the Sacramento valley, represented by the Anti-Debris Association. It was to rehabilitate hydraulic mining, under certain restrictions prescribed by a board of United States Engineers, that the Miners' Association was first formed. This was accomplished by the passage of what is known as the Caminetti law. Under permits granted by the Debris Commission, hundreds of mines have beeu enabled to operate the past twelve years, despite the continued opposition of the Anti-Debris Association; but for several years past there has been no active opposition. At the convention the fight was renewed with energy and resulted in the passage of a nnmber of resolutions.

A paper was read by J. R. B. Tregloan on "Development of Abandoned Mines" on the Mother Lode. Other papers were read by title, to appear in the pnblished transactions of the association.

The report of the Committee on Resolutions was presented by E. C. Voorhies, as follows:

WHEREAS, Membership of a Californian upon the Rivers and Harbors Committee of tbe House of Representatives can be made of great service to the State of California; tberefore, be it

Resolved, That this convention urge the appointment of one of tbe members of the California delegation on tbe Rivers and Harbors Committee, and tbat our chairman and secretary be instructed to telegraph sucb indorsement to Speaker Cannon and earnestly request that he make such appointment.

WHEREAS, Tbe Committee on Department of Mines and Mining reports that it is of the opinion that it is impracticable at this time to obtain the consent of Congress to appoint a Cabinet officer for such a department, and that instead this Association should urge upon Congress tho necessity of at least creating a special commissioner of mines and mining under supervision of the Secretary of the Interior, of the Treasury, or of Commerce and Industries, as may be considered best; and

Whereas, Not only have the California Miners' Association, but also the Trans-Mississippi Congress, the National Mining Congress and kindred bodies for some years been urging upon Congress the necessity of creating a Department of Mines and Mining with a Cabinet officer at its head; and

Whereas, These efforts have thus far been apparently in vain, although a new Cabinet position has since been created in tbe Department of Commerce and Industries, having in charge many departments formerly under Cabinet officers, but omitting mining; and

Whereas, Different branches of the mining industry of tbe United States are now looked after by different bureaus, under different departments, with different heads; and

Whereas, It is the opinion of this Association that the best interests of the miner would be subserved by having an industry, which has grown in annual product from $369,319,300 in 1880 to $1,086,529,521 in 1901, reprosentod by a Commissioner of Mines and Mining under whatever department Congress may determine; and

Wbereas, It is perfectly woll understood that from 1867 to 1876 there was a Government Commissioner of Mines and Mining whose duty it was to collect statistics, historical and technical matter relating to mining, which office was abolisbed at the end of 1876; but it is recognized tbat at that time the general mining industry was of small importance as compared with the present conditions when its product is worth over $1,000,000,000 yearly; and

Wbereas, Upon the abolition of that office the United States Mint, United States Geological Survey and United States Census took consideration of these matters relating to mining, and have since continued, while the United States Land Office has been in charge of matters connected with tho mineral land locations, minerals, patents and titles.

Wbereas, The mineral industry is now in a position to demand from the Government the recognition due to its yearly increasing pecuniary and industrial importance, and to ask that its affairs be placed in charge of one Federal official to whom all miners may appeal, and who will collect statistics and matters relating to the technology of mining; therefore, be it

Resolved, Tbat tbe California Miners' Association, in convention assembled, ask that Congress appoint a separate and special Commissioner of Mines and Mining, whose work shall be done upon the lines of that of tbe Director of the United States Geological Survey, but to include undor his jurisdiction gold and silver, as well as all otber mineral substances produced in the United States, said commissioner to be under such cabinet officer as Congress may deem best; and

Resolved, That the president and secretary of this association be authorized and instructed to transmit copies of these resolutions and of the report of the committee on department of mines and mining, to the members of the California delegation in Congress, and respectfully ask their aid in the furtherance of the object desired, and request that a suitable bill be introduced to carry out such object in behalf, not only of the miners of California, but of those of tbe whole United States.

WHEREAS, The lapse of time frequently renders it difficult and sometimes impossible to prove with certainty tbe date of a mining location upon wbich a mineral patent has been based, thus giving rise at times to expensive and vexatious litigation, therefore be it

Resolved, That all patents for mineral lands hereafter granted or issued under or by autbority of the United States shall contain a statement of the date of the location of tbe claim or claims upon which tbe granting or issuance of such patent is based, and said statement shall be prima facie evidence of tbe date of such location in both State and Federal courts.

Resolved, That we urgently request our Representatives in Congress to secure appropriations for the purpose of building additional restraining dams and barriers for mining debris upon tbe tributaries of the Sacramento and the San Joaquin rivers, viz: Upon the Bear, American, Cosumnes, Mokelumne, Calaveras rivers and their branches.

Resolved, That the California Miners' Association looks with grave concern upon the differences that arise from time to time between the employer and employed in the mining industry in this State.

Resolved, That this association hereby offers its friendly aid in the settlement of any such differences that may bereafter arise. and to that end be it further

Resolved, Tbat whenever requested so to do by the several interested parties the president of tbis association shall appoint a committee to arbitrate such differences.

WHEREAS, Tbe Mining Bureau is tbe only organization in the State for the accumulation of data, records, maps and geological specimens for the general welfare of the mining industry; therefore be it

Resolved, That we earnestly request our Legislature to place the Mining Bureau upon a proper basis by making a sufficient and permanent appropriation for its support.

WHEREAS, The United States Debris Commission, having congressional authority to determine wbat hydraulic mines in the drainage basins of the Sacramento and San Joaquin rivers may legally conduct that form of mining, having in a written communication to this Association stated that there has been no considerable failure of any of the impounding barriers; but few cases of illegal mining discovered; tbe number of failures of dams comparatively small, and that no large percentage of debris has escaped by reason of failures of impounding works; and

Whereas, This Federal commission in charge of such work bas the best facilities for knowing of the practical workings of the law relating to hydraulic mining; therefore, be it

Resolved, That this Association deprecates the numerous and frequent attempts of the Anti-Debris Association, a private organization, without either Government or State sanction or authority, to interfere with individual mines and miners and obstruct, as far as it lies in its power, the workings of the law permitting hydraulic mining in the section referred to by serving injunctions and otherwise annoying miners who bave received legal licenses from the United States Government to mine by the hydraulic process.

Resolved, That we approve the recommendation of our president witb reference to "wildcat mining schemes," and the association will gladly furnish the public with any such information regarding such schemes that may be in its possession.

WHEREAS, The mining exbibit to be made at the Louisiana Purchase Exposition will to a certain extent advertise the mineral industry of California; therefore, be it

Resolved, That we earnestly request that the mining men throughout the State contribute specimens and samples, througb the State Mineralogist, to be oxhibited.

Resolved, That this association holds itself greatly indebted to tho public press of San Francisco and tbe mining counties for the assistance it has given not only to tbe association, but to tbe mining industry of California during the past year.

Resolved, That this association is under deep obligations to the merchants, manufacturers and business men of San Francisco for their generous financial aid during the past and previous years, and recognize the fact that without this special assistance it would have been unable to accomplisb one-half of what has been done. The association is free to acknowledge this, since the largest proportion of funds received has come from these gentlemen, who are only indirectly interested in the mining industry.

Resolved, Tbat we approve the project presented by El Dorado County Miners' Association for the construction of barriers and restraining works on Weaver creek, in El Dorado county, California, and we urgently request our representatives in Congress and in tbe State Legislature to secure appropriations for the purpose of building the same.

The following resolutions were passed looking to the extending of the business of hydraulic mining as already practiced under restrictions of the Debris Commission:

Resolved, That the California Miners' Association respectfully urges the Congress of the United States to appropriate the sum of $500,000, to be expended under the auspices of the California Debris Commission, for the purpose of constructing impounding dams or other restraining works on the several streams and their respective tributaries constituting the Sacramento and San Joaquin river systems, as outlined in the recommendations contained in executive document No. 267 (Fifty-first Congress, second session) and in executive document No. 98 (Forty-seventh Congress, first session), and that the Senators and Representatives in Congress from the State of California are hereby specially requested to use their best endeavors in securing the aforesaid appropriation.

Resolved, That the California Miners' Association respectfully urges the Legislature of the State of California to appropriate the sum of $500,000 to be expended for the purpose of constructing impounding dams or other restraining works on the several streams and their respective tributaries constituting the Sacramento and San Joaquin river systems, as outlined in the recommendation contained in executive document No. 267 (Fifty-first Congress, second session) and in executive document No. 98 (Forty-seventh Congress, first session).

In recent years the officers of the Miners' Association has consisted of president, first, second and third vice-presidents, treasurer and secretary. At this convention the offices of second and third vice-presidents were abolished, and the executive committee, formerly with a large and scattered membership, was replaced by an advisory board of eleven members. The following officers were elected for the ensuing year:

President, C. M. Belshaw of Contra Costa, second term.

Vice-president, H. P. Stowe of Butte.

Treasurer, S. J. Hendy of San Francisco, fifth term.

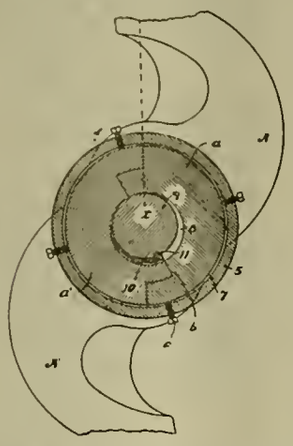
Secretary, E. H. Benjamin of Alameda, sixth term.

Mining and Metallurgical Patents.

PATENTS ISSUED NOVEMBER 10, 1903.

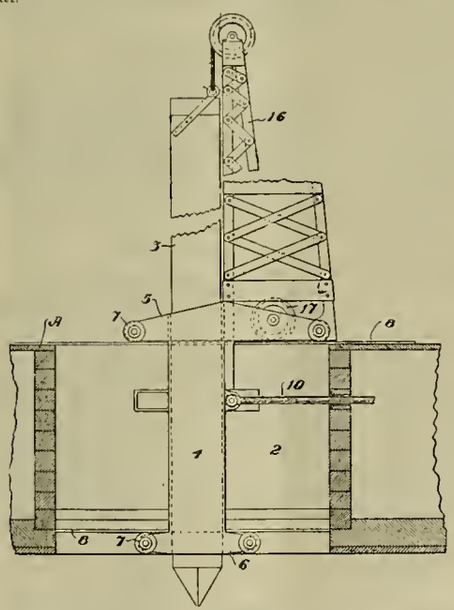
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

Sectional Cam for Ore Stamps.—No. 743,681; A. P. J. Bossell, Angels Camp, Cal.



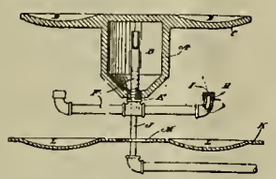
In cam, combination of two separate members having interlocking hub sections divided on lines within ends of cam, each of cam members formed integral with curved tang or segmental flange which overlaps line of division of hub and is adapted to bear upon opposite hub section, each hub section having a curved recess of which the segmental flange forms an outer wall, and projection on one section adapted to fit recess of opposing section, and sections having cam grooves in bearing surfaces, and segmental key slidable in grooves.

Dredger.—No. 743,751; R. A. Perry, Oakland, Cal.



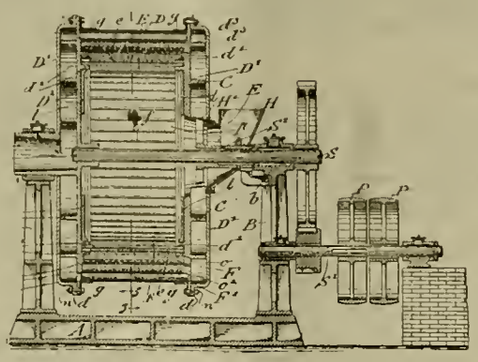
Dredge boat having open vertical longitudinally disposed channel, spud or pile adapted to be driven through channel into mud beneath boat, means by which boat is movable in direction of its length with relation to fixed pile, and device carried upon boat and movable with pile and operating substantially in line therewith, by which pile may be withdrawn from bottom.

Hydrocarbon Burner.—No. 743,976; L. E. Coleman, Santa Ana, Cal.



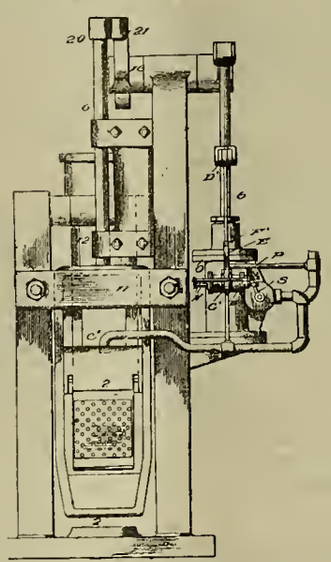
Hydrocarbon burner comprising removable vertical retort chamber; spreader plate affixed to casing of retort chamber at top thereof; vapor pipe commencing within chamber extending from near top of retort chamber out through bottom and extending thence and terminating centrally below spreader plate; burner tip on end of vapor pipe below spreader plate; fuel supply pipe opening into retort chamber; bed plate below vapor pipe having draft opening therethrough disposed to one side of burner tip.

Ball Grinding Mill.—No. 743,791; M. F. Abbe, New York, N. Y.



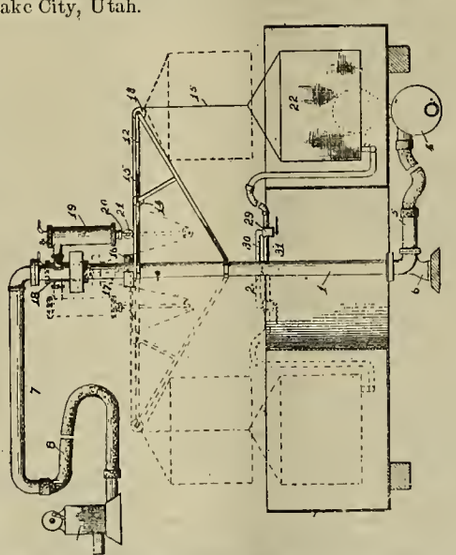
Ball grinding mill, comprising drum composed of cylinder having heads, and provided with heads exterior to and at some distance from cylinder heads, hopper in feed-end heads of cylinder, plurality of transverse steel bars arranged between heads of cylinder concentrical to cylinder, screens between bars and cylinder, openings in feed-end head of cylinder at inner side of screens, spiral conveyer between feed-end cylinder head and exterior head, openings in discharge-end head between outer heads.

Method of Crushing and Stamping Ores.—No. 743,799; J. C. Anderson, Highland Park, Ill.



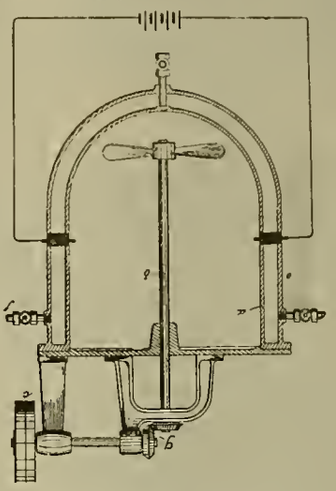
Method of milling ores by lifting die of stamp mill by direct application of suitable column or head of water delivered to point of application of power through pipe or similar closed conduit, and allowing water to escape and permitting die to descend by gravity, and conducting water exhausted into stamp mortar for pulping crushed ore.

Rotary Filter. — No. 743,652; G. Moore, Salt Lake City, Utah.



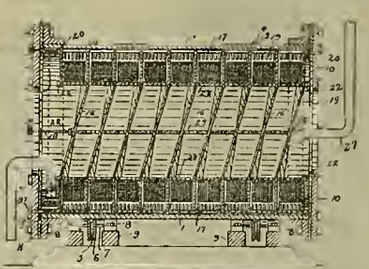
Filter comprising revolubly mounted standard, filtering means carried thereby, tank containing material to be filtered, arm projecting from standard, devices carried by arm for sustaining filtering medium and for lowering same into and removing same from receptacle, and mechanism for producing first drawing and then blowing action through filtering medium.

Extracting Chromium From Chrome-Iron Ore.—No. 743,668; R. Suchy and H. Specketer, Griesheim-on-the-Main, Germany.



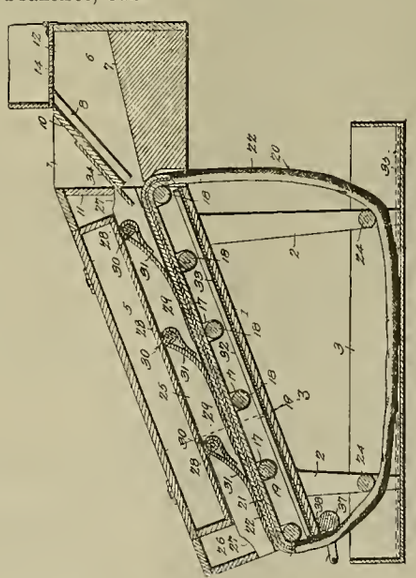
Process of making soluble chrome-iron ore and obtaining chromium compounds by heating ore together with sulphuric acid in excess and an oxidizing agent and separating by filtration precipitated insoluble ferrisulphate from chrome-sulpho acid.

Amaloamator.—No. 743,871; H. Hoeschen, G. Marks and H. Eisele, Omaha, Neb.



Amalgamator comprising rotatable cylinder, internal spiral amalgamating and conveying plate carried by cylinder and rotatable therewith, mixing paddles and collecting blades adjustably held between convolutions of spiral plate, settling chamber formed at one end of cylinder, means for rotating cylinder, means for feeding pulp into cylinder, means for removing exhausted pulp from settling chamber, and means automatically controlling removal.

Ore Separator.—No. 743,413; J. W. E. Allen, San Francisco, Cal.



In ore separator, combination with endless apron, of supporting and clamping means comprising suitably supported recessed strips having rollers mounted therein, and detachable clamping strips disposed above same, edges of portion of apron being held between supporting strips and clamping strips.

Mining Summary.

SPECIALLY COMPILED AND REPORTED FOR THE MINING AND SCIENTIFIC PRESS.

The U. S. Census Bureau on the 13th inst. issued a preliminary report showing that during the calendar year 1902 there were mined in the United States 4211 short tons of emery and corundum, valued at $104,335; 335 tons of garnet, valued at $132,829; 12,439 tons of marl, valued at $12,741, and 6240 tons of infusorial earth, tripoli and pumice, valued at $54,558, exclusive of $1436 in value mined as a by-product of soapstone and talc.

ALASKA.

(Special Correspondence). — The tin-bearing ledges, which have been located as a result of finding stream tin associated with placer gold near Teller, on the Seward peninsula, have been bought by J. H. Hutchinson, of Boise, Idaho, for several years manager of the Trade Dollar mine of Idaho. He was on the ground soon after the discovery and helped to organize development work. He has taken to Boise half a ton of ore sacked for treatment and is preparing to return early in the spring and open the claims with a number of men.

The United States at present imports all the tin used in the country, which last year reached about 70,000,000 pounds, the price ranging near 30 cents per pound. It is understood from A. Collier, of the United States Geological Survey, who has been conducting surveys on Seward peninsula the past season, that the Bureau will issue a special hulletin on this discovery.

Boise, Idaho, Nov. 16.

Slate and Nizina, Copper river's two producing placer districts, yielded $500,000 in gold during the past season, says G. M. Esterly, operating in that section. The past season has demonstrated that Nizina is essentially a hydraulic district.

ARIZONA.

Cochise County.

D. Hart, G. Keenhold and J. Jacohsen are reported to have bought seven claims hetween the Bisbee West and Wolverine mines, near Bishee, for $40,000. The claims include the Southern Belle, Occident, Orient and Old Kentuck. Development will be increased.

Graham County.

A. F. Hoffmann & Co., operating in Garfield gulch, near Clifton, are preparing to build a stamp mill for their gold property. They have a 3-foot vein at the hottom of a 40-foot shaft sunk on the vein.

C. E. Stevens, superintendent of the Stevens mines at Metcalf, reports the steam plant in operation and sinking in the winze progressing. The gasoline plant proved unsatisfactory and steam was substituted. The company is pumping 30,000 gallons of water per day from its mine.

Maricopa County.

(Special Correspondence.) — The Lime Creek C. Co. has men at work in the Cave Creek district.——J. E. Maddox is working on his property in the White Tank mountains taking out ore which he is sending to the mill at Buckeye. The ore is free milling, and yields $30 per ton on the plates.

R. E. Miner is working his group near the Union mines north of Phœnix. Developments have shown an ore body.

A large hody of kaolin has been uncovered on one of C. O. Case's claims east of Wickenhurg. In that section it is not profitahle to ship kaolin on account of high freight rates, and there is no local demand for it.——Wolframite is reported found north of Phœnix.

Phœnix, November 16.

(Special Correspondence).—It is reported the Gold Coin mine, south of Phœnix, will resume work by Dec. 1. —— The discovery of a good grade of muscovite is reported hy a prospector in the Santa Estrella mountains, south and west of Phœnix.

J. D. Houck of Cave Creek says that miners and prospectors are coming in every day for supplies and report finding values hoth in old workings and new properties. —— J. Moore and H. Linville are reopening the Mexican mine in Cave Creek district. —— W. L. McKay is getting out copper ore from his claims near Cave Creek postoffice.

Phœnix, Nov. 16.

(Special Correspondence).—The Pike's Peak G. M. Co. has men at work on its group near Phœnix, says Manager Hewin. ——C. E. Rand has ohtained a controlling interest in a lead property near Wickenburg that will be worked for vanadium and molyhdenum values. —— The stamp mill at Buckeye is crushing high-grade ore from the Black Hawk mine in the White Tank mountains. —— A contract has been let for sinking the shaft on the Governor Brodie bismuth claim to depth of 250 feet. —— Donofrio & Eddy, doing development work on their claims near Frog Tanks, report cutting a ledge of high-grade ore 5 feet in width. They will put in machinery. —— The Angel mine, near Wickenhurg, has eleven men at work, and hy Dec. I thirty men will be employed.

Phœnix, Nov. 17.

Mohave County.

The hoisting plant of the Treasure Hill M. Co. at Treasure Hill, near Cerhat, is in place and sinking the shaft resumed. Delay was caused hy failure to receive timbers for the gallows-frame. When the shaft is down 200 feet crosscuts will he run. It is said six veins outcrop within the two locations.

Pinal County.

(Special Correspondence).—The miners at Superior have struck for higher wages and thirty men are out. The company will ohtain other men in Phœnix to take their places.——G. Emmet has men at work on the Gila Monster group of claims on Mineral creek above Kelvin.

The Troy-Manhattan Co., at Troy, will build a smelter near Riverside on the Gila river as soon as the track of the Phœnix & Eastern Railroad is laid to that point. The track gang is laying track hetween Queen creek and Florence. In ahout two months they expect to he at Riverside.

E. S. Russell and A. L. Arthur have a group adjoining the Superior C. Co. claims, near Florence, which they will work the coming winter.

Florence, November 16.

Santa Cruz County.

The International Cyanide Co., of which A. Hoover is president and manager, will develop its gold prospects 18 miles north of Nogales. It is said assays from the ledge 40 feet wide average $3.50 free gold per ton.

Yavapai County.

(Special Correspondence).—Tbe Grijalva Coarse Gold Co. is increasing development work on its group north of Wickenburg. This property was formerly worked by Mexicans. It is reported they will huild a mill.——J. V. Rohy and J. Rogers are getting out ore from their claims in Buckhorn district. The ore is packed to the smelter at Wickenhurg.

At the Boaz mine men are at work and more will he added. The mill will be put in shape for an extended run.——The Allen stamp mill, near Columhia, will he repaired.

Wickenhurg, Novemher 16.

It is reported H. B. Clifford has bonded the Contention mine in the Bradshaw mountasns, southeast of Prescott, and development work will he increased.

CALIFORNIA.

Fresno County.

The Esperanza Oil Co., at Coalinga, has put in an electric lighting plant to obviate the danger incurred from torches and lamps. The entiro lease will be lighted. Work is progressing on its No. 4 well.

The Oil City Petroleum Co., at Coalinga, has huilt another 1200-harrel storage tank, which gives this company a total storage capacity of 3500 harrels, to take its oil from seven producing wells. Its eighth well is in the oil sand.

Inyo County.

There are twenty men on the payroll of the Cecil R. M. Co., near Ballarat.——At the Ratcliffe mine, in Panamint section, men are at work and the mill is kept running, says the Randsburg Miner.

Superintendent Vahrenkamp is huilding a mill on the property formerly owned hy the Ballarat M. Co., near Ballarat.

At Camp Lyon, near Ballarat, the Golden Argus M. & M. Co. is increasing work on the crosscut to tap the main ledge.——At Tuha canyon, in Panamint mountains, J. P. Flint has men at work, and put his 12-stamp mill in operation this week.

Kern County.

The Sanborn Oil Co., operating in the Devil's Den district, northwest of McKittrick, has machinery on the ground and will drill several additional wells.

Nevada County.

(Special Correspondence).—At Meadow Lake the Cash on the Dump Co., which hought the Freeman and Vineyard mines, has hegun development work on its five claims. In the spring a mill and hoisting works will he huilt. This company is composed of Eastern and Los Angeles men. J. D. Hoff, of San Francisco, is manager and consulting engineer. The Crystal Lake G. M. Co., operating the Hartley property, the Excelsior and Union mines, adjoining the Cash on the Dump mines, has been operating the past year, and last week made a satisfactory cleanup. They have closed down the 10-stamp mill for the winter. During the winter development work will he continued to open up the ore hodies so the mill may he run full time, instead of hut fifteen hours for several months past. The shaft is down 90 feet and showing ore, but will not he worked in, as it is not protected for winter work. Hoisting has been done hy a horse whim, hut water power will he installed next spring. The crosscut from the south tunnel will he driven 60 fect and a drift run on the ledge. This drift will run under middle and north cut at 90 feet helow surface.

The Crystal Lake G. M. Co. has a plant of ten stamps, with one table and two helt concentrators, one 8x10 rock breaker, air compressor and three machine drills—all driven hy water supplied from Meadow lake, through a 14-inch pipe 4800 feet long, delivering under a head of 250 feet. The California Ore Reduction Co. has put up a roaster plant, operated hy water power and using crude oil for fuel. This company has a storage tank at Truckee holding 300 harrels of oil. The oil is hauled in 1000-gallon tank wagons to Meadow Lake—36 miles. The cost of the oil delivered in company's tank at the mine is about ten cents per gallon. Owing to lateness of season and soft roads, no oil has been hauled and the plant will not be operated till spring. It has capacity of seven tons of concentrates per day, and including all expenses is expected to roast at cost of $2.43 per ton. The Excelsior ores run 6% in sulphurets. The ten stamps crush from 35 to 38 tons per day. At Old Man mountain, 3 miles southwest of Meadow Lake, the claims of tbe Girard M. Co. and L. Butts have been bonded, and development work will he done this winter.

Emigrant Gap, Nov. 17.

W. J. Organ of Nevada City, superintendent of the Tilton group of mines on the South Yuba river, near Edwards' crossing, says he will put the mill in repair preparatory to resuming.

The Champion M. Co. at Nevada City is removing the pumps from the Spanish mine.

J. McCaffrey, superintendent of the Polar Star mine, near Nevada City, says he has pulled the pumps out of the mine on orders from the Eastern office. No reasons were given. It is thought the suspension of operations will only he temporary. The track and other equipments in the mine will he allowed to stand.

The work of lowering the water at the Brunswick mine, near Grass Valley, is progressing, says Superintendent Nealon. The water is helow the 1000-foot station. Men are at work putting in the second of the electric pumps. A station has been cut for it at that level.

The Gold Bank mine, near Washington, will not start up until next spring, says T. A. Kohler, half owner.

Placer County.

(Special Correspondence).—The Trinidad mine in Sailor canyon, near the American river, near Emigrant Gap, has taken in winter supplies and will operate ten stamps. The ore is of fair grade hut the conditions are such that mining and milling is heing done at a cost of 88 cents per ton. Ore is mined hy a system similar to that employed some years ago in the Old Spanish mine in Nevada county, wbere ore was stoped, shot down a raise, and delivered to mill by gravity for 67 cents per ton. This property is owned by G. S. Montgomery of Beulah. A. J. Frœhlich is superintendent.

Emigrant Gap, Nov. 17.

San Diego County.

M. Jacques and F. S. Newcomh, operating a group of claims at Banner, including the Eureka, Florence, Lone Jack and Gold Standard, are building a reservoir for water to run a mill. The Gold Standard is an extension of the Golden Chariot and a crosscut tunnel has been driven 360 feet to strike the Golden Chariot contact, says the Julian Miner. There is a spring on the Florence, where the reservoir is heing huilt, which will afford water to run a 20-stamp mill, the fall being 60 feet.

Sierra County.

The stamp mill at the Telegraph mine began operations last week and five stamps are steadily dropping. The other five stamps will he dropping this week. The Telegraph mine is at Fir Cap, 9 miles from Downieville. It is owned by Eastern men and is superintended hy J. W. Finney. The Telegraph was originally a gravel mine, and, while working as such, the ledge was struck.

Siskiyou County.

The Yreka Journal says the snowfall of the past week on the high mountains gives promise of starting a good water supply for the placer miners along the creeks and within reach of ditches. Should there he more storms soon, there may be water enough for hydraulicking also and for ground sluicing.

The Blue Gravel mine has been bought by E. Wallace and his company will work it in conjunction with the race track property at Yreka.

The McCook mill on Humhug creek, north of Yreka, will hegin work this week crushing ore from the Punch Creek mine (the Mono), owned by G. W. Grayson. Development work has heen in progress under presont management for a year. There are 600 tons of ore on the dump that will he milled. Grayson intends to huild a 10-stamp mill. In the face of the tunnel the ledge has width of 11 feet.

Tuolumne County.

At the Blue Bell and Rosella mines, near Carters, under bond to R. Cunningham of Bakersfield, the shaft is down 75 feet, showing a hody of quartz. A steam hoist will he put in.

At the Hampton mine at Tuttletown a tramway 250 feet long has been completed from the mine to the Darrow mill. There are forty tons of ore in the hins ready for crushing as soon as water power can he ohtained. —— The Toledo mine closed down last week.——The Street M. Co. has heen incorporated, with principal place of business in San Francisco, hy J. A. Stroud, R. Kinsman, J. Hartery, L. J. Shumau and W. C. Beatie, to operate the Street mine near Tuttletown.

At the Santa Ysabel mine, near Stent, after a shut down of two years, operations were resumed under the management of E. C. Loftus, and twenty-five men are at work, says the Magnet. An auxiliary steam plant has heen put in and the company can continue operations when water power is not obtainahle. Three shifts are sinking the three-compartment shaft from depth of 200 feet, and other development has heen started.

At the Jumper mine at Stent, Manager Kerr has men grading for an additional twenty stamps. When in place the mill will havo eighty stamps.

Ventura County.

After a shut down of several months, the Sulphur Mountain Oil Co. has resumed operations at Sulphur mountain, north of Ventura. They have begun drilling on No. 2.

COLORADO.

Denver advices say the reported negotiations hetween the operators and the striking miners in the northern Colorado coal district failed, and the men are still out. Because of the lack of coal, owing to the miners' strike, tbe Rocky Mountain Paper Co. at Denver has closed its mills for an indefinite period, throwing out 200 persons.

Boulder County.

The United States G. Corporation bas put in an air compressor plant at the portal of the tunnel, which will be driven ahead. The group of this company in Fourth of July gulch, at the hase of the Contiuental divide, 7 miles above Eldora, is accessihle hy a good wagon road and near the Denver, Northwestern Pacific railroad, heing huilt. The holdings consist of 230 acres of mineral ground containing eleven lode claims and 180 acres of placer ground, the latter heing covered with timher. The plan of development to open up the ore hodies is to drive a crosscut tunnel 1500 feet into Arapahoe mountain. This tunnel will cut the lowest vein at depth of 200 feet and the highest vein at depth of 1000 feet.

Chaffee County.

At the Vivandiere mill, near Salida, the foundations for the buildings are completed and the machinery and framework are on the ground. Another carload of machinery, consisting of a roaster, tables, jigs, etc., arrived last week, says Manager New. The site of the mill is near the Gold Bug mine, half a mile helow the Vivandiere. The object is to accommodate the Gold Bug ore and have the mill easily accessihle from all parts of the district. The capacity will he fifty tons per day to start with.

Clear Creek County.

The Mendota mill, near Silver Plume, is running full time again, and sixty tons of dump material is being handled daily. ——Cavanaugh & Allen have a lease on a block of Vulcan ground and are driving the drift and also stoping on an ore shoot.

Work has been resumed on the West End tunnel at Dumont, which is being driven hy the owners of the Kaverue miue to cut their vein 200 feet helow the prosent workings. The tunnel will be 1600 feet in length, about half the distance having heen already driven hy hand. It is intended to put in an air compressor plant. The mine is equipped with a 10-stamp mill operated hy water power.

M. Riley, of Georgetown, has a hond

and lease on the Edgar, Providence and Chance, also a lease on the Fred Rogers and Government lodes on Democrat mountain, near Georgetown. It is intended to clean up the Rogers for distance of 100 feet and work will be started in sinking the shaft on the Government. Work will be resumed on the Rogers and Edgar, and the shaft sunk at intersection of vein, at which point 4 feet of quartz has been opened, which has given returns averaging 373 ounces in silver to the ton.

A strike was made last week in the Helen-Harold tunnel on Wood mountain, near Georgetown. An 18-inch shoot of quartz gave assays of $65. The tunnel on the Helen-Harold is in 850 feet and has reached depth of 550 feet. They will continue the bore for another 200 feet. A mill will be built ready for operation this spring. The property of the Helen-Harold M. Co. consists of seven claims. Machine drills and a compressor will be put in.

Manager C. S. Desch of the Corry M. Co., near Silver Plume, says arrangements have been made for building a concentrating mill for treating their ore on the ground instead of shipping. Their ores run $7 per ton.

The Santiago group in East Argentine district, near Georgetown, was sold last week to the Hazelton G. M. & M. Co. for $250,000. A cyaniding and concentrating plant will be built in the spring. The Hazelton Co. also owns the Baltimore group. W. Rodgers is manager.

Dolores County.

L. Habermann, lessee of the Wellington group of mines on C. H. C. hill, near Rico, reports opening up a body of high-grade carbonate and is preparing for shipments during the winter. He will put more men to work. —— The Ocean Wave M. Co. continues operations in Horse gulch. The Rico vein is being opened up by the main tunnel.

Fremont County.

Florence reports say by Dec. 1st there will be thirteen strings of tools working in the Florence oil field. Some of these wells are expected to strike oil before that date. Among the new companies operating is the West Lebanon of Indiana. Victor Oil, Gas & Coke Co. of Florence and Victor will drill two wells, the Columbia Crude Oil Co. of Denver and Cripple Creek will drill four, and Lloyd & Co. of Colorado Springs will drill one well.

The Dorcas reduction works, near Florence, will be enlarged. Five leaching tanks will be added, two of which are to be installed without delay. The tanks are to be 30 feet in diameter. It is said the company proposes enlarging the plant from time to time till it will have a monthly capacity of 10,000 tons.

Gilpin County.

The Pittsburg Con. G. M. & M. Co. is again operating the Gold Dirt mine, at Rollinsville, says Superintendent Anderson.

Aurora, Ill., parties are preparing for further development of the property of the Orado G. M. Co. in Eureka district, near Central City. A. Skeels is superintendent. The milling ores run three ounces gold to the cord. The group is west of the Concrete, Gunnell and Grand Army mines.

The Granville G. M. & M. Co. has been incorporated to operate near Central City by B. G. Granville, J. L., W. H. & P. R. Hoefler and W. M. Keenan.

It is reported work will be resumed on the Newfoundland mine on Gunnell hill, near Central City.

A power plant will be built for the Specie Payment tunnel. A large compressor and engine will be put in. A tunnel has been started in Virginia canyon to cut 700 feet below the deepest workings of the Specie Payment. The distance to the shaft is 3000 feet.

The Fairfield mine shaft, near Russell Gulch, is down 576 feet and sinking has been stopped. It is operated under lease and bond by the Fairfield G. M. Co., in which Baltimore, Md., parties are interested. In sinking the last lift of 100 feet the shaft showed a vein with 6 inches of a smelting streak which carried values of $200 per ton. Shipments will be increased. J. C. Williams is superintendent and W. J. Nickerson is manager.

Gunnison County.

The Netted Gem G. M. Co. has been incorporated by R. S. Beymer, M. Denson and R. S. Beall of Rocky Ford and A. and B. Beymer of Bowerman. The company owns the Netted Gem group, west of Bowerman, and will start development. —— The Bessemer M. Co. of Pueblo has been organized to operate in Bowerman district by G. G. Witzke and A. H. H. Baxter of Pueblo. The company owns the Leona group, which it is developing. A 4-foot vein has been opened in the shaft, which shows free gold.——The Piute group of eight claims and a half interest in the Fool's Errand group of seven claims, adjoining the Independent group, were sold last week to the Belzora-Bassick M. & Dev. Co. of Michigan. The company will continue development this winter.

A 5-foot vein of free-milling gold ore assaying $8 per ton has been struck in a crosscut being run from the lower tunnel of the Woods G. M. Co.'s property, consisting of sixteen claims in Pie Plant gulch, near Tin Cup. Also, in the upper tunnel they have 15 feet of free-milling ore. Their 100-ton amalgamating and concentrating mill has been completed and will be started up in the spring.

Hinsdale County.

Superintendent H. Harrington of the Ohio group, near Lake City, says he is putting in a hoisting plant.

E. F. Calvin has a lease on the W. C. Garlock group in Silver Coin gulch, near Lake City.

It is reported the Henson Creek Lead M. Co., near Lake City, will resume operations.

Lake County.

The Yak Tunnel Co., at Leadville, is shipping 3000 tons of ore a month and at the same time increasing development work in all parts of their territory. The connections at the Ibex properties at the tunnel have all been completed, and while the tunnel now extends only to the Ibex No. 4 shaft, it is expected it will later be driven farther into Breece hill.

The Fryer Hill M. Co. at Leadville is operating twelve separate properties, and the output from them all is handled from the El Paso shaft, says the Times. The output is principally sulphide, of which 150 tons daily are shipped to the Murray plant of the A. S. & R. Co. near Salt Lake City, Utah. The siliceous ores from the Jimmie Lee, Cora Belle and Bangkok are being sent to the local plant. The water in the properties has been lowered and only 400 gallons per minute is being raised.

The Arkansas Valley smelter, near Leadville, is running full force and its eight furnaces are handling 1000 tons a day, and this work gives employment to 800 men. The sulphide mill with its sampling equipment is also operating, treating 300 tons a day.

The pumping machinery at the Pride of the West shaft of the Fryer Hill M. Co., at Leadville, is handling fifty gallons of water per minute while the shaft is being sunk. The shaft is down 380 feet. At the ore horizon they will drift for the Progressive shoot. —— Repairs have been made at the Vega shaft house, on the north side of Big Evans gulch, near the Diamond. The shaft will be sunk.

La Plata County.

(Special Correspondonce).—A strike of high-grade ore has been made on the May Day mine, at the entrance to La Plata canyon, and the mine sold to Denver and Durango men for $50,000, one-tenth down and the remainder in two and four months. Sinking will be done. At depth of 35 feet the vein has widened to 2 feet, and the smolter returns are said to give value of $150 per ton on unsorted ore. ——Work on the Southern Boy mine has been stopped, all the men having been put to work on development of the May Day mine.

The Bonnie Girl M. Co. is increasing work on its properties at La Plata, having forty men a mile up stream from the town putting up buildings, making roads, and ditching for a pipe line. A boarding house for 200 men is nearing completion and a large hunk-house commenced. By December 1st they will start building the mill, the first unit of which will be fifty stamps. It will be connected with the mine by a wire-rope tramway, half a mile in length. The ore body is in lime and porphyry—a network of blankets, dikes and fissures. The average value of the rock is $5 per ton.

The Cumberland mine, at the head of the La Plata, is being reopened by Cripple Creek lessees, and it is reported a body of shipping ore has been struck.

La Plata, Nov. 16.

The May Day mine, near La Plata, has been sold to D. G. Miller of Creede, with A. E. Reynolds, C. E. McConnell et al. The men from the Southern Boy mine have been transferred to the May Day and more are being added. Superintendent Beach is grading for a shaft and ore house and other buildings. A whim will be used for hoisting until water is reached.

Las Animas County.

Trinidad reports of the 17th inst. say the exodus of coal miners to other sections since the strike was inaugurated is estimated to aggregate to date 1000 men (one-seventh of the entire working force of Las Animas and Huerfano counties). The cold weather is causing suffering among strikers' families, who are living in tents near the coal camps. All strikers at Hastings have been warned to vacate the company's houses at once.——Officials of the Colorado Fuel & Iron Co. at Pueblo say the coal miners' strike will be solved in their favor by aid from the steel and iron works men, who have been laid off at Pueblo, and who are going to the coal mines.——Two thousand of the workmen in several departments of the steel works have been laid off, as those departments were suspended on account of the cutting off of the coal supply by the strike. A carload of them went to the Walsen mine, near Walsenburg (Huerfano county), and began operation of the coal cutting machines on the 17th inst. General Manager Welborn of the Colorado F. & I. Co. says they have more miners working now than at any time since the strike began and each day adds to the output.

Montezuma County.

(Special Correspondence).—The mines and mill of the Mancos Con. M. Co., at head of East Mancos river, near Mancos, has been shut down on account of labor troubles and the freezing of the water supply. This property is controlled by J. Doyle, discoverer of the famous Portland mine at Victor. The ore body is 2 to 6 feet in thickness and the deepest workings are down 500 feet. A few men will be kept on development work during the winter, but the mill will not be started again before spring.

Mancos, Nov. 15.

Ouray County.

Work on the mill for the Bobtail mine, near Red mountain, is progressing. The mill is of 50-ton capacity and the machinery is being set up.

San Juan County.

Since cutting the Oscoola vein, in the Green Mountain group, near Silverton, the single drill will be supplanted by five machine drills. A cross-compound steam operated air compressor will be put in.

The Buckley mine, in Eureka district, has been bought by B. G. Granville of Central City, and operations have been started under superintendency of J. Loughran. Ore is being broken and shipped to the Eagle mill.

The Benson tunnel on Galena mountain, near Silverton, is in 1500 feet, attaining depth of 1200 feet. It is expected the German Oak vein, 26 feet wide and giving surface values of $10, will be reached within the next 300 feet. At 1100 feet a blind lead 9 feet wide was passed through, which gave returns of $15 per ton.

The Kendrick-Gelder Co. has completed the 5400-foot tram which connects the Henrietta mine with the terminal on the S. & G. Northerly Railroad, near Silverton. The tram will have capacity of 500 tons daily. The mine is under development with fifteen men and electric drills. The 150-ton capacity smelter is ready for operation.

The Highland Mary mill, near Silverton, is producing concentrates at the rate of one car a day, says the Standard. The ore goes four into one, with values mainly in copper and lead.

San Miguel County.

With the Carriboau-Montezuma mill near Ophir temporarily closed, the Silver Bell mill of fifty stamps is the only reduction plant in the county working at present, says the San Miguel Examiner. It is running full capacity and treating 200 tons of ore daily, which yields besides the values saved by amalgamation on the plates an average of two cars of concentrates per day. Manager Buckley is pushing development on the Ida. About 100 men are at work at the Ophir Con.

The electric motor and hoist for the Mayflower group, in Bridal Veil basin, near Telluride, are being set up.

The North Star group of claims on Silver mountain, north of Ophir, has been bought by the owners of the Carbonero group and development will be increased. G. B. Pickett, of Ophir, is manager. The Carbonero ore is sulphide and carbonate of lead, carrying gold and silver. The North Star group is below the Carbonero, and is most advantageously located for operation of both properties. They will work the two groups through the lower level of the North Star, and the tunnel will be driven ahead to intersection of the Carbonero vein at vertical depth of 1500 feet from the surface.

Governor Peabody reports that he has been asked for troops by the mine owners in Telluride district, where a strike of the miners continues, and that he has asked President Roosevelt to send the regulars from Fort Logan, as the State troops are needed in the coal districts. It is understood the mine owners want to start their mines with non-union men.

The mill at the Double Eagle group, near Telluride, of which J. H. Litchfield is manager, is completed, but as water power is to be used and there is a scarcity of water in the basin at this season of the year, it is thought the plant will not be put in operation this winter. The ore is free milling, with some sulphides. Development and stoping will be done during the winter.

Summit County.

At the Victoria mine, near Breckenridge, President Hoover of the company says construction on the mill is progressing. The main mill building will be 50x140 feet and will have twenty stamps with cyanide attachments.

Superintendent Colcord has remodeled the Excelsior concentrating mill near Breckenridge.——The Four Most M. Co., which owns properties on Chief mountain, is developing them with an adit on the Bogy.

M. Anderson has bought the Louise D. and Polly Gilpin claims, near the head of McCullough gulch, near Breckenridge. They show values in lead and gold.

Teller County.

Manager T. Cornish of Stratton's Independence, Ltd., on Battle mountain, near Cripple Creek, has 453 men at work, on two shifts. There is being shipped from the property 225 tons of ore per day, which is giving the usual values of $20 to $25 in gold per ton. All of the ore is being sent to the Black sampler at Goldfield for treatment.

The Ingham cyanide mill, near Cripple Creek, is being taken down, as the dump has been cleaned up.

The "Ella M." M. & M. Co. has been reorganized and is resuming operations on the upper tunnel on the Ella M. claim on eastern slope of Trachyte mountain, near Gillet. The old (or the lower) tunnel has been driven for distance of 208 feet. In this tunnel an ore shoot 6 feet wide was opened up of low-grade values. Tests are being made to determine if it can be successfully treated by cyanide process.

The Mine Owners' Association reports 2500 non-union men employed on their properties in the camp. The Western Federation of Miners claims there are 1600 union men still at work, while there are 300 miners working who have never been bothered as to whether they were union or non-union on properties and cyanide plants on outlying hills in the producing area. One hundred more are at work in the samplers, another 100 as ore haulers, and 100 as coal haulers and drivers of ore supplies for supply houses, and between 100 and 200 more employed by firms allied with the mining interests.

Governor Peabody has decreased the number of troops in Cripple Creek district to 200. The cavalry has all been ordered home.

The Aztec G. M. & M. Co., operating on the Elk claim on northeast slope of Mineral hill, near Cripple Creek, has put in a heavier plant of machinery and is sinking the shaft to the 300-foot point.

All of the samplers of Cripple Creek are working to their capacity. Manager N. Franklin of the Eagle sampler says that he has twenty-three men at work in the sampler, with four men in the office. The ore is coming from mines all over the district.

It is estimated, says the Cripple Creek Times, for the October payrolls there was paid out last week in Cripple Creek camp to miners, teamsters, clerks and others directly connected with the mining industry, $300,000. This is $150,000 less than prior to the strike.

IDAHO.

Boise County.

The Klondike mill on Willow creek, near Idaho City, began crushing last week. The machinery of the hoist is in place. The shaft is down 90 feet.

Idaho County.

Second payment of $30,000 is reported made on the purchase price of $100,000 for the Dundee and Glasgow mining claims on Profile creek, in Big Creek section, Thunder Mountain district, near Roosevelt. The claims were bought by a New York company.

B. J. Mack, manager of the Rankin G. M. Co., near Warren, says the flume to convey water to the mill for power has been completed and is over a mile in length. Work in the mines is progressing. Contracts for driving tunnels have been let to several parties. The sawmill has been shut down for the winter. The mill is expected to be in full operation next week.

Engineer E. S. Hesse has surveyed a road for the Iron Springs M. Co. down Rapid river, to connect with the Meadows-Grangeville road at Pollock, says the Weiser Signal. Work will be commenced on it in the spring. He reports 18 inches of snow last week at the Iron Springs camp.

Kootenai County.

The Wisconsin M. & M. Co., operating in Blacktail district, 10 miles south of Sandpoint, will put in an air compressor and drilling plant. The plant includes a 12x12 air compressor, a four-drill machine and a 50 H. P. boiler. The company has a tunnel driven 400 feet on the Mexico claim and expects to drive the bore 1 mile to develop the Mexico, Re-

bate, Mariposa, Alki Baby, Alice B, Marie, Single Jack, Currency and Broken Hill claims.——The North Dakota M. Co., which owns the Black Jack group, in the same camp, is driving an 800-foot tunnel to develop its group of claims and is in 200 feet.

Owyhee County.

T. F. Walsh of Denver, Colo., has bought the Standard mine, in South Mountain mining district, near Silver City. A company will be organized and start development and shipping ore next spring. South Mountain camp contains bodies of carbonate and galena.

KANSAS.

Allen County.

The plant of the La Harpe Smelting Co., ½ milo east of La Harpe, in Iola district, is in operation with two blocks, says the News-Herald. A third block will be built. W. Lanyon has made plans to put up a four-block plant at Caney. A gas well was recently drilled at that point, in which the pressure was great enough to blow out the string of tools. The United Zinc & Chemical Co. at Iola, and the Cherokee-Lanyon Spelter Co. at Gas have each built additional blocks during the current year. The two-block plant of Hess & Steuck at Chanute is about completed. It is reported the Edgar Zinc Co. proposes an enlargement of its Cherryvale plant.

MICHIGAN.

There are approximately 22,000 shareholders in the twenty-three Lake Superior mining companies reporting to the Michigan Mineral Commissioner, says the News.

Houghton reports to the Mining Record say the favorable weather of early November has been utilized to clear the wharves of refined copper. With the close of lake navigation the copper must be held till spring, or forwarded by all-rail routes, at an average cost of $8 per short ton greator than the mixed lake and rail freight. For several winters past copper has been shipped to the seaboard by rail until a few weeks before opening of navigation in April or May, and owing to small supplies of copper now on hand it is thought all-rail shipments will be begun before the close of the year. Despite the closing down of a number of iron mines in the Lake district and reductions in forces of many of the properties remaining active, the supply of skilled miners does not seem to increase in the copper district. There is no scarcity of common labor, but there is a shortage of experienced miners. The scarcity is not serious, but several hundred more miners could be employed to advantage.

Houghton County.

The No. 2 shaft of the Winona mine at Winona will be sunk to the sixth level during the winter. The bottom of the shaft is reported in copper ore, and the Winona continues to supply medium-grade stamp rock to the single head running thereon at the Atlantic mill.

At the Calumet & Hecla mine, at Calumet, repairs on the Red Jacket shaft are reported progressing. The October production showed a decrease, owing to this shaft being out of commission.

Work of completing No. 5 shaft at the Tamarack mine, near Calumet, is progressing. The capacity of the hoist for the mile haul is 40 tons of rock hoisted for each ton of coal consumed.

No. 2 shaft of the Franklin Junior mine, near Hancock, on the conglomerate is down 150 feet, and raising is in progress from the seventh level. The shaft house is in place. Crosscutting will be done only at the 100-feet stations.

The Isle Royale mine, near Houghton, has resumed opening of new ground at both shafts.

Product for month of October of the Baltic mine, near Painsdale, amounted to 720 tons of copper.

Ontonagon County.

The skip is running to the twentieth level in the main shaft of the Victoria mine at Victoria. The Victoria is the deepest mine in Ontonagon county, and development work continues.

The Michigan mine at Rockland is expected to begin production this week. The extension of the Mineral Range railroad to the shafts has been completed. One stamp will be used, on day shifts only, and this will crush 225 to 250 tons of rock daily, says Prosidont Stanton.

MISSOURI.

Crawford County.

M. Welton of Joplin, manager of the Missouri C. M. Co., which owns a copper mine in Crawford county, near Sullivan (Franklin county), says machinery is on the ground to open up the ground, and operations will begin before Dec. 1. The company has secured title to the lands adjoining Copper mountain, becoming sole owner of 7400 acres lying in Crawford and Washington counties.

Lawrence County.

At Stotts City, Superintendent J. Davis is putting in machinery for his mining plant on the Shipman land.——O'Grady & Rule have repaired the mill at the Illini mine and expect to begin operations this week.

Jasper County.

The Golden Rod (the Yellow Dog) mine, on the Underwriters lease, produced, from Sept. 11 to Oct. 24, 1,000,000 pounds of jack and 400,000 pounds of lead in thirty shifts. Since putting in the heavy pump, the company has had no trouble in handling the large volume of water which the mine makes, says W. R. Caulkins of Carthage, manager.

The mine and mill operators of Joplin district, in order to increase the prices of lead and zinc, which have been falling for some time, shut down their plants and mines during the first week of November. The move included the majority of the producers and had the effect of materially steadying the market. Frequent meetings of the producers have been held, says the Joplin News-Herald, but no further shut down will be made as yet. All properties are in operation at present.

W. Hogue, superintendent of the Olive plant, near Joplin, during the shut down, has put in an electric light plant. The Olive is owned by the Bash-Scogin Co. and is on the I Know ground.

The Alvina M. Co., composed of E. Zelleken, M. Dorfeldt and B. Wurzel, reports having struck zinc in deposits at depth of 112 feet at Tuckahoe.

MONTANA.

Granite County.

G. H. Babcock and D. T. Conkling have a lease and bond on the iron mines on Franklin hill, 2 miles southeast from Philipsburg, and intend shipping two carloads of ore daily to the smelters of Butte and Helena, says the Mail. The mines are owned by F. Hughes and C. Peoples, of Granite. There is a 5-foot ledge of ore which averages 50% iron, and the smelters take it for fluxing purposes. A road has been graded to the mine.

Jefferson County.

C. Baradio, J. Beaulieu and G. Vachor, of Basin, report finding coal croppings on east fork of the Little Blackfoot river, 15 miles from Basin and 2 miles from the smelter under construction by the Cataract C. M. Co., and 5 miles from the right of way of the Basin & Elliston railroad. The course of the veins is north and south. They have located several claims and have started development work. M. Westfall, of Basin, has also made several locations for Butte men.

The McCabe Co. last week started another three-compartment shaft on the Erickson group of their properties at Corbin. This, like others, will be sunk at least 500 feet. They expect to start shafts on their other groups.

Lewis and Clarke County.

The Pittsburg & Montana M. Co., which bought the Christina group of mines and claims near Austin, 15 miles from Helena, has also bought the Fanny Parnell and two other adjoining claims for $16,000. Three other claims were also taken up for surface ground. On the Christina group considerable work has been done and copper-silver ore has been shipped. They will develop and work the groups.

Missoula County.

The Du Quesne M. Co., owned by Pittsburg, Pa., men, is closed down for the winter. The mine carries values in lead, silver and copper.

NEVADA.

Elko County.

The Seigel mines, at Seigel, are shipping steadily to Salt Lake City, Utah. The manganese contained in the ores is said to make the product desirable for fluxing. Shipments are being made via Oasis, Utah, and the Salt Lake route, instead of via Wells and the Southern Pacific, as formerly.

Esmeralda County.

The suit instituted by the Tonopah Con. M. Co. to recover the Buckboard claim, which the Consolidated Co. claimed as part of the McNamara claim, at Tonopah, has been dismissed. This leaves it still in possession of the Tonopah Co.

The Tonopah Independence M. Co. of Liberty has been organized, under South Dakota laws, to operate a group of six claims 4 miles northeast of the Liberty mine and 20 miles from Tonopah. A contact ledge, between lime and porphyry and averaging 6 feet in width, has been traced and surface assays show $10 a ton, equally divided between silver and gold. C. F. Maunder is superintendent.

O'Meara & Lynch of Tonopah are reported to have bonded for $50,000 the Reveille mine, and are shipping via Sodaville.

Eureka County.

(Special Correspondence).—The Welsh-King mines, on Prospect mountain, between the Diamond and Silver Connor mines, is reported to have opened a 1-foot ledge of silver-lead ore, averaging $8 per ton.

A process of treatment on the ground is being sought for the low-grade ores of the camp. The varied character of the ores makes it difficult, but progress is reported. Among these low-grade ores are: A gold-silver-hearing quartz ledge in the Banner, assaying $9; an iron-silver quartz outcropping near the Cloud, assaying 40% iron and 13 ounces silver; scattered bodies of same in Ruby Hill tunnel; a considerable quantity of silver-lead-gold ore in limestone; oxidized iron ores assaying $6, running $2 to $4 gold, $3 to $5 silver and balance lead, are scattered through the mines in Eureka district.

The Alexandria, being worked by A. Laird et al., has made a shipment of lead carbonate carrying gold and silver.

The Avou mine, owned by A. Fraser, near the Silver Connor, has silver-lead ore assaying $6.

Eureka, Nov. 17.

Washoe County.

The Desert King M. Co. at Wedekind, near Reno, continues shipping ore. The dump is cleared up and the rock is hoisted from the 190-foot level and sacked.

NEW MEXICO.

Grant County.

The Clifton C. Co. now controls the Wildcat mine and mill at Santa Rita—the result of settling pending litigation. They will enlarge the 65-ton concentrator to 150 tons capacity. The ground is opened to depth of 300 feet, showing low-grade copper ore.

The St. Louis Gold Gulch M. Co. of Silver City, owning the Lucky Bill claim, also the Dutch Uncle and Carbonate claims at Gold Gulch, will increase development. It was decided to work and sink either on the Easton shaft or put in a double compartment shaft on the Dutch Uncle, says the New Mexican.

At the Missouri mine, 1 mile east of Central, they are unwatering the shaft preliminary to sinking and drifting. This mine was opened a year ago and high-grade ore shipped, but water interfered. It is proposed to sink the shaft at least 300 feet and drive drifts and crosscuts every 50 feet.

Work has been started by W. McAllister, lessee, on the Aztec and Arizona mines at Pinos Altos. The Aztec mine and its mill, north of Silver City, have been idle for ten years. McAllister has cleaned out the shafts and drifts of both mines. Arrangements are being made with the smelter at Silver City by which freight and treatment charges are reduced and shipping will be resumed.

Rio Arriba County.

The Glenwood M. Co., operating at Rinconada, 6 miles above Baranca station, on the Rio Grande Railroad, has completed putting up a Huntington mill, capacity fifty tons a day, with settling tanks for use of cyanide process. The equipment will later be increased.

Taos County.

Work has been resumed on the Elliott mine, in Bromide district, 12 miles west of Tres Piedras, says Superintendent F. A. Elliott.

The Frazer Mountain M. Co., at Irving, is treating seventy-five tons of ore per day and the smelter is turning out 12,000 pounds of copper matte per twenty-four hours, says W. Frazer, manager.

More men are being put to work on the Golden Treasure mine, near Red River, which has been bonded and leased by J. T. Erickson of Pueblo, Colo.——W. F. Doty is developing the Monday mine on Bitter creek, near Red River. He is taking out ore which carries copper and gold.

OREGON.

Baker County.

Development work will be increased on the Fidelity group in Wind creek section, near the Porcupine and Justice groups, near Sumpter. Manager Mohr will continue the crosscut until the vein is cut, then drifts will be run.

Josephine County.

Considerable work is being done on Foots creek, near Grants Pass, by Champlin & Co. They are building a dredger, by which the gravel bed of Foots creek and much of the lower benches and bars will be worked. The company is building a dam across the creek near the river to raise the water of the stream for the required depth for dredging. Machinery for the dredger is on the ground. The Champlin Co. has bought 1200 acres of placer ground. Dredging will also be done this season on the Illinois and other southern Oregon streams.

The Yellow Jacket mine, of Foots Creek district, near Grants Pass, has been bought by G. A. Dyson of Eugene for Orme, Shaffer, Mears & McIntyre. Dyson will continue development of the Yellow Jacket.

The Eureka mine of Soldier Creek district, near Grants Pass, has reverted to its former owner, A. F. Nelson, who is arranging to increase development work. The Eureka is equipped with a 10-stamp mill, steam hoists, air compressor and other machinery. The ledge has a width of 6 feet and carries values in sulphurets and free gold of $15 a ton. It is opened to a depth of 150 feet.

The Monumental quartz mine, near Waldo, has been bonded by the Waldo S. & M. Co. and will be developed. The Monumental is a base proposition, the quartz carrying arsenical pyrites. The ledge of the Monumental is said to be 50 feet in width. It is being developed by an inclined shaft, from which drifts and crosscuts are run on the vein. The ore will require a concentrator.

Jackson County.

The Bill Nye M. Co., operating on Gall's creek, 3 miles south of Gold Hill, will increase work the coming season. They have a 5-stamp mill and hoist on the ground, which will be placed in position, says Superintendent D. R. Andrus. The company has an 80-foot shaft, besides tunnel and drift work. The ore is free milling.

SOUTH DAKOTA.

Lawrence County.

The Golden Crest mill, in Two Bit gulch, near Deadwood, is in full operation after being enlarged. It is treating forty-eight tons per day. The ore shows average of $18 per ton and an extraction of 85% has been obtained. Five stamps were added, bringing total to ten.

The Reliance G. M. Co. is working steadily its group on Annie creek, near Terry, developing its ground and excavating for the mill. Two tunnels are being driven, one being in 400 feet and the other 320 feet. They are connected for ventilation. R. Fitzgerald is mine superintendent.

TENNESSEE.

Knox County.

It is reported the Roseberry Zinc Co. has decided to shut down its mill at Mascot because of its inability to dress the ore properly. The mill is of the Joplin type, but is said not to be adapted to the refractory Mascot ore, as the zinc ore of the Joplin, Mo., district is more easily concentrated.

UTAH.

Beaver County.

From the Cactus group of mines, near Frisco, there will be forwarded to the furnaces of the American S. & R. Co. ores to the value of $10,000,000, says S. Newhouse, owner. The ore carries copper, gold and silver values. The contract provides that the delivery of Cactus ores shall begin as soon as the furnaces of the copper plant projected by the American Co. at Murray are completed. The Cactus will also supply the furnaces with 100 tons daily of concentrates from the mill. Newhouse will build a concentrator which will have a capacity for reducing 1500 tons of ore daily.

The initial shipment of copper matte from the Majestic Co.'s smelter at Milford showed value of $125 a ton, says Manager Alexander. The shipment was of twenty tons.

Grand County.

At Castleton the Finley G. & C. M. & M. Co. is resuming mining operations to continue through the winter, says C. A. Finley, manager. The Finley Co. is of Colorado Springs, Colo., men, with C. A. Fitch, president. It owns three claims at the foot of Horse mountain.

A merger has been formed in Salt Lake City whereby the Dirigo-La Sal and International companies were united in the Dirigo-La Sal, operating in Beaver basin and Deep creek, near Basin. D. H. McCann, manager, has let a contract for running a tunnel on the Beaver basin group. Next season they will begin operations on both the Deep creek and Beaver basin properties and at the same time prepare for building reduction works on Deep creek.

Machinery for the Inter-State cyanide mill in Gold basin, near Basin, is on the ground, says J. H. Clark, manager.

The list of working properties this winter in Basin district in the La Sal mountains will include the Grouse Mountain, Skylark, Iowa and Monarch, Findley, Dirigo-La Sal, Inter-State, and possibly the Mineral Mountain Tunnel and Colorado properties. A company, the Midland Belle, has been organized.

Carbon County.

It is reported the coal miners at Castle Gate have gone out on a strike in sympathy with the miners in Colorado, and it is thought the strike will spread to all the principal coal mines in Utah. The Utah Fuel Co., controlling most of the Utah mines, is under contract to supply the Southern Pacific Railroad with not less than 1000 tons of coal a day. This contract has been running as high as 3000 tons, besides the coal shipped to the coast for commercial purposes. At present about one-third of the miners at Sunnyside are out.

Iron County.

The Colorado Fuel & Iron Co. has increased its number of men at work in its iron mines, near Cedar City, to 100. Work is being projected all along the iron zone on the company's holdings, a distance of 11 miles. This work consists in sinking shafts to determine extent of the iron deposits. Six of these shafts are being driven. As the ore is taken out tests are made of its quality and character and a record kept. All the shafts, while experimental, are so driven that they can be used when the actual taking out of ore in quantity is reached.——Manager Milner of Salt Lake City says he has men at work on his properties, which adjoin those of the Colorado Co.

W. H. Wobber of Colorado Springs, Colo., manager of the Interstate M. & R. Co., says he will begin development work on their Good Hope group, seven claims and a fraction, near Stateline. It is ¾ of a mile from the Johnny and Ophir properties. He is backed by Pennsylvania and Milwaukee, Wis., men, with L. B. Wolf of Lewisburg, Pa., president.

Salt Lake County.

The Maxwell group, near Bingham, is connected by pipe line with the Yampa mine compressor and machine drilling has superseded hand work.

The Boston Con. mine at Bingham will be equipped with electricity. An electric mine locomotive will be used and the underground workings will be lighted with incandescent lamps.

WASHINGTON.

Ferry County.

(Special Correspondence). — Republic smelters are overcrowded. Work is to be resumed on the Chico, Lone Pine and Surprise. Tests are being made on Quilp, Lone Pine-Surprise and Mountain Lion ores with a new cyanide method. Total October shipments were 4640 tons.

The Bolchor has a large body of solid ore—an iron sulphide carrying copper and gold—the class of ore necessary to use with the ores of Republic to make a proper flux.

Republic, Nov. 16.

The Six Eagles tunnel, near Republic, is in 1620 feet and is being driven at rate of 5 feet per day. The face is in sandstone and considerable water is coming in. It is expected the ledge will be struck at depth of 800 feet. There are twelve men working at the mine. —— There are twenty-one men at work on the Ruby mine, blocking out ore to stope when the Golden Zone mill starts up. There are 1200 running feet of workings in the mine. The north drift on the lower tunnel is in 300 feet and the south drift is in 325 feet. The Golden Zone mill will be ready by Nov. 26.——At the Similkameen falls the tunnel is completed, and will be ready to turn the water in and run the impact wheel before the rest of the machinery is set up.

Okanogan County.

F. C. Lavigne of Spokane, superintendent of the Black Bear stamp mill, near Loomis, leased to the Pinnacle G. M. Co., says he increased the speed and lessened the drop of the stamps. The result has been that the plant has handled 50% more ore daily than formerly and has saved 90% of the values. The first clean-up since resuming was made last week, after a short run, proving satisfactory.

Controlling interest in the Wild Jack mining claim has been bought by E. Boling of Spokane, and its name changed to Cornucopia. Boling has bought an interest in the Chloride and Cleopatra mines also. He says development work will be increased. The ores carry copper, gold and silver. There are 10 feet of quartz, and 2½ of it is shipping ore. The mines are 6 miles from Riverside, and the ore will be hauled to Riverside at $2 a ton. There it will be sent down by boat to Brewster, where it will be transferred to the steamer and shipped to Wenatchee, and from there by rail to Everett or Tacoma.

Snohomish County.

D. Guggenheim, chairman of the board of directors of the American S. & R. Co., says they expect to reopen the smelter at Everett.

Stevens County.

Work has been resumed on the Kemp-Kemar C. M. Co. group, near Loon Lake, and shipments are expected to begin by Dec. 1st. The mines are 6 miles from Loon Lake. The ore runs 15% in copper.

Superintendent J. J. Moynahan of the Conquest Con. M. Co., operating near Nowport, says a hoisting plant was put in the past summer and development is being increased. He has twenty men at work and the shaft is down 135 feet.

WYOMING.

Carbon County.

The North American C. Co.'s smelting and converting works at Grand Encampment resumed operations on the 15th inst. after a temporary shut down. The blister copper being turned out for the Eastern refineries carries $20 to $30 in gold per ton, which is sufficient to pay charges from smelter to market. The aerial tramway between the smelter and the Ferris-Haggerty mine has not been in steady operation because storms damaged the towers, but these have been repaired and a steady run is expected.

FOREIGN.

AFRICA.

Transvaal.

London advices of the 12th inst. state that within ninety days a bill will be passed and arrangements will have been completed for introduction of Asiatic labor into the South African gold mines. There are now employed in those mines 65,000 men, whereas there is need of at least 200,000.

AUSTRALIA.

Queensland.

At the Mount Morgan G. M. Co. at Mount Morgan a steam shovel will be used to remove the overburden and is expected to lessen the cost, as well as lessen the time required to remove it.

Western Australia.

The official report of the Department of Mines for the year 1902 shows the total mineral output valued at £8,094,617, being an increase of 9% as compared with the value for 1901. The value of the output of minerals other than gold represents 1.8% of the total mineral production. Western Australia's gold output was 53¾% of the total amount produced by all of Australia. The land leased for gold mining was 32,570 acres; men engaged in gold mining, 20,475; population of State, 214,805; gold output, £7,947,662, being 1,871,037 ounces fine, exceeding that of 1901 by 167,620 ounces. The increased output is general throughout the districts. In the East Coolgardie field, especially, the mines on the Golden Mile are being proved by deep sinking and diamond drilling.—— The output of black tin for the year was £39,783, the two producing districts being Greenbushes and Pilbarra. —— As compared with 1901, production of copper ore was less by 7698 tons. The decrease was due mainly to suspension at the smelters at the Anaconda mine, in Mt. Margaret field.——The only coal-producing field was the Collie, its output being 140,884 tons, about 23,000 tons in excess of 1901. Coal prospects are being exploited near Mingenew, in Irwin River district. A diamond drill is in operation.——There were 22,424 ounces fine of silver, of value of £1581, produced as a by-product. —— Small quantities of cobalt, plumbago and silver-lead ore were obtained, but no precious stones, during the year.——Tables giving the average number of men employed at the mines during the year show the number has increased by 1070 on the gold mines, while less are employed on all other mines, bringing the total down to 315 more than in 1901. The number of alluvial workers has shown a steady falling off for several years past. The total number of men killed was 39, as against 45 in 1901, and injured 132, as against 130, all the mining accidents occurring in the gold fields.——Of State batteries, the report says: In all £117,600 have been expended in their erection, equipment and necessary water supply during six years. During the year 1902 there were 39,517 tons of stone treated by the batteries, yielding 57,255 ounces.

BRITISH COLUMBIA.

Boundary District.

Ore shipments from the Boundary district for the month of October amounted to 73,256 tons, as against 61,388 tons for September and 69,968 tons in August. Shipments for the year to November 1st aggregated 532,383 tons.

Cariboo District.

Surveys are completed at the Con. Cariboo hydraulic mine at Bullion for extension of the company's water system. Estimates of the cost of tapping these water reserves are being made by Manager J. B. Hobson. It is reported that Morehead lake is 2 feet higher than it was last spring when the water was turned on in the pits.

At Eight-mile lake the Thistle gold mine is reported to have made its final clean-up for the season, yielding a total of $50,000. The property is owned by P. Sutherland & Co. It has been worked three seasons.

East Kootenay District.

The Chu-Chee-Woo, a Chinese company, working placer holdings on Wild Horse creek, north of the Nip & Tuck, near Fort Steele, has finished work for this season.——Owing to lack of water, most of the companies on Wild Horse creek had started to clean up for the season, but recent rains increased the water supply to such an extent that mining operations have partially been resumed.——The Gold River M. & P. Co. is cutting a right of way for a flume 16 feet wide and 5 feet deep, 2 miles in length, to convey water of Bull river to the auriferous ground near Fort Steele. Giants, flumes, sluice boxes, etc., will be put in next spring.

Rossland District.

At the White Boar mine, near Rossland, development in the deep levels has been carried ahead steadily, and ore is being hoisted from the 1000-foot level. The spur from the main line of the Red Mountain road was completed last week. The hoisting machinery is being set up at the headworks.

Ore shipments from Rossland camp for month of October aggregated 38,151 tons, as compared with 39,651 tons for September and 36,010 tons for August. Shipments for the year to November 1st reached 330,574 tons.

Vancouver Island.

The foreign coal shipments from the mines at Ladysmith for the month of October reached a total of 22,795 tons.

The Western Fuel Co. has struck in the southern end of No. 1 mine at Nanaimo a seam of 10 feet of workable coal, giving that part of the workings new prospects. At the new slope at Departure Bay the pumps are controlling the water situation. The foreign shipments of the Western Fuel Co. for month of October aggregated 14,344 tons of coal.

The Government has decided that the Chinese must get out of the coal mines. Premier McBride says an attempt will be made to stop the coal companies employing Chinese underground, they being considered unsafe workmen there. The former action was balked by the Dunsmuir company taking the matter through the Canadian courts and getting a decision in its favor with the judicial committee in London. Since then a new law has been passed to deal with the matter. J. Dunsmuir, owner of the mines, says this will be fought in the same way. Action will be started this week. Inspector Morgan has summoned the superintendent of the mines at Cumberland, and the company will be condemned to pay a fine, as the employment of Chinese is not denied. An appeal will be taken, and the matter will go to the Supreme Court. From there it will go to Ottawa, and eventually it is expected to go to Downing street, London.

Yale District.

J. Redman of Kamloops says the Boulder Creek M. Co. is operating a number of mining propositions in Copper mountain, Similkameen and Aspen Grove sections. The Nickel Plate and Cousin Jack claims carry large ore bodies of low-grade copper ore. The Nickel Plate Co. is building plants for treatment of the ore. Machinery for a cyanide plant and a 40-stamp mill is on the ground.

COLOMBIA.

(Special Correspondence).—At the Espiritu Santo mine at Cana, on the Isthmus of Panama, the ground has been opened up to depth of 600 feet. The ore body has been stoped out from the 500-foot level to the surface and filled. The ore shoot is getting narrower and longer with depth, but maintains its values. The ore contains considerable sulphides, which are low grade. Manager Proctor is sinking a new incline shaft, which is expected to cut the ore body at depth of 1500 feet. This shaft is in the foot wall, to one side of the ore body, and is going down at nearly the same angle as the lode.

The 20-stamp mill is in steady operation. It is equipped with Frue vanners. The cyanide plant handles the concentrates. Water power is used, running five impact wheels and one turbine, which, in addition to the mill and hoist, operate a sawmill, machine shop and electric light plant. The tailings are impounded; 90% of the values in the ore are recovered by amalgamation.

Cana, Nov. 1.

CUBA.

Havana reports several hundred men thrown out of work by the closing of the iron mines in Santiago province. These mines were formerly owned jointly by the Pennsylvania Iron Co. and the Bethlehem Iron Co., but now owned by the latter.

CANADA.

Ontario.

The lode at the Sultana mine, in Lake of the Woods district, near Wabigoon, trace of which had been lost, has been recovered and development work increased. The mill will be operated.

CHINA.

Manchuria.

Vladivostok reports a joint stock company being organized there with a capital of $3,000,000 to operate the tin mines of Manchuria, the promoters hoping to break the Anglo-American monopoly.

MEXICO.

Chihuahua.

E. A. Horner of Chihuahua, who has an option on the Santo Domingo placers on Conchos river, reports the Mexican Gold Fields Co. organized under Arizona laws to take over the property. Horner says he expects to begin operations by Jan. 1.

The Encinillas M. Co., Ltd., has completed its smelter at Santa Rosalia, on the line of the Central railway, consisting of a 50-ton matte furnace and a 50-ton lead furnace. The plant is expected to blow in this week. The foundations for a 20-ton stack furnace have been laid.

The Industrial M. Co., of Bascurito, is preparing to irrigate 600,000 acres of land. A canal is being built and a dam across the Sinaloa river, to secure water supply. Hydraulic machinery will be put in to operate the placer mines of the company along the river.

Hidalgo.

La Union reduction works at Pachuca reports having on hand $100,000 worth of ores and has made a contract with the San Rafael y Anexas group, which includes the Soledad and Sorpresa mines, for all their ores.

Lower California.

It is reported the Ybarra G. M. Co. of San Francisco, Cal., has sold its group of mines at Calmalli, near Santa Domingo, to a company of London men for $100,000.

Personal.

W. D. CAMERON of New York is in San Francisco, Cal.

W. W. OCHS of Salt Lake City, Utah, is in the East.

GEO. SANDERS has returned from New York to Wickenburg, Ariz.

H. E. PICKET of Placerville, Cal., is in San Francisco on mining business.

PHILIP ARGALL has returned to Denver, Colo., from a trip to Montana.

F. E. SHAW of Butte, Mont., is in San Francisco, Cal., on mining business.

W. A. ROBERTS is in San Francisco, Cal., from mines in Grants Pass, Or.

E. C. LIMBACH is located at Gilt Edge, Mont., where he has charge of a mill.

C. A. YOUNG, interested in Nome, Alaska, mines, is in San Francisco, Cal.

G. CLARK of Minas Prietas, Sonora, Mex., is superintendent of the Lapiz mine.

P. WHITE has resigned as superintendent of the Broken Hill M. Co. at Ymir, B. C.

A. H. TUTTLE is secretary and manager of the Broken Hill M. Co., at Ymir, B. C.

B. L. JONES is manager of the Josephine mine at Cusihuariachic, Chihuahua, Mexico.

T. CLARK, interested in El Dorado Co. mines, is in San Francisco from Placerville, Cal.

L. R. MCINTOSH has resigned as superintendent of the Jubilee M. Co. at Carl Junction, Mo.

A. W. KEDDIE of Oroville, Cal., interested in Butte county mines, is in San Fraucisco, Cal.

F. F. THOMAS, E. M., manager of the Gwin mine, Calaveras Co., Cal., is in San Francisco, Cal.

C. F. MAUNDER is superintendent of the Tonopah Independence M. Co., near Tonopah, Nev.

H. P. STOW of the Gold Bank mine, Forhestown, Butte Co., Cal., is in San Francisco, Cal.

H. W. TURNER returned to San Francisco, Cal., from mine examinations in Orogon, and has gone to Calaveras county, Cal., to examine a gold mine.

E. C. VOORHIES of the Pioneer Reduc-

tion works at Sutter Creek, Cal., is in San Francisco, Cal.

J. HANLON has returned to the Crown Point mine, near Phœnix, Ariz., from a visit to Europe.

F. H. LATHROP of Salt Lake City, Utah, has gone to Tonopah, Nev., to locate permanently.

T. E. SCHWARZ, Denver, Colo., is in Brookline, Mass., called there by the death of his father.

A. B. GOULD of Placerville, Cal., interested in El Dorado county mines, is in San Francisco, Cal.

J. M. SHERRARD, manager of the Taylor Iron & Steel Co., Highbridge, N. J., is in San Francisco, Cal.

MANAGING DIRECTOR A. F. HOLDEN of the United States M. Co. is in the East from Salt Lake City, Utah.

C. H. DUNTON of Placerville, Cal., superintendent of the Eureka Slate Co. at Kelsey, is in San Francisco, Cal.

W. LOGAN is superintendent of field work for the Western Union Oil Co., operating near Santa Barbara, Cal.

H. CONDER is in temporary charge of the Crowl Creek copper mine, Shuttleton, near Cobar, New South Wales.

W. C. CAPEN has assumed the management of the West Coast Rubber Co., 102 First street, San Francisco, Cal.

C. E. BUNKER, superintendent of the Sultan mine at Hillside, Ariz., is in Chicago, Ill., on company business.

B. N. LEHMAN of Salt Lake City, Utah, of the Yankee Con. Co., left last week for Juneau, Alaska, on mining business.

H. Z. OSBORNE of Los Angeles, Cal., president of the Dorleska mine, Trinity county, Cal., is in San Francisco, Cal.

H. ANDREWS, operating in Bear gulch, near Jardine, Park county, Mont., is at the mines from Salt Lake City, Utah.

JOHN ROSS, JR., superintendent of the Wildman-Mahoney mine, Sutter Creek, Cal., is examining mines at Grants Pass, Or.

J. D. WOOD of Salt Lake City, Utah, of the Daly-West M. Co. and the Daly-Judge M. Co., is in San Francisco, Cal.

W. F. FREMERSDORF, metallurgical engineer and chemist, late of Vancouver, B. C., has established an office in San Diego, Cal.

R. A. PARKER, E. M., has entirely recovered his health and has office headquarters at 217 Boston Building, Denver, Colo.

W. E. POMEROY, general superintendent of the Yaqui C. Co., returned to Campo Santo Nino last week from New York.

M. WELTON of Joplin, Mo., is manager of the Missouri C. M. Co., operating in Crawford Co., Mo., near Sullivan, Franklin Co.

W. THOMPSON, general manager of the Rossland-Kootenay M. Co., returned to Rossland, B. C., last week from a trip to Mexico.

J. E. BAMBERGER of Salt Lake City, Utah, principal owner of the Daly-West mine at Park City, Utah, is in San Francisco, Cal.

FRANK DAVIS, manager of the Yaqui River S. & R. Co., returned last week to Toledo, Sonora, Mex., from San Francisco, Cal.

J. H. HUTCHINSON of Boise, Idaho, is in Boise after a trip to the tiu mines on Seward Peninsula, Alaska, in which he is interested.

M. H. CAVANAUGH, formerly of Webb City, Mo., is manager of the Northwestern Zinc Corporation's properties at Galena, Mo.

C. C. DERBY, manager of the mines of the Mariposa Estate Co. in Mariposa county, is in San Francisco from Mt. Bullion, Cal.

W. RODGERS of Georgetown, Colo., is manager of the Hazelton G. M. & M. Co., operating in East Argentine district, Clear Creek Co., Colo.

J. B. TREGLOAN, superintendent of the South Spring Hill mine, south of Amador City, Cal., is in San Francisco, Cal., on mining business.

P. B. AIKEN of San Francisco, Cal., president of the Amador Climax G. M. Co., is at their mines near Pine Grove, Amador Co., Cal.

W. G. AMENT, manager of the Golden Drift M. Co., near Grants Pass, Or., returned there last week from a trip East on company business.

A. B. LEWIS, manager of the Royal, Imperial and other Utah properties, returned to Salt Lake City, Utah, last week from an extended trip East.

E. S. KESKEYS, for the past four years connected with the Ishpeming M. Co. at Carl Junction, Mo., is superintendent of the Juhilee M. Co. at the same place.

W. L. WATTS, E. M., of Los Angeles, Cal., is in San Francisco, Cal. He leaves shortly for Texas and Mexico, where he will make oil and mine examinations.

J. H. HAMMOND, consulting engineer for the Guggenheim Exploration Co., and J. W. Brock, president of the Montana M. Co., are in San Francisco, Cal., from Denver, Colo.

J. W. BENNY, who has been in charge of the company's smelter for the past two years, is general manager of the Shannon C. Co. at Clifton, Ariz., vice H. S. Anderson, resigned.

JOHN SPARREY of Portland, Or., has been appointed superintendent of the coal mines of the Portland Coal & Dev. Co., near North Yamhill, Or., vice W. Steadman, resigned.

C. B. LAKENAN of Grass Valley, Cal., has resigned as superintendent of the Coe mine and has gone to Arizona as superintendent of the Mohave G. M. Co. mines, near Needles, Cal.

H. L. CORNISH has resigned as superintendent of the La Grange D. & M. Co., at La Grange, Cal., and is in Berkeley, Cal. He will go to Durango, Mexico, about December 1st.

JAS. CONSTABLE, now at Seattle, Wash., has just finished an engagement with the Coronation M. Co., in the development of a silver-lead property in southeastern Alaska.

WM. STEADMAN, who has been superintendent and manager of the coal mines near North Yamhill, Or., for the past two and one-half years, has resigned, on account of age and poor health.

H. S. ANDERSON, general manager of the Shanuon C. Co. at Clifton, Ariz., for the past two years, has resigned to devote his time to his private business and will make El Paso, Tex., his hoadquarters.

W. H. WEBBER of Colorado Springs, Colo., recently superintendent of the Rambler M. & S. Co. of Wyoming, is manager of the Good Hope group of the Interstate M. & R. Co., at Stateline, Utah.

Z. F. RAWSON, vice-president of the Santa Ana M. & M. Co., has resigned the superintendency of the Lapiz mine, near Nogales, Ariz., and will devote his time to the Santa Ana properties near Sahuaripa, Sonora, Mex.

W. S. MANN has resigned as mill superintendent of the Nobles G. M. Co., near Descanso, San Diego Co., Cal., to take a similar position with the Ventanas M. Co., operating cyanide plants at Villa Corona and San Cayetana, Durango, Mex.

C. E. ALLEN has been appoiuted general superintendent of all the mines of the United States M. Co. in Utah. Heretofore he had charge of only the Centennial-Eureka, in Tintic district, but will now have the Bingham properties as well.

THE following officers have been elected for the ensuing year by the California State Miners' Association: Chas. M. Belshaw of Antioch, Cal., re-elected, president; H. P. Stow of Forbestown, vice-president; S. J. Hendy of San Francisco, treasurer, re-elected: E. H. Benjamin of San Francisco, secretary, re-elected.

ROBERT McF. DOBLE, consulting engineer, has returned to San Francisco, Cal., after an absence of several months in Mexico, having completed the installation of the hydro-electric power plant and transmission of the Guanajuato Power & Electric Co. The transmission is from the Duero river to the city of Guanajuato, a distance of 101 miles, at 60,000 volts. The line is constructed of No. 1 B. & S. hard drawn 19-strand copper cable, supported by porcelain insulators, iron pins, steel cross-arms and steel towers, there being usually only twelve towers per mile. The uormal span is 440 feet, although in some cases spans of over 1300 feet are used.

Obituary.

J. A. MATTHEWS, a pioneer miner of Montana, died at Phillipsburg, Mont., on the 6th inst., the result of heart trouble. Deceased was a native of Watertown, N. Y., 66 years of age. During the Civil war he served with the army of the Potomac. Early in the '70s he went to Montana and engaged in placer mining at Yam Hill, Pioneer and Henderson Gulch.

D. J. BURNETT, a pioneer miner, and son of the late P. H. Burnett, first Governor of California, died on the 17th inst. at San Francisco, Cal., due to age and general debility. Deceased went to Oregon in 1843, and six years later moved to California. He engaged in mining and mercantile business at different times. He leaves a widow, four sons and two daughters. Deceased was a native of Tennessee, 74 years of age.

Commercial Paragraphs.

THE S. S. Machinery Co., Sixth and Market streets, Denver, Colo., are moving their place of business to Twenty-fifth and Larimer streets, where they will have larger and more commodious quarters.

C. M. FUELLER, mining engineer, 1752 California street, Denver, Colo., is designing a large mill for D. G. Cahoon, manager of the Dexter M. & D. Co. of Atlantic City, Wyoming, and also expects to take the contract for designing the Hazelton mill at Georgetown, Colo. Mr. Fueller states he is having a great deal of experimental or testing work to do at present. He has a fully equipped plant for testing ores up to carload lots.

THE National Wood Pipe Co. of Los Angeles, Cal., has just completed the construction of eight lines of 48-inch diameter, and one line of 18-inch diameter wood stave pipes, to be used as pen stocks for the Columbia River Improvement Co., near Tacoma, Wash., the staves for this pipe being made from Washington Douglass fir. This company reports now building two parallel lines of 36-inch diameter redwood stave pipes for pen stocks for the American River Electric Co., near Placerville, Cal., all of the above lines being built under the Wheeler patent for continuous stave pipe. The company also reports building several miles of 4, 8 and 10-inch Woodward patent machine banded redwood water pipe for the city of Oceanside, Cal., and that the work has been tested and accepted by the city of Oceanside. The pipe was made for a maximum pressure of 200 feet.

THE Wellman-Seaver-Morgan Co. have closed a coutract with the John Cockerill Co., of Seraing, Belgium, whereby they acquire from the Cockerill Co. the exclusive right to manufacture and sell in the United States the Cockerill type of gas engine. These engines they state to have been in successful use throughout Europe for a longer time than any other design of large unit gas engines; they further state that the horse power of this type in satisfactory and successful operation in Europe is larger than all other types of gas engines combined. By virtue of this contract with Messrs. Cockerill & Co. they obtain the exclusive right to manufacture and sell, and also acquire all of the drawings, plans and other information of the Cockerill Co., as well as the benefit of their experience in the manufacture and use of these engines. An especially valuable feature of the connection is the fact that the Cockerill Co. have their own blast furnace, steel works and rolling mills in connection with their engine building shop, making it possible for them to test every new type and modifications of the engines they build, in actual work, before sending them out to their customers. The Wellman-Seaver-Morgan Co. state that these engines are suitable for any of the uses for which large power units are required, such as blowing engines for blast furnaces and steel works purposes, electric power plant for both alternating and direct current, rolling mill work, and in fact all places requiring heavy, severe and continued service. With the gas engines, the Wellman-Seaver-Morgan Co. state that they are prepared to furnish complete installation of the necessary accessories, such as cleaning, purifying and regulating apparatus, that their Cleveland and Akron works are admirably adapted for the manufacture of this class of work, as regards large and powerful tools, cranes, etc., especially their Webster, Camp & Lane Division at Akron, which for many years has been engaged in building high-grade Corliss and other steam engines.

Catalogues Received.

High-grade turbines are the subject of a handsome trade treatise issued in English, Italian and Norwegian by the Trump Manufacturing Co., Springfield, Ohio.

"The Hot-Blast Stove and Its Application to Copper and Pyritic Smelting," is the latest contribution made by the Colorado Iron Works Co. of Denver, Colo., to modern metallurgy. It does not claim to be anything more than a collection or compilation of papers, articles and abstracts from letters to customers, written at various times, on smelting practice and equipments, but is none the less valuable in its present shape.

Latest Market Reports.

SAN FRANCISCO, November 20, 1903.

METALS.

SILVER.—Per oz., Troy: London, 27½d (standard ounce, 925 fine); New York, bar silver, 58⅜c, refined (1000 fine); San Francisco, 58⅜c; Mexican dollars, 46@47½c San Francisco, 44⅜c New York.

During the past week silver has been unsettled, though showing an upward tendency, being nearly 2 cents higher now than in last week's quotations.

COPPER.—New York: Standard, $13.00; Lake, 1 to 3 casks, $13.00; Electrolytic, 1 to 3 casks, $13.00; Casting, 1 to 3 casks, $13.00; San Francisco: $15.00. Mill copper plates, $17.00; bars, 18@24c. London: £55 15d spot per ton.

Copper shows a slight falling off in price from last week's quotations. Following are the figures of German consumption of foreign copper for the months January-September, 1903, compared with the same period of 1902-1901, in tons:

	1903.	1902.	1901.
Imports	63,527	62,091	48,755
Exports	7,797	6,718	7,233
Consumption	55,730	55,373	41,522

LEAD.—New York, $4.25; Salt Lake City, $3.50; St. Louis, $4.00; San Francisco, $4.50, carload lots; 4⅜c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5⅜c; pig, $4.75. London: £11 11s 3d ₱ long ton.

SPELTER.—New York, $5.75; St. Louis, $5.10; London, £21 ₱ ton; San Francisco, ton lots, 6⅜c; 100-lb. lots, 7c.

TIN.—New York, pig, $25.10 @ 25.50; San Francisco, ton lots, 27c; 500 lbs., 28c; 200 lbs., 28c; less, 28½c; bar tin, ₱ lb., 30@32c. London, £116 7s 6d.

PLATINUM. — San Francisco, crude, $18.00 ₱ oz.: New York, ingot, $19.00 ₱ Troy oz. Platinum ware, 75 @ 80c ₱ gram.

QUICKSILVER. — New York, $46.00@47.00, large lots; London, £8 7s 6d; San Francisco, local, $43.50@44 ₱ flask of 76½ lbs.; Denver, $49.50. Export, $42.50@43.00.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

SOLDER. — Half-and-half, 100-lb. lots, 18.00c; San Francisco, Plumbers', 100-lb. lots, 15.25c.

ZINC.—Metallic, chemically pure, ₱ lb., 50c; dust, ₱ lb., 10c; sulphate, ₱ lb., .04c.

NICKEL.—New York, 50@60c ₱ lb.; ton lots, 40@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30@34c.

ANTIMONY. — New York, Cookson's, 7½c; Hallott's, 6⅜c; San Francisco, 1000-lb. lots, 8c; 300@500-lbs., 8½c; 100-lb. lots, 10½c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, $15.85 @16.10; gray forge, $13.50; San Francisco, bar, 3c ₱ lb., 3½c in small quantities.

STEEL. — Bessemer billets, Pittsburg, $23.00@25.00; open hearth billets, $23.00 @26.00; San Francisco, bar, 7c to 12c ₱ lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer	$16 50@17 00
Foundry Northern 1	15 50@16 00
Northern 2	15 00@15 50
Northern 3	14 50@15 00
Southern 1	14 35@——
Southern 2	13 35@——
Southern 3	12 85@——
Forge	12 35@——
Charcoal	17 00@18 00
Billets, Bessemer	24 00@——
Bars, iron	1 40@——
Bars, steel	1 46½@——
Rails, standard	28 00@30 00
Rails, light	28 00@32 00
Plates, boiler	1 90@ 2 00
Tank	1 75@ 1 80
Sheets, 26 store	2 90@ 3 00
Angles	1 75@——
Beams	1 75@——
Tees	1 80@——
Zees	1 75@——
Channels	1 75@——
Steel melting scrap	12 00@12 50
Relaying rails	23 00@25 00
Dealers forge	10 00@10 50
No. 1 railroad wrought	13 00@13 50
No. 1 cast, net ton	12 00@12 50
Iron rails	16 50@17 00
Car wheels	16 00@17 00
Cast borings	4 50@ 5 00
Turnings	8 50@ 9 50

LUMBER. — (Retail): Pine, ordinary sizes, $24.00@25.00; extra sizes higher; redwood, $28.00@30.00; lath, 4 feet, $4.50

@5.00; pickots, $21.00; shingles, $2.50 for No. 1 and $2.25 for No. 2; shakes, $13.50 for split and $15.00 for sawed; rustic, $28.00 @35.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wiro, $3.35; Cut, $3.55; 10d to 16d, Wire, $3.45; Cut, $3.35; 8d Wire, $3.50; Cut, $3.50; 6d and 7d, Wire, $3.60; Cut, $3.60; 4 and 5d, Wire, $3.70; Cut, $3.70; 3d, Wiro, $3.85; Cut, $3.85; 2d, Wiro, $4.10; Cut, $4.10. Special rates for carload lots.

LIME.—Santa Cruz, $1.60 country, $1.75 city ₱ bbl.

CEMENT.—Imported, $2.50@2.75 ₱ bbl.: California carload lots, $2.25 f. o. b. at works; small lots, $2.50 ₱ bbl. in sacks, 4 sacks to bbl.

GENERAL SUPPLIES.

OILS.—Linseed, boiled, bbl., 49c; cs., 54c; raw, bbl., 47c; cs., 52c; Lucol oil boiled, bbl., 44c; cs., 49c; raw, bbl., 42c; cs., 47c. Kerosene—Pearl, per gal., 22c; Astral, 22c; Star, 22c: Extra Star, 26c; Eocene, 25c; Elaino, 28c; Water White, in bulk, 15½c; Mineral Seal, iron bbls., 19c; woodon bbls., 21½c; cs., 25c; Mineral Sperm, cs., 26½c.; Deodorized Stove Gasoline, bulk, 17c; do., cs., 23½c; 86° Gasoline, bulk, 21c; do., cs., 27½c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19½c; Lard Oil, E W. S., bbl., 85c; cs., 90c; Neats-foot Oil, pure, bbl., 75c; cs., 80c; Sperm, crude, 50@60c; Natural White, 70c; Bleached, do., 75c; Whale Oil, cs., 50@55c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per ℔., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2.00 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11c ₱ set; 14 oz., 40s., 10c.

COAL. — San Francisco, coast, yard prices: Wellington, $8.00; Seattle, $6.50; Coos Bay, $5.50; Southfield, $8.00. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8.00; Cumberland, $13.00; Cannel, $8.50; Welsh Anthracite, $13.00; Rock Springs, $8.50, long ton; Colorado Anthracite, $14.00. Coke, $10.50 per ton in bulk, $13.00 in sacks; Sunnyside, $8.50, long ton.

CHEMICALS. — Cyanide of potassium, 98%–99%, jobbing, 23@24c ₱ ℔.; carloads, 23@23½c; in tins, 30c; soda ash, $2.00 ₱ 100 ℔s.; hyposulphite of soda, 3@3½c per ℔.; caustic soda, in drums, 3@3½c ₱ ℔.; Cal. s. soda, bbls., $1.20@1.40 ₱ 100 ℔s.; sks., $1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-℔. tins; roll sulphur, 2½@2¾c; powdered sulphur, 2@3c; flour sulphur, French, 3½@3¾c; alum, $2.00@2.25; California refined, 1¾@2c; sulphide of iron, 8c ₱ ℔.; copper sulphate, 5½@5¾c; chloride of lime, spot, $2.50@2.75; sulphuric acid, in carboys, 66% B, 1¾@2c ₱ ℔.; nitric acid, carboys, 8c ₱ ℔.

BONE ASH.—Extra No. 1, 5@6c ₱ ℔. No. 1, 4@5c.

WHITE LEAD.—Per ℔., in kegs: 500 ℔s. and over at one purchase, per ℔., 6½c; less than 500 ℔s., per ℔., 7c; in 25-℔. tin pails, ½c ₱ ℔. above keg price; in 1 and 5-℔ tin cans, 100 ℔s. per case, ½c. per ℔. above keg price. Dry Lead—In bbls., 1 ton and over, 6½c; do. in kegs, 7c.

RED LEAD.—500 ℔s. and over at one purchase, ₱ ℔., 6½c; less than 500 ℔s., 7c.

LITHARGE.—Pure, in 25-℔. bags, 8@9c ₱ ℔.

BORAX.—Concentrated, 6@7c ₱ ℔; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

MANGANESE.—Pure, ₱ ℔., 60c.

SODIUM.—Metal, ₱ ℔., $1.00.

BISMUTH.—Subnitrate, ₱ ℔., $1.75.

MERCURY.—Bichloride, ₱ ℔., 90c.

MOLYBDENUM.—$2.00 ₱ ℔.

CHROMIUM.—90% and over, ₱ ℔., $1.00.

PHOSPHORUS.—American, ₱ ℔., 75c.

SILVER.—Chloride, ₱ oz., 90c@$1.00; nitrate, 55c.

ALUMINUM.—No. 1., 99%, small lots, 37c ₱ ℔.; 100 ℔s., 35c; 1000 ℔s, 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

URANIUM.—Oxide, ₱ ℔., $3.50.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific Coast inventors:

FOR THE WEEK ENDING NOVEMBER 10, 1903.

743,413.—ORE SEPARATOR—J. W. E. Allen, S. F.
743,673.—BENCH STOP—H. W. Baltz, Wyandotte, Cal.
743,807.—TOOL BOX—J. Begg, Ventura, Cal.
743,681.—SECTIONAL CAM—A. P. J. Bossell, Angels Camp, Cal.
743,817.—DENTAL BRIDGEWORK—F. A. Brewer Sr. & Jr., Watsonville, Cal.
743,821.—BOTTLE WASHER—W. E. Brown, Los Angeles, Cal.
743,690.—SAFETY PIN—Casper & Gerder, Sacramento, Cal.
743,973.—BALING PRESS—Coad & Biddle, Dallas, Or.
743,976.—OIL BURNER—L. E. Coleman, Santa Ana, Cal.
743,666.—ATOMIZER—A. S. Dixon, Los Angeles, Cal.
743,667.—ATOMIZER—A. S. Dixon, Los Angeles, Cal.
743,698.—CULTIVATOR—H. Downer, Grant's Pass, Or.
743,840.—SNATCH BLOCK—F. M. Eby, Cottage Grove, Or.
743,848.—BAG HOLDER—J. W. Fiddes, Tacoma, Wash.
743,979.—HYDRAULIC ELEVATOR—B. Flood, Los Angeles, Cal.
743,705.—PISTON AND PACKING—C. P. Fogh, Wadsworth, Nev.
743,490.—COMPASSES—J. W. Griffith, S. F.
743,981.—LAND MARKER—J. E. Hagen, Santa Monica, Cal.
743,864.—LOCOMOTIVE PILOT—E. R. Halesworth, San Bernardino, Cal.
743,639.—DRILL—L. A. Hardison, Santa Paula, Cal.
743,735.—CAN OPENER—H. B. Landis, Trail, B. C.
743,535.—CULTIVATOR—J. H. Martin, Riverside, Cal.
743,905.—ROOFING TILE—A. H. Memmler, Los Angeles, Cal.
743,742.—FISH CUTTING MACHINE—W. Munn, S. F.
743,916.—AIR BRAKE—H. F. Ong, Wendling, Or.
743,751.—DREDGER—R. A. Perry, Oakland, Cal.
743,752.—SEPARATOR—W. G. Read, Davisville, Cal.
743,940.—OIL BURNER—H. L. Sherwood, Oakland, Cal.
743,769.—HEATER—Tabrett & Lewin, S. F.
743,744.—WINDLASS—J. O. Toole, Butler, Nev.
743,777.—OIL BURNER—Tucker & Grundell, S. F.
743,596.—MECHANICAL MOVEMENT—L. R. Tulloch, Angels Camp, Cal.
743,783.—RAIL JOINT—R. J. Weken, Everett, Wash.
743,965.—SNATCH BLOCK—D. E. Welsh, Cottage Grove, Or.
743,787.—VALVE—G. G. Wickson, S. F.
743,609.—PAPER HOLDER—C. O. Young, Rialto, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

SECTIONAL CAMS FOR ORE STAMPS.—No. 743,681. Nov. 10, 1903. A. P. J. Bossell, Angels Camp, Cal. This invention relates to improvements in cams for lifting stamps in quartz and like mills. Its object is to provide a cam which can be quickly put on and taken off of a shaft without disturbing the other cams on the shaft or without the necessity of dismantling nearly the entire battery, as is so often the case in mills where the ordinary solid one-piece cams are used; also to provide a simple means of securely locking the cam on the shaft without weakening any of the parts.

SEPARATORS.—No, 743,752. Nov. 10, 1903. W. G. Read, Davisville, Cal. The object of this invention is to separate valuable and worthless products and to produce such separation without the use of screens or an air blast. It may be used to separate nuts or the pits of nuts from the shells or debris which may be mixed therewith, grain and chaff, mining products, and any material which may be separated in a similar manner. It consists of surfaces inclined and grooved in the direction of the length and made convex or declining from an apex to the edges transversely of the length, means for feeding the material to be separated upon the central line of grooves, means for imparting a shaking motion to a plurality of these surfaces over which the material is designed to pass, and means for conveying away the separated products.

DREDGER.—No. 743,751. Nov. 10, 1903. R. A. Perry, Oakland, Cal. This invention relates to an apparatus for dredging material from beneath the water or under conditions in which material can be elevated and transported. It consists in a means for advancing and fixing the apparatus at intervals so that the excavating device can be made to work over a certain stated space, and a mechanism for raising the advancing spud and transferring it from the rear to the front of the channel in which it operates. In conjunction with this an independent working spud may be employed about which the dredge is turnable while at work.

CAN OPENER.—No. 743,735. Nov. 10, 1903. H. B. Landis, Trail, Canada. This invention consists of a bracket or standard with means for permanently attaching to a table, a plate connected therewith having holding pins adapted to enter the top of a can, a ratchet bar slidable through guides in the upper part of the standard having a point adapted to enter the can centrally between the holding pins, a pawl adapted to engage the teeth in the ratchet bar to hold it and the plate in the proper relation with the cans of different heights and a handle bar swiveled to turn about the lower part of the ratchet bar, said handle bar carrying a knife adjustable upon it, so as to cut out the section of the top of the can by turning the handle around its fixed center.

PISTON ROD PACKING.—No. 743,705. Nov. 10, 1903. C. P. Fogh, Wadsworth, Nev. This invention relates to an improved metallic packing for piston rods and the like. Its object is to provide a simple, durable self-adjusting packing by which a tight joint can always be maintained. The special feature is that of the ball joint at each end of the packing ring; two inclosing cups with conical inner bearing surfaces corresponding to the tapers of the ring exerting a pressure on the packing more nearly at right angles to the axis of the piston rod to hold the packing tighter to the rod, and moreover the ring always has a full bearing on the rod.

SAFETY PIN.—No. 743,690. Nov. 10, 1903. J. W. Casper and Wm. Gerder, Sacramento, Cal. This invention relates to an attachment for safety pins which enables the user to easily disengage the pin from the inclosing tip into which it is forced by the elasticity of the parts. It consists in forming the enclosing tip into which the point of the safety pin is forced by elasticity with an open slot in the part against which the pin normally rests and in conjunction therewith of a hinged or pivoted plate, which is normally interposed to prevent the pin from passing out from said slot. By withdrawing the plate a little the slot is left open and the point of the pin will be forced through it and released.

SITUATIONS WANTED.

A COMPETENT MILLMAN OF 10 YEARS' EXperience would like to take charge of a mill in any part of the country, understanding cyaniding thoroughly. Wife would like to take charge of boarding house at same place. Address W. G., care of Mining and Scientific Press.

A YOUNG MAN, 5½ YEARS WITH PRESENT company, 3 years in charge of mill and placer works, graduate assayer, good millman, wants change of location where his ability to do things and performing them will lead to advancement. Can handle men successfully. Can leave in 30 or 60 days. Address "Mine Manager," this office.

AN ASSAYER AND CHEMIST WITH TWELVE years' experience in mining, milling, smelting and cyanide work desires a position. Best of references. Address Box 379, Ceutral City, Colo.

EXPERIENCED MILLMAN WISHES POSItion. Address Box 202, Enterprise, Cal.

MECHANICAL ENGINEER, TECHNICAL graduate, desires responsible position with gold dredging company. Ten years' experience as manager, constructing and consulting engineer gold dredges. Special experience saving fine gold. Can design and build complete plants. Will take position opening new ground or with going company. Address "Dredging," care of Mining and Scientific Press.

MINING ENGINEER AND METALLURGIST, with sixteen years of practical experience as superintendent, manager and consulting engineer of mines and mills, desires position on or after Janunry 1st. Speaks Spanish fluently. Address P. O. Box 77, Durango, Mex.

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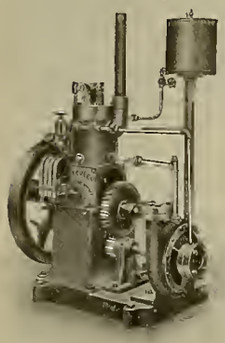
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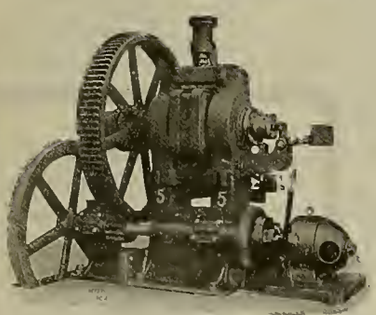
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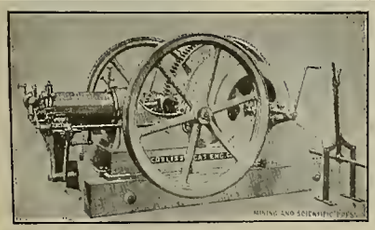
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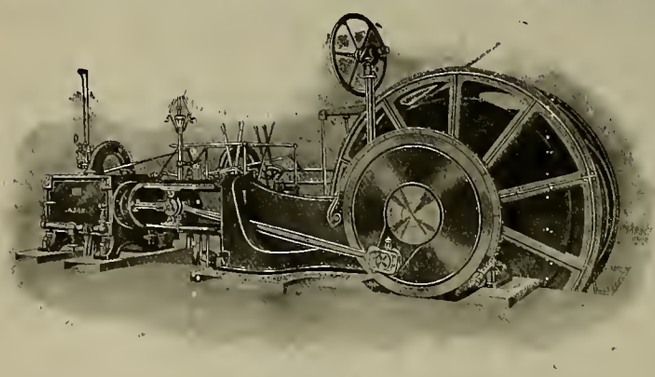
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The Mines of Santa Eulalia, Mexico.

The Santa Eulalia lead-silver mines are in the mining district of that name 17 miles southeast of Chihuahua. They were discovered in 1703, and have for many years been a great producer of lead and silver. It is said that during eighty-six years succeeding its discovery royalties were paid the crown on an output aggregating $112,000,000. The mines were worked by the primitive native methods until within the past twenty years. All the machinery in the district has been introduced within this time. The yearly tonnage is stated to exceed that of former times. It is connected with the main line of railroad by a narrow gauge road. The reduction works to which most of the ore is taken is situated about 3 miles from Chihuahua. The principal mines are operated by Americans. The country rock is largely limestone with dacite (a quartz bearing andesite). Underlying these is granite. The ores are principally carbonate of lead with galena at the center of the larger masses. Rich pockets of silver chloride, and occasionally embolite (chloro-bromide of silver), with some silver sulphide are found. The ore occurs as shoots and irregular masses in lunestone. The Santo Domingo mine (see illustration) is the most noted property in the district. The ore in this mine occurs as a replacement of limestone by the metasomatic process common in this kind of ore deposit. The limits of the ore deposits are not always sharply defined, sometimes passing by insensible degrees into non-metalliferous limestone.



Mines of Santa Eulalia, Chihuahua, Mexico.



Street Scene, Guaymas, Mexico.



Water Plant of the Ybarra Mines, Lower California.



Mill at Otilia Mine, Ybarra Mines, Lower California.

(See page 351.)



Mexican Boys Sorting Ore, Ybarra Mines, Lower California.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market Street, San Francisco, Cal.
Telephone, Davis 771.

ANNUAL SUBSCRIPTION.

United States, Mexico and Canada.....$3 00
All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

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J. F. HALLORAN.....Publisher

SAN FRANCISCO, NOVEMBER 28, 1903.

TABLE OF CONTENTS.

ILLUSTRATIONS: Page.

Mines of Santa Eulalia, Chihuahua, Mexico.....348
Street Scene, Guaymas, Mexico.....348
Water Plant of the Ybarra Mines, Lower California.....348
Mill at Otilia Mine, Ybarra Mines, Lower California.....348
Mexican Boys Sorting Ore, Ybarra Mines, Lower California.....348
Open Cut San Francisco Mine, Ybarra Mines, Lower California.351
Vertical Shaft Otilia Mine, Ybarra Mines, Lower California....351
Bore Hole Central Boulder Mine, Western Australia.....353
Bore Hole Associated Northern Mine, Western Australia.....354
Arrangement of Sampling Works.....356
Mining and Metallurgical Patents.....357

EDITORIAL:

The Mines of Santa Eulalia, Mexico.....348
To Establish Mining Experiment Stations.....349
The Western Federation of Miners.....349
Temporary Injunction Against Arizona Miners.....349
Troops at Castle Gate Coal Mines, Utah.....349
Improvement of Oil and Gas Engines.....349
Increase in Leasing.....349
Copper Mines of Lake Superior.....349
Steel in Construction Work.....349
Asiatic Labor for the Rand.....349

MINING SUMMARY.....358-359-360-361-362

LATEST MARKET REPORTS.....363

MISCELLANEOUS:

Concentrates.....350
The Ybarra Mines, Lower California.....351
Recovery of Tin From Tin Scrap.....351
Tin in Alaska.....351
Chlorine Smelting.....352
An Important Uplift Under the Great Plains.....352
Measurement of High Temperature.....352
Survey of Diamond Drill Bores.....353
Distribution of the Publications of the U. S. Geological Survey.354
Cyaniding Low Grade Slimes.....354
Method of Estimating Gold in Working Cyanide Solutions.....355
California Gold Product.....356
Sampling Custom Ores.....356
Mining and Metallurgical Patents.....357
Personal.....322
Commercial Paragraphs.....363
Obituary.....363
Catalogues Received.....363
New Patents.....363
Notices of Recent Patents.....363

THE American Mining Congress, the last session of which was held during September in the Black Hills of South Dakota, has caused to be introdueed in Congress a bill to establish mining experiment stations in each of the mining States and Territories of the United States, for the purpose of aiding in the development of the mineral industry, the bureau to be under the direetion of the Secretary of the Treasury. The bill provides for the appointment at each station of a geologist at a salary of $3000 per annum, and a chemist at $2000 per annum, and the sum of $5000 to be appropriated for the equipment of each station. It further provides that it shall be the duty of such geologist and ehemist to receive for assay or analysis all rock, cement, clay or other miueral-bearing substanee that may be brought to them by any citizen of the United States, and make a proper classification or assay of eaeh sample for the purpose of ascertaining the exact amount of gold, silver, cinnabar, etc., which eaeh sample eontains, and to furnish to each depositor of such sample, at nomiual charge, a full assay or analysis of samples, ete. While the idea of experiment stations is one worthy of eonsideration and may prove of decided benefit to the mining industry, thc plan outlined in the bill is clearly an invasion of the field now oecupied by the numerous assayers and ehemists throughout the eountry, and would result in driving some of them ont of their profession. A busiuess of the charaeter indieated in the bill would quiekly require the serviees of uumerous assayers under the nominal charge arrangement, for samples for assay and analysis would arirve by the thousands, and the geologist and ehemist would soon find themselves unable to meet the demand. The idea of solely qualitative analysis by State or government institutions has no objectionable features, but has much to recommend it, and if conduеted along those lines might aeeomplish much good for the mining industry.

Asiatic Labor for the Rand.

The report of the commissioner appointed by the Chamber of Mines of Johannesburg, South Afriea, to investigate the conditions under which Chinese labor might be employed on the Rand; the possibility of obtaining such labor and its adaptability as supplemeutary to Kaffir labor now employed there, has been made by H. R. Skinner, commissioner. In his report Mr. Skinner reviews the introduction of Chinese labor iuto the United States and the eauses whieh led to legislative action to limit Chinese immigration and ultimately to their exclusion. He states that when the Chinese first eame to America they were welcomed, as at that time there was a scareity of labor, and that they were found really useful in performing a great deal of work for whieh a sufficient number of American or other white laborers were unobtainable. But the Chinese eame in such numbers and entered so vigorously into competition with white labor that they beeame obnoxious and legislation to preveut their further immigration resulted. The commissioner reports essentially the same condition for Canada. He proposes a set of eouditions, suggested by experience of Amerieans, under which Chinese might be safely admitted to the Transvaal, as follows: "Term of serviee; elass of work he will be permitted to engage in; hours of labor; that he can under no circumstances or in any form engage in trade; that he cannot own land or vested property; compulsory return to China upon the expiration of his term of service, unless he eleets to apply for a renewal of his indenture."

The commissioner states that it is due to the nouability of the United States to enforce conditions of such a uature that lead to the opposition to Chiuese in Ameriea. The prineipal eounts agaiust the Chinese both in the United States and Canada are stated to be non-assimilation of the Chiuese to Western ideas and customs, the hoarding spirit of the Chinese; their preferenee to trade with their own people, and the successful eompetition of Chinese with white labor, due to the fact that Chinese are willing to work longer hours than white men, and the low standard of living among the Chinese, whieh permits them to live in comfort at a very low cost.

The eommissioner's report contaius much other interesting data, as the result of his inquiring into labor conditions as related to Chiuese on the Paeific eoast.

For several years past labor has been scaree on the Rand, the mines being unable to secure a full complement since before the Boer war. In their extremity they have looked to India and China and the interior of Africa, and even a species of enforced employment, akin to slavery, has been suggested, but the latter was rejected as impossible. India was found unable or unwilling to furnish the large number of men desired, and China has already earned a reputation for sending out a elass of labor which had ultimately beeome objeetionable. In view of this fact, the eommission was appointed which investigated with the above result.

If Chinese are ever employed on the Rand under the terms suggested by Mr. Skinner, it is difficult to see how they eau ever become a menace to South Africa commercially, socially or otherwise, for the Chinese beeomes merely a laborer without opportunity to exercise any personal preference, or being in any manner able to change his condition. His numbers may be limited. The length of his stay is predetermined. His occupation is fixed. He has no rights and no privileges, except to return to his native land at the termination of his term of service. In fact, he beeomes a mere machine, or is placed on the same plane as an animal. In South Africa these eonditions are possible to impose, but not so in Ameriea, where human beings are reeognized as sueh. If Chinese ean be iuduced to accept these terms and at the same time the rate of wages which will be offered, it may bc expeeted that any deficiency of labor in the mines of the Rand will be supplied by the Chinese empire.

THE dastardly assassination of the superintendent and foreman of the Vindieator mine at Independenee, Colo., on the 21st instant, is one of the most diabolical of sueh numerous crimes. That there is even a very small pereentage of union miners who would counteuance such a fiendish plot to avenge any real or fancied wrongs no fair minded person is willing to believe, but the commission of sueh crimes as the destruetion of the Bunker Hill & Sullivan mill at Wardner, Idaho, four years ago, and the assassination at that time of several men who were objectionable to the union; the cowardly murder of Manager Collins last winter, at the Smuggler Union mine near Telluride, Colo., and now this latest atrocity merit universal eondemnation. This is the latest of a list of crimes only somewhat less in degree that have been committed by men of this stamp, and those who elaim to control the miners' union should heartily try to make it impossible for such things to oecur. The name of the Western Federation of Miners is fast becoming a synonym for brutal assassination. Its watchword appears to be "Rule or Ruin." Two horrible crimes and a large number of lesser ones have already blackened the name of the State of Colorado, and it is time that the people of that commonwealth put an end to an organization capable of planning and executing such damnable murders as that at Independenee.

ONE of the notable features of the increasing output of the Cripple Creek, Colo., district is the leasing system. This method of working the mines of that district has always been prominent in the operation of that camp ; but it is stated that it is expeeted that a larger number of men will be employed under this system during the next few months than ever before. It is recognized as a most economical method of operating a mine. The leasers are not always individuals, but usually eousist of a number of men legally assoeiated as a eompany or eorporation, formed for this specific purpose. There are still large bloeks of undeveloped ground iu the district, mostly owned by the larger companies, aud on these blocks a great number of men will find employment. The leases arc based on a fair and equable basis, aud many leasers have made a fortune in this way.

THE improvement of oil and gas engines has done much to advance the development of the mining industry in the desert regions of the great Southwest. Many veins in these arid seetions have a high grade of ore, but these ores are not always easily treated. Electricity has not, as yet, been extensively applied in that part of the eountry, probably for the reason that the mines are seattered over a large area, often many miles apart, and although electricity is applicable to the operation of these mines, it is, generally speaking, impracticable at present from a commercial standpoint.

THE copper mines of Lake Superior are shipping out every available pound of copper from their storehouses in order to take advantage of the lower freight rates obtaining by the Great Lakes during the open season When the shores are frozen on the approaeh of winter the eopper output must be shipped by the all-rail route, at greater expense, hence the present activity in shipping out all metal on hand before the coming of winter.

EACH year sees steel entering more widely into mine construction work. A few years ago a steel head frame was looked upon by many as an experiment which might possess some unknown element of uncertainty and danger. The successful eonstruction and continued use of steel head frames, as well as of buildings, has made them not only popular, bnt their superiority is recognized.

DURING the summer Judge Sloan of Yavapai county, Arizona, issued a temporary injunction against the loeal members of the Western Federation of Miners, restraining them from interfering with the operation of the mines owned or eontrolled by the Mine Operators' Association of Yavapai county. This injunction on appeal has now been made permanent.

GOVERNOR WELLS of Utah has found it necessary to send troops to Castle Gate coal mines, where the striking coal miners have been using threats and intimidating miners who wished to eontinue work. These men had no particular grievanee, but struck out of sympathy with the Colorado miners who are on strike.

CONCENTRATES.

THE deepest oil well in California is reported to be 2846 feet in depth, the next deepest being 2810 feet.

✤✤✤✤

THE cam, in form similar to that in use in the stamp mill, was employed as early as 1550 to operate a multiple bellows in the manufacture of iron.

✤✤✤✤

BY geomorphology is meant the genitic study or tracing of the origin of the topographic forms of any age or region, through the combined processes of degradation, or erosion, and deposition.

✤✤✤✤

THE first silver sent from Mexico to Spain after the conquest of Cortez is reported to have been taken from the mines of Tasco, in the State of Guerrero, in 1552, in which year the ore deposits were discovered by the Spaniards.

✤✤✤✤

THE mineral powder from Delta, Colorado, is evidently the result of precipitation of iron from water containing it in solution, by sulphuretted hydrogen, and the oily appearance of the water is probably due to the sulphuretted hydrogen.

✤✤✤✤

THE relation of horse power to the number of revolutions of an engine, as adopted by the British Admiralty, ranges from 350 H. P., at 125 revolutions, through a greater power with a lesser number of revolutions, to 6000 H. P. at sixty-five revolutions.

✤✤✤✤

AT Lundy, in Mono county, Cal., the Crystal Lake M. Co. have the suggested method of plowing up a bed of tailings that are being cyanided. A quantity of hay is scattered over the tailings dump and a drove of forty hogs are turned loose to root for a living, which they do, loosening the compact sands and permitting them to dry.

✤✤✤✤

IN crosscutting through hard rock, where zones of soft, seamy rock are encountered, it is cheaper to timber this part of the crosscut at once, for later the soft ground is almost certain to cave unless supported. In the endeavor to economize, this precaution is sometimes neglected and a cave occurs, which increases the expense of timbering.

✤✤✤✤

THE workings of dry mines may be filled with dry tailings with safety, but such an expedient in a wet mine might prove both expensive and disastrous, as if any opportunity occurred the tailings would run like quicksands and give no end of trouble. At the Morenci and Shannon mines, near Clifton, Arizona, tailings are being dumped into the mines to fill old stopes.

✤✤✤✤

THERE are few mines where crosscutting is not advisable, if not necessary. Experience has taught that failure to crosscut has frequently resulted in a mine superintendent leaving the discovery of a rich shoot of ore to his successor, who did crosscut systematically. Occasionally a cave in mine workings will expose ore, the existence of which was unsuspected, but which would have been found by crosscutting.

✤✤✤✤

ANY desired design may be etched on polished steel by covering the metal with a coating of wax, first warming the steel. When cold, sketch in the wax the design or inscription, allowing the point of the instrument to penetrate entirely through the sheet of wax to the metal surface beneath. Then apply nitric acid and allow it to remain in contact with the steel for a short time, then wash the acid out with warm water and remove the wax with a cloth, and the design will be found etched on the surface of the metal.

✤✤✤✤

THERE is an established ratio between the size of wire rope and the sheaves over which it passes. A ½-inch rope should not be run on a sheave or drum less than 4 feet diameter; a ¾-inch rope should not be run on a smaller sheave than 5½ feet diameter; an inch rope on a 7-foot diameter sheave, and a rope 1½ inch diameter should not be run over a sheave or drum having less than 12 feet diameter. Winding ropes over sheaves or drums of smaller diameter than that suited to them, results in breaking of the wires and the unstranding of the rope, which makes renewal of the rope more frequent than would otherwise be necessary.

✤✤✤✤

THE peripheral speed of wheels of varying size keyed to the same shaft, if revolved, is proportional to their several diameters. If a straight track has three rails, the center one being 4 inches higher than the outside rails, and the outside wheels are 2 feet in diameter, the center wheel being 16 inches in diameter, with each rotation the 24-inch wheels will move forward 75.3984+ inches, and the peripheral movement of the 16-inch wheel during the same revolution is 50.2656+ inches; so that with each revolution of the axle the central wheel will be dragged forward 25.1328+ inches. Raising the central rail above the outer rails will make no difference.

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AUGITE is aluminous pyroxene. It frequently is found altered in part, or completely, to the variety of hornblende known as uralite. Augite is greenish to brownish black, to black. The uralite resulting from its alteration is grass green and usually fibrous. It is commonly observed in many igneous basic rocks such as diabase. The uralite by further alteration passes over to chlorite. Original hornblende also alters to chlorite. Chlorite schist may be the result of the alteration of either diabase or diorite. Chlorite schist is often siliceous and gold bearing, constituting large masses or zones of pay rock. It graduates into talc schist, argillaceous mica schist and slaty serpentino.

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SHAFT BOXES to carry a sheave on a vertical post gallows frame may be of the "bracket" type or may be flat. In either case the boxes should be let into the post at least 1 inch by cutting a dap in the faces of the upright timbers holding the shaft. The boxes may be secured with lag screws, or, if preferred, with bolts passing entirely through the posts; the latter is not necessary. The sheave may run freely on the shaft, or the shaft may be made to extend beyond the boxes and give free play, to equalize the direction of pull, if the hoisting reel be near the gallows frame. If the distance from the sheave to the reel be 60 feet the angle made by the rope crossing from one side to the other of the reel is unimportant in small hoisting plants.

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DRY CRUSHING and roasting of telluride ores, prior to cyaniding, is practiced at some of the mines of Western Australia. The telluride ores of the Black Hills are cyanided direct, being crushed wet. Recently at one mill in that State the practice of crushing ore in cyanide solution has been discontinued, for the reason that coarse free gold had appeared in the ore, and copper amalgamating plates have been placed below the batteries, the ore being cyanided after amalgamation. Little success has attended efforts to amalgamate ores where the cyanide solution is used in the battery, as the cyanide renders the plates hard and almost as brittle as glass, and, being rendered non-absorbent, they catch little gold. A little cyanide on the plates is beneficial; too much is worse than none at all.

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WHEN air is compressed in a cylinder in a single operation to 100 pounds pressure a high temperature results, and for this reason the cylinders of air compressors are jacketed and a current of cold water is kept in circulation through the space between the jacket and the cylinder. Sometimes this temperature exceeds 400° F., and under such conditions it is difficult to properly lubricate the interior of the cylinders. The oil fed into the cylinder is blown into the pipe line and eventually reaches the mine through the exhaust of the machine drills. Occasionally the oil, and organic substances taken into the compressor through the intake valves, catch fire from the high heat generated in the cylinder. This is known as "flaming of air compressors." The danger of this is diminished by compressing air in two stages, by compounding in two cylinders. This results in securing high pressure with much lower temperature.

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WULFENITE and vanadinite are rare lead ores, but are occasionally found in Arizona and New Mexico. Wulfenite is lead molybdate, containing molyhdenum trioxide 39.3% and load oxide 60.7%. Calcium sometimes replaces the lead. This mineral is found in square tabular crystals, sometimes massive, and either coarse or fine. Its hardness is 2.75 to 3, but it is very brittle. Color yellow, orange yellow, honey yellow, greenish, grayish white, sometimes bright red, streak white. Vanadinite is a vanadate of lead, and also contains chlorine; vanadium pentoxide 19.4, lead protoxide 78.7; chlorine 2.5, or lead vanadate 90.2 and lead chloride 9.8. Phosphorus is also often present, also sometimes arsenic, both replacing vanadium; in color resembles wulfenite. The attempt is to be made to work some of the Arizona mines containing these minerals to obtain the rare molyhdenum and vanadium contained in them. In former years large quantities of these minerals were sent to the lead smelters together with carbonate lead ores.

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TO DETERMINE the horse power of a steam engine, the following formula is employed: Indicated horse power (I. H. P.) $= \frac{PLan}{33,000}$, in which P means effective pressure in pounds per square inch; L is the length of stroke in feet; a the area of piston in square inches (for accuracy one-half of the sectional area of the piston rod must be subtracted if it pass through one head, or the whole area if it pass through both heads); n equals the number of strokes per minute (two for each revolution of the flywhool). Example: Cylinder 8 inches diameter, stroke 11 inches, working pressure 140 pounds per square inch, 200 revolutions per minute = 400 strokes per minute; 8 inches diameter = area 50.265 square inches; 11-inch stroke × 400 strokes = 366.6 feet; 140 × 50.265 × 366.6 = 78.1 H. P. For two cylinders this is 78.1 × 2 = 156.2 H. P. This is only approximate, no allowance being made for friction, condensation, or other causes of loss of power. There is often considerable difference between theoretical indicated horse power and actual horse power developed by an engine.

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IN drifting in running ground where "breast boards" are necessary, it is generally advisable to work from the top downward. The overhead lagging and those on the side nearest the top, should be driven as far forward as possible, extending beyond the ends of the side lagging and the face of the drift. The top board may then be taken out and a quantity of the loose ground removed, the board replaced and driven forward as far as possible. In succession each board is thus removed and replaced until the bottom is reached, when the operation is repeated, recommencing at the top. In ground not too bad to permit it, this process may be carried on from the bottom upward, the board next the bottom being first removed and enough ground taken out to permit it to be advanced several inches. The ground is then cut out from behind the second board from the bottom without removing it, the board being advanced by driving up the side lagging. In this manner the work proceeds from the bottom upward; but, as previously stated, if the ground be very bad, the work had better be commenced at the top, or a run may occur which would cause much loss of time in catching up.

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IT is impossible to figure the horse power of a boiler, having the superficial area of heating surface only. A boiler horse power was formerly determined by the amount of water evaporated per hour, in units of 34½ pounds, from 212° F. Two boilers of the same size and identical in make may be rated at 100 H. P. each. The one with good fuel and forced draught may develop 200 H. P.; the other, with poor fuel, inexperienced firing, poor draft, etc., may not develop 75 H. P. The American Society of Mechanical Engineers appointed committees in 1885 and 1899 to make tests of steam boiler capacity, and these committees reported as favoring what is known as the centennial standard, viz.: "The commercial horse power of a boiler shall be the evaporation of 30 pounds of water per hour from a feed water temperature of 100° F. into steam at 70 pounds gauge pressure, which shall be considered equivalent to 34½ units of evaporation. In order to derive the greatest amount of power from a boiler of any size, all the conditions under which it must operate should be at their best. This includes quality of fuel, arrangements for draught, proper firing, heated feed water, large relative heating surface. The heating surface per horse power is usually placed at 11.5 square feet, the grate surface per horse power at ⅓ square feet, ratio of heating to grate surface 34.5. The heating surface should be such that there should be at least 1 square foot for every 3 pounds of water to be evaporated at 212° F. per hour, and still more liberal allowance should be made if its efficiency is reduced in any way, as through incrustation, or by accumulation of soot, or through a tendency of the heated gases to select passages of least resistance and to blow through them at such high velocity that a great amount of its effect is lost. If the surfaces are clean and the heated gases pass over them uniformly, there is little to be gained by increasing the heating surface beyond 1 square foot to each 3 pounds of water evaporated per hour.

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POCKETS of gold occur under a great variety of conditions in mines. Often they are found in large and well-defined veins, frequently they occur in the walls of such veins, and again in seams. In nearly every instance where pockets of gold have been found, careful investigation has shown that the pockets occur in a vein or seam at a point where at least one other vein or seam, and often two others, intersect the main vein or seam. Cases have been noted where pockets occur along a line of fault which had dislocated a gold-bearing vein. In some pocket mines the bunches of gold occur with noticeable regularity within a well-defined zone or area along the fissure carrying them, forming what may be termed a shoot, beyond the limits of which pockets are not found. When a mine of this character has been extensively developed, a working map, showing the various cuttings with the stopes where pockets were found, has the same appearance as the stope map of a mine where the gold is evenly distributed and no pockets occur. Pockets of gold are also found in dikes or zones of slaty or schistose rocks, within well-defined walls. In such cases there is usually a series of transverse fissures, crossing from wall to wall—in the dikes due possibly to shrinkage, and in the slates to stretching of the rock. In these transverse fissures, which usually lie in a plane approaching the horizontal, is found crystallized quartz, calcite, iron sulphide and other minerals, with pockets of gold distributed along these "floors" of quartz. Usually in such fissures the gold is found near one of the walls. Where the zone is slate or schist, it is often found that there are seams or veins of quartz running with the slates or schists and approximately coinciding with them in strike and dip. Across this zone, cutting both slates or schists and the veins paralleling them, are a second series of flat, or nearly flat, seams usually containing quartz, and at the intersections of these pockets form, either along the line of intersection or "bunched" at the point of a crossing of a third seam, called the "gold seam." These gold seams usually contain a pulverulent, earthy mineral, which consists largely of black oxide of manganese and iron oxide. Quartz in veinlets and granules is also present. Miners follow the seam persistently in the expectation of cutting veins and crossings where gold may be expected to occur, and are not often disappointed when in a pocket region. The slates and schists in pocket mines are usually heavily impregnated with pyrite. In some mines arsenical pyrite is a good sign of the proximity of a pocket of gold, though far from an infallible index. In other mines, where a dike accompanies the pocket-bearing seams or veins, the appearance of light green scales of iron silicate with the softening of the dike rock is considered a good sign, as this condition is frequently observed when pockets are found in mines of this description.

The Ybarra Mines of Lower California.*

Written for the MINING AND SCIENTIFIC PRESS.

Lower California has been attributed to a southern contiuuation of the Sierra Nevada uplift; and the Gulf of California is likened to the Great Basin.† That the peninsula about the 28th parallel differs in structure from the coast is evident. About Guaymas, on the Mexican mainland, are evidences of much local volcanic action. On one island in the harbor, shalcs and conglomerates are cut up by dykes and mixed with lava flows, at the entrance to the harbor, cliffs 500 feet high are composed entirely of light-colored lava beds, showing flow lines that bend sharply up and down, and twist about remarkably; amygdaloidal in structure, full of gas holes from the smallest pumice to the large caves that form the refuge of flocks of birds; while north of the harbor, along the Sonora coast, faults aud non-conformities occur at short intervals. About Guaymas the evidences are for much local disturbance.

Directly opposite, however, along the coast of the peninsula, from Santa Rosalia northward, the structure appears massive and extensive. The hills in the rear appear as large bodies of igneous rock, in places coarse grained, granitic, showing few structural lines. From the gulf shore, to one-third the way up the hillsides there are long shelf-like beds of lava that can be traced for at least 100 miles along the coast, distinctly contrasted with the hills at whose feet they lie. These beds dip toward the gulf; and in the canyous it can be seen that the surface of the shore takes its form from the position of these occurring on the Mexican mainland, help to show that the peninsula and mainland are of separate origin.* The predominance of these tombstone-like forms, the silence and absence of animal life, the broken up surface, the hot shadeless sun, result in an impression on the observer far different from the deep shaded magnificence of the Sierras.

Economically, the dryness of the climate is likewise the most important feature. On the side of its benefits are deposits of salts of industrial value that depend on dryuess for their origin. There are large beds of pure salt (Na Cl) at San Domingo, on the Pacific coast; of gypsum near San Francisquito bay, on the Gulf coast; and of kaolin, for porcelain, farther south; none of which, however, have been worked. On the side of disadvantages, are the great cost of getting water for operations, and the nearly related cost of transporting supplies. At the Boleo copper mine, at Santa Rosalia, the water has to be piped 20 miles. At the Ybarra gold mine, at Calmalli, the supply is from a single well, which supplies a 20-stamp mill, and all the camp, and also Campo Alemano, 10 miles south, where it is brought on burros and sold for 25 cents (Mexican) a keg of about twenty gallons.

Mining at the Ybarra gold mine has been carried on intermittently since 1891, with a force of about 150 Mexicans. The headquarters are at the town of Calmalli (owned by the company), in about the middle of the peninsula, where the company receives its supplies from San Domingo, on the Pacific coast.

The ore deposit resembles those of the Mother Lode of California. The quartz occurs in a talc schist, in a zone of crushing parallel with the cleavage. This zone averages 4 feet wide, reaching occasionally 7 or 8. The quartz lies in it mixed with thin layers of the schist, sometimes showing a foot, or several feet, of clear quartz; at other places, perhaps close by, changing to ribbou rock. This mixture of quartz and schist runs $12 a ton; but the cost of working up to the present has made that a low-grade ore. The work has been carried on chiefly by taking out frequent kidneys running $30 to $50, which have supplied a 20-stamp mill. The chief mine (the Otilia) is dowu 600 feet.

A feature that was to be expected from the extensive weathering is a considerable surface enrichment. In a stretch of several miles, where the vein crops on the surface, "Gambozinos" have dug it out, finding it pay in panning. Frequent shallow trenches and ditches thus remain to show the rush to the camp in the early days.



Open Cut San Francisco Mine, Ybarra Mines, Lower California.



Vertical Shaft Otilia Mine, Ybarra Mines, Lower California.

beds, aud not from erosion. The beds weather back iu successive layers parallel with the shore, looking at first sight like river terraces, probably similar to the "recession of cliffs" described by Powell, in the region of the Colorado canyon.‡ The general appearance is strougly for coutinuity of structure north aud south in the line of the peninsula.

The surface appearance, or topography, across the peninsula at the 28th parallel, however, despite auy similarity of geological structure, does uot at all resemble the Sierras. Two things govern the topography of Lower Californuia and make it different from that to the north, namely, the lowuess of the uplift, and, more important, the dryness of the climate. The former results in one hill after another, with rounded top, all at about the same height, seldom over 5000 feet, in monotonous frequency. The latter results in making it a desert.

The traveler, crossing the peuinsula from San Francisquito bay west to Calmalli, finds at the start a road cleared through the cactus years ago by Spanish missionaries. He takes with him all the water he will use, aud buries several kegs in advance for his burros. The cleared road does not go far, however, and the most of the trail runs through the loose, hot sand of arroyos. These arroyos, beside the loose sand, are filled with huge boulders, that make poor footiug for the animals, and render the trail indistinct. On all sides, weatbered rock appears in place on a great scale, whole hillsides of mere boulders similar to those that have already falleu into the arroyos. Weathering has goue on at an exteusive rate, while, owing to the scarcity of water, erosion has not followed to remove the disintegrated matter, which remains mostly in place. Cacti find a hold here and there among the rocks, helping by their roots to break them up.

In the wider of these dry valleys, where there is more room, cacti thickly cover the sandy floor, and the trail winds iu and out among them, much as in the sagebrush of Nevada. Some of these cacti (notably the Cedreos) are of strange appearance, and, not

*See illustrations on front page.
†Vol. 5, Bull. Geol. Soc'y Am., page 489.
‡Report U. S. Geol. Survey, 1874.

Recovery of Tin From Tin Scrap.

Interesting details relative to the recovery of tin from tin-scrap was recently published in the "Zeitschrift fur Elektrochemie." In Germany, several works have been built and operated for carrying out this procedure, the largest beiug that of Goldschmidt, at Essen, where 50 to 60 tons of tin scrap are reported to be treated per day. The difficulty of obtaining an adequate supply of raw material has hiudered the dcvelopmeut of other works. The processes used for recovering the tin are based upon the use of the scrap as anode material, in a bath containing sodium chorlide and hydrate, or in one containing hydrochloric acid. The advantage of the former is that less iron goes into solution, but against this there is the lower efficiency of the process and the more spongy nature of the deposit obtained at the cathode. The failure to produce directly metallic tin is one of the chief difficulties in the operatiou of both processes, for considerable losses occur in smelting and refining the spongy deposit obtained at the cathode. Under certain conditions metallic tin can be obtained in the electrolytic bath. aud Pfanhauser has stated his opinion that the avoidance of formation of sponge is simply a question of maintaining the concentration of the tin salt solution in the neighborhood of the cathode. This condition would appear to be difficult to attain in the works treating tin-scrap on an industrial scale, and the problem of producing metallic tin at the cathode is complicated further by the slow but gradual increase of impurities in the electrolyte. A new works for the treatment of tin-scrap has recently been built at Pfaffstatten, uear Vienna, and an electrolytic process for recovering tin from slags is also reported to be in operation at Tostedt, in Germany.

*Proceedings Cal. Acad. Sci., 2nd series, vol. 5, page 733.

Tin in Alaska.

Written for the MINING AND SCIENTIFIC PRESS by ROBT. M. BELL.

There has been much talk of tin in Alaska for the last two or three years, and the reports of Alfred Brooks of the U. S. Geological Survey, who conducted a thorough reconnaissance of Seward peninsula in 1900, and of Arthur Collier, who followed him in the same field in 1901 and 1902, had prepared the country to expect some valuable discoveries of tin in that region. And that expectation, it now seems certain, is not to be disappointed. The discovery has been made, and although the development as yet covers but the work of a single season, enough has been done to demonstrate beyond a reasonable doubt that a very large and valuable deposit of tin stone has been discovered at last in United States territory.

Seward peninsula is a body of land—something over 20,000 square miles in area—which lies between Bering sea and the Arctic ocean, and is washed by Bering strait on the west. The name Seward peninsula is only found on the most recent maps, but its position has become identified in the public mind by the wonderful discoveries of placer gold at Nome four years ago.

Since 1899 placer gold has been found in nearly all the streams of that richly mineralized peninsula, and almost uniformly the placer miners in the west eud of the peniusula have been finding stream tin in greater or less quantities iu their rockers and sluice boxes after shoveling in the gold-bearing gravel. Alfred Brooks was the first to identify the heavy mineral which the miners had been picking out of their riffles and throwing away, as the tin ore, cassiterite ($Sn O_2$), which, when pure, carries 78% of metallic tin. In some streams there was a great deal of this, and as soon as Brooks discovered its real character a special bulletin was issued describing it and warning the miners of the region to be ou the lookout wherever they found placer tin rich in the streams, for ledges of ore in place in the near vicinity. But till this year no ledges were found, though as much as forty tons of placer tiu was collected in a few streams in one vicinity in a single season.

In July, 1903, a party of prospectors set out from the town of Teller on Port Clarence to cross overland to the north side of the peninsula. They followed up Lost river, which empties into Port Clarence, 20 miles west of Teller, and bad gone only 5 miles from the coast when thcy discovered and located a tin ledge, which at present promises to be the most important mineral discovery yet made iu Alaska. The ledge is described as a granitic dike 100 feet wide, cutting through the lower Silurian limestone (called in the Uuited States geological reports of the region the Port Clareuce limestone), which forms the surface of all that section of the peuinsula and attains a thickness of 2000 feet. The ledge has been stripped the whole width and is found to carry good values in tin throughout, while some of it is said to be rich. Tin has been found in North Carolina, South Dakota aud California, but uot yet developed in importan quantities, and the Government reports show that

no commercial tin was produced in this country in 1902.

This discovery promises to change the story soon, lying as it does close to the coast and cheap transportation by boat.

The character of the ore and the extent of the ledge are not uncertain, for they have been investigated by Arthur Collier, who announced the tiu discovery to be bona fide.

Chlorine Smelting.*

Discussion of paper by JAMES SWINBURNE.

In view of manifest interest in the paper of James Swinburne on "Chloriue Smelting With Electrolysis," read before the Faraday Society of London, which was published in full in the MINING AND SCIENTIFIC PRESS in the issues of August 8 and 15, 1903, the following diseussion of the paper by O. J. Steinhart is of equal interest:

PRESENT PROCESSES.—I think Mr. Swiuburne's remarks, classed under the heading of "Present Processes," have a good deal of truth in them, as some of the cumbersome methods, although the outcome of the experience of generations, in some cases still are rather crude. On the other hand, it must not be forgotten that it is not only the carbon which causes the trouble in obtaining pure metals, but also the presence of fractional pereentages of other foreign bodies and metals. Will Mr. Swinburne fare much better by his proposed plan of obtaining the various metals? I think he will find that some of the metals produced will have to undergo further treatment to render them fit for use iu the arts.

CHLORINE PROCESS.—With regard to the remarks made under the head of "Chlorine Processes," I do not quite see how Mr. Swinburne can altogether avoid desilverization of the rich bullion obtained. Anyhow, the lead would have to be cupelled to separate it from the silver, and the resultant litharge either sold as such, or reduced to metallic lead.

I am uot quite clear in what way Mr. Swinburne proposes the substitution. Does he contemplate, for instance, the substitution of lead by zinc from the suspended chlorides in water, or in the fused condition? I assume it to be the latter.

With regard to the elimiuatiou of iron and manganese, this, I think, judging from past experieuce I have had, will be rather a troublesome step in the operation, but by no means insurmountable, provided proper oxidation of these elements is provided for.

While dealing with this part of the process, it may be interesting to recall some recent experiments by Borchers on the subject:

"Zinciferous galena, and also the middlings resulting from the mechauical dressing of such ores, and which cannot be further dealt with by chemical or electro-magnetic methods, are among the products which the author proposes to treat by means of electrolytic chlorine in revolving drums at a temperature of 30–40° C. Chlorides of the metal present are formed, with the elimination of free sulphur. These chlorides are leached systematically by means of water, and after removing the free sulphur from the remaining sludge by fusion with steam under pressure, the residue consists of an easily smelted 40% zincy product, carrying most of the silver. The mixed solution of chlorides of zinc and lead are boiled down and completely dehydrated, and finally submitted to electrolysis without previous separation. The ziuc and lead thus obtained will separate into two layers if kept fused, analogous to the ordinary desilverization by means of ziuc (Parke's process). The electrolysis of the mixed chlorides is particularly advautageous, as ordinary iron vessels can be employed, which cannot be done in the case of $ZnCl_2$ only. The following are products obtained: Sulphur, chlorination residue of argentiferous ziuc blende, silver, lead and zinc."

You see that he confirms Messrs. Swinburne and Ashcroft in their reaction. The reaction seems to go equally as well in the "dry" as in the "wet."

I have myself, in conjunction with Mr. Vogel and others, for several years made extensive large scale experiments with the view of commercially electrolyzing $ZnCl_2$. I can only confirm, from my own experience, that given an anhydrous $ZnCl_2$ as free as possible from oxygen, there is uo difficulty in producing zinc and chloriue. The yields of chlorine we have, however, obtained in no case exceeded 95%, as compared with the zinc, even with the greatest care, and as the recovery of chlorine, so to speak, forms the stepping stone in Messrs. Swinburne and Ashcroft's process, this item, consisting of a loss of 5% of chlorine, must needs be a very serious item in the cyclic operations contemplated by the inventors. However, no doubt Messrs. Swinburne and Ashcroft have carefully gone into this matter and satisfied themselves on this point.

SMELTING LEAD-ZINC BLUESTONE.—I presume Mr. Swinburne meaus by bluestone the mixed lead-zinc sulphides, although I believe this term is generally applied to a similar class of ore originally found at Anglesea.

COST OF PROCESS, ETC. — As to the cost of the process, I think, on the whole, that Mr. Swinburne's prognostications as to the cost are correct, although some of the various items must, under the circumstances, be more or less guesswork.

For instance, in the estimate given for the 100,000 tons, £15,000 are allowed for loss of metals and chlorine. Now, roughly speaking, 30,000 tons of chlorine will pass to the process, and allowing a loss of about 3%, this would amount to nearly 1000 tons of chlorine. I do not know what it costs Messrs. Swinburne and Ashcroft to produce chlorine, but putting it at £6 to £8 per ton, this aloue would form a considerable item, not to count the absolutely unavoidable losses on, say, £700,000 of metals produced; £15,000 will certainly nothing like cover all this.

I should also like to know, with reference to this point, if Mr. Swinburne has satisfied himself that ores aud slimes can be obtained at the low rates he uentions, as some of us well remember how another promising process came to grief, owing to the want of rich enough ore at a reasonable figure.

With regard to the treatmeut of some of the other metals, such as antimouy, arsenic, nickel, etc., I think Mr. Swinburne has set himself a task which will take years to work out in its various branches.

Taking the paper and processes as a whole, I think great credit is due to the persevering and untiring work of Messrs. Swinburne aud Ashcroft, and it is only right that inventors who have left the beateu track of other metallurgists and chemists, and shown such originality in their new methods, should meet with every success.

R. S. Hutton said he would like to know whether the process could be applied to treat mixed nickel and copper sulphides. Nearly all the Sudbury nickel ores that were treated in America had to be desulphurized, and there was an enormous loss of sulphur. At the same time America imported large quantities of sulphur, much of which was roasted in order to yield sulphurous anhydride, e. g., for sulphuric acid and paper pulp manufacture. The application of such a process as Mr. Swinburne's should effect great economies in these directions. It should be particularly valuable in coujunction with Browne's method of nickel refining, by electrolysis of the chloride solutious, the preseut practice being to couvert the roasted ores into chlorides and thus lose all the sulphur.

Mr. Swinburne, in his reply, informed Dr. Steinhart that on account of there being a slight vacuum maintained throughout the system the loss of chlorine was very small; if there were leakage at any point, the tendency would be for air to leak in, not for chlorine to escape. In any case—and a certain loss of chlorine had always to be provided for—chlorine could be obtained quite cheap by the treatment of calcium chloride with zinc sulphate for example. Dr. Steiuhart's £6 a ton is for free chlorine; we would not buy free chlorine. The loss of metals was likewise practically negligible; the gangue left behind was always perfectly clean. There was indeed no point in the cycle of operations where such losses could occur. As regards the prices of the ores given in the paper these were based on estimates obtained from America, and were well within the right side of the margin. In fact they could be had at very much lower figures. Professor Thomson's suggestious to stop the process half way was, he thought, quite practical, and negotiations with a large alkali works were now being made to give effect to that idea. In reply to Dr. Perkins, the electrodes lasted if the zinc chlorides were perfectly anhydrous. There were two methods of effecting this—Dr. Steinhart's, and having recourse to a preliminary electrolysis with cheap carbons. The latter was the method employed in the present process. Answering Mr. Huttou, Mr. Swinburne said he had no experience with nickel ores, but they would doubtless behave in much the same way as the others. A question had been asked as to the purity of the metallic products; the metals obtained were perfectly pure, and needed no further treatment for refining. As regards the cost of water, which might be an important item in inaccessible districts, this was small. All the salts dealt with in the intermediate stages of the process were easily soluble.

*Trans. Faraday Society.

An Important Uplift Under the Great Plains.

In investigating the geological structure of the central great plains regiou, N. H. Darton of the United States Geological Survey has discovered an uplift, or arch, in the earth's crust, which may have great economic importance. Owing to the thick covering of clays and sands iu the plains, the structure of the underlying rocks is difficult to ascertain, but, from a careful survey of exposures in western Kansas, the Republican valley in Nebraska, and the southwestern corner of South Dakota, and a consideration of much new evidence afforded by well borings iu the last few years, Mr. Darton has demonstrated the existence of a narrow arch of considerable magnitude, extending from the vicinity of Lenora, Kans., through Norton county, across Furnace, Frontier, Lincoln aud other counties in Nebraska to the White river, where this river crosses the Nebraska-South Dakota State line.

This uplift is probably due to a slight shrinkage of the earth's crust, and an extensive series of cretaceous and underlying rocks are involved. As oil and gas are often associated with uplifts of this character, the one above uoted will undoubtedly attract the attention of those who are seeking for these products. Two deep wells, now in progress at Jennings and Kanona, Kans., lie slightly west of the line of uplift, so that they will not fully test its capabilities.

A report now in preparation on the geology of the great plains by Mr. Darton will be issued by the Geological Survey in the course of a few months, and describe more fully the geological structure aud resources in the region.

Measurement of High Temperature.

Demaud for a practical apparatus with which high temperature cau be measured is large, but, till lately, science could uot wholly meet this demand, measuremeut of high temperatures being limited to that degree which served as a standard in testiug, the nearest beiug the radiation of glowing bodies for the determination of their temperature. In February, 1900, a description of a new method for measuring high temperatures was published, based on a law first theoretically deducted and afterwards proven by experimeuts, showing how the same value for the temperatures for the electric arc light could be more easily obtained with the possibility of measuring up to 4000° C. and above.

On this subject H. Wauuer says: "The law established by all these experiments permits for at least a certain group of glowing bodies, measurement up to the highest temperatures. Wheu a compact body is heated, the rays emanating from same may be observed by the human eye; the body's color will chauge with the rising temperature from dark red to light red, to yellow aud to bright white, which colors—orange, yellow, etc.—are addcd until the rays meaus that at first mainly red rays are observed to which at the higher temperature the other spectrum appear white. In analyzing the rays by a prism it is found that with the rise of temperature some single color, for instance, red, suffers a rise iu the intensity which can be measured progressively with a specially constructed photometer. By knowing the law which combines mathematically the acting factors, the temperature, the proper light intensity of a single color, and its wave length make it possible to measure unlimited high temperatures by the photometric measurement of the light intensity of a certain color. * * * The entire procedure is so simple that it can be readily learned by any foreman or intelligent workman within a short time. The whole apparatus is 30 c. m. long (12 inches), built like a telescope, and can be easily handled without a support. It does not matter how great the distance is from which the measuremeuts are taken, if only the field of vision is properly illuminated by the light emanating from the body to be examined.

"The sources of errors with this new method rest solely with the exactness of the measurement, and by the quality of radiation as compared with the theoretically (so-called) 'black body.' As far as the first cause of error is concerned it can be ueglected, for various parties who have been asked to take measurements using this apparatus for the first time have obtained correspondiug correct results. The nearest to the theoretical black bodies are the insides of closed furnaces, as muffle furnaces, etc., the glow of which are observed through small openings, which, however, must not be covered by glass or mica during the measurement. The measured temperature is equal to within a few degrees of the real one.

"By actual experiments I obtaiued for blast furnace slag 1321° C., for outpouring irou 1384° C., for slag pouring from the converter 1700° C. The temperature of the converter gases seemed to remain below 1500° C. However, the radiation of the flame causes a rise of temperature as decarburation, etc., progresses; the falling of the temperature during scrap addition cau be measured progressively, while the absolute temperatures could not be obtained on account of the constant changeable transparency of the flame. The temperature of flowing steel can only be measured by looking direct upon the same.

"The advantages of this new apparatus, whose sole agents for the United States of America are Eimer & Amend, New York, consist in its reliability, because its indicatious are based on a law of nature determined scientifically correct, and not on an empirical one, accuracy, exceeding handiness (it may be used with or without support), portability, and its quick adjustment (consuming, according to experience, but a few seconds). The instrument may be adjusted at the start to any desired temperature, thus showing exactly when the same is reached. Another special advantage of the apparatus is that it can be trained upon any visible part of the furuace in order to compare the temperature in different places in the furnace. It is invaluable to iron and steel furnace men, in fact, to all, wherever high temperatures are to be measured."

Survey of Diamond Drill Bores.*

Written by W. R. BAWDEN.

The theory, so long stoutly defended, that it was impossible for a diamond drill to bore in auy other direction than a straight line, has long since been disproved, the clinostats invented by E. F. MacGeorge having been the most important factor in conclusively showing that serious deviations are possible iu the path of a hole bored by the medium of the diamond drill.

Although Mr. MacGeorge's instrument is well kuown, it is exceedingly difficult to procure and eveu more difficult to make, and after several fruitless efforts to do first the one and theu the other, the urgency of the situatiou rendered it necessary to look about for some other means of attaining the desired eud, viz., the survey of diamoud drill bore some 500 feet long having a supposed dip of 18½° from the horizoutal aud a diameter of $1\frac{3}{8}\frac{4}{4}$ of an inch.

It is uot necessary to detail the initial difficulties and somewhat heavy expenses entailed in designing a survey iustrumeut suitable for working in so confined a space as a diamoud drill bore, but suffice it to say that in no instance was it easy and in some cases impossible (without protracted delay for importation) to secnre suitable material as regards quality and dimeusions.

The difficulty iu procuring good workmauship in glass blowing aud also of securing true cyliuders of glass 6 inches loug by 1¼ inch in diameter is somewhat surprising, as also is the great loss due to breakages in cutting up loug glass tubes into short leugths.

THE CLINOSTAT.—The clinostat with which the hole was eventually surveyed is more suitable for a horizontal hole than a perpendicular one, the degree of efficiency being decreased in proportion as it nears the perpendicular, bnt, by modifying, but still maintaining the main priuciple on which the clinostat is constructed, namely the Gimbal or universal joint motion, the instrumeut could be made as effective for the survey of a perpendicular as a horizontal hole.

The method of use of the clinostat is as follows:

The refraction meter is filled with liquid gelatine and allowed to cool, say at an angle of 15°.

The lines are then viewed through the solidified gelatiue and recorded by the reading instrument with the result that considerable refraction is observed.

When the meter is placed in the reading instrument, aud the graduation viewed through air, each of the degrees in the meter reads correctly with the degrees marked ou the vertical arc of the readiug instrument, but wheu they are viewed throngh the medium of gelatine or other more or less dense substance, the errors due to refraction are immediately apparent aud casily corrected. The difference at zero or horizontal positiou is very slight, but from that point the error increases as the angle of the refractiou meter is increased.

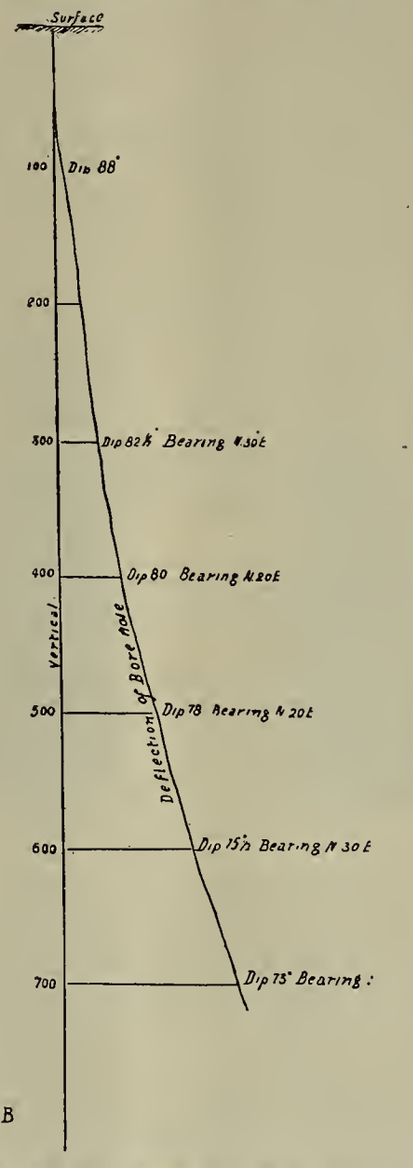
LOCAL DATA.—The diagram gives the course of a hole drilled on the Central Boulder gold mine, and showing the amount of deflectiou in a hole which was intended to be a perpendicular oue. The survey was made by a representative of Bewick, Moreing & Co. I uuderstand the dip and bearing were taken every 100 feet, and, as will be observed from the accompanying sketch, the deflection to the east commences near the surface, and continues irregularly but at an ever increasing rate down to a depth of 700 feet, where an obstruction was encountered rendering further survey impossible without having resort to special and expensive means for clearing the obstruction. The deviation at 700 feet amounted to 92 feet to the eastward.

This is a very serious difference, aud illustrates the uccessity of surveying before driving or sinking toward the point which the diamond drill was supposed to have reached, as it is quite within the rauge of possibilities that a deep hole with such a deflectiou might altogether pass out of the property in which it was started.

Information regarding the deflection of a perpendicular hole is supplied by G. M. Roberts, manager of the Associated Northern Blocks. The method employed in testiug the accuracy of the drilling operations was perhaps unique in itself, as it illustrated a case where, although the diamond drill bore swerved from its origiual course to a serious degree, the surveyor was enabled to tracc its course without the assistance of a diamond drill snrvey apparatus. The drill hole having beeu cut at one spot, a portion of the hole was exposed in order to make it possible to observe the augle of dip and direction by means of a theodolite. This gave data for striking the hole at a second place, where fresh observations had to be taken, as it was proved that the deviatiou continued to rapidly increase.

Thus from point to point the hole was traced and cut, until it had been interscctcd in no less than five places. The deflectiou in this instance was about 50 feet, and when it is considered that this deflection might have occurred toward any point of the compass, the problem that presents itself to a mine manager ou the completiou of a drilling operation is rather a puzzling one.

The results obtaiued from drilling operatious on the Great Boulder mine have, generally speakiug, beeu of a satisfactory nature, and by R. Hamilton I have been shown a number of instances iu which the far end of diamond drill bores, although deflected to a certain exteut, were easily picked up in driving and crosscutting. The majority of the drill holes drilled by the Great Boulder have been comparatively short, or have been more or less horizontal, rendering surveying practically unnecessary. Where it has been possible to prove the correctness of the drill holes by subsequent operations, it has beeu found that they have been fairly correct, but so far the opportunity has not occurred of proving! holes that were more thau 300 feet long, except in oue instance, where a level driven at the bottoun of a 600-foot hole proved a greater amouut of deflection than had hitherto been experieuced, the direction of the deflection (the total amount of which has not yet been ascertained) being opposite to that generally found ou the fields.



Bore Hole Central Boulder Mine, Western Australia.

At the Hannan's Star Gold Mines, Ltd., the difficulty in picking up the extremity of the diamoud drill hole which passed through a valuable lode, caused a good deal of anxiety and expense in exploring ground through which it was supposed the drill had passed.

A glance at the plan showing the supposed positiou of the bore hole, and the position given by the clinostat survey, will illustrate the importauce of either boring a hole straight or adopting some means of snrveying it.

The position of the lode cut by the diamond drill and plotted in accordance with the clinostat survey brings it in parallel with the lode where it had been explored in other parts of the mine, whereas the assumed or direct line theory throws the position altogether out of line.

The survey indicated the distance of the end of the bore hole from its supposed position to be about 150 feet iu a northerly direction, and that the deflection started from the collar of the hole. The initial error as regards azimuth may possibly have been due to a slight twisting of the machine when the necessary pressnre for drilling was put on. The hole, which started at about 18½° dip from the horizontal, gradually lost its depression and eventually became flatter until it attained a horizontal position, from which it rose about 1¼°.

CAUSES OF DEFLECTION.—The causes which go towards forcing the diamond drill rods ont of the course in which they are originally lined up are so numerous that one feels inclined to doubt if it is possible to drill a hole to a great distauce in a perfectly straight line. The force exerted at the top end of the rods acting against the resistauce at the bottom end would naturally bend the drill rods, causing them to bear hard on one side or other of the hole, thereby influencing and alteriug the angle of the crown.

The following notes, for which I am indebted to C. J. Winston, manager of the Goldfields Diamond Drilling Co., should be of much interest to those who have had experience of the vagaries of diamond drill holes on these fields, as he points out how faults may, to a great extent, be guarded against.

Mr. Winston, whose ideas are the result of long practical experience and close observation, writes as follows:

The causes of bore holes going out of trne courses are numerous. The principal are—

First—Soft formations and neglect to extend casiug.

Second—Boring a large hole and following core barrel with small rods.

Third—Giving the diamonds too much clearance beyond the metal size of bit.

Fourth—Working a wornout core barrel too long.

A word or two concerning each of these will help to explain why these causes affect a bore hole; also, in discnssing each case, past failures can be avoided, and means to ensure practical accuracy be pointed out clearly, so that every mine manager can see for himself where failures are liable to occur and can insist that proper precautions are taken before it is too late.

First Cause—In case of soft material being bored, if precautions are not taken in time the hole will enlarge by the action of the rod, and this will make the hole take an entirely new course. This is especially so if soft ground is eucountered between two hard faces of rock that stand at an angle to the direction of the bore hole.

As an illustration, take two walls 10 feet apart and having very soft ground between them. Wheu the diamond bit strikes the lower wall it is very certain to slide off and follow down the hard wall, and it is difficult to estimate where it eventually would go.

The remedy for this is to extend the casing until it rests on the lower wall. Then the bit has an iron tube to hold it straight and very little deflection will occur. The same tendency to slide off would be experienced with the casing as with the bit, but this is overcome to a great extent by having a loug string of casing that is a fairly close fit to the borc hole, and the hard upper wall will hold the casing straight and the loug length above the hard wall will guide the lower end through the soft part lying between the two walls.

The wider the hard walls are apart the longer line of casiug it is necessary to use to eusure the lower end not sliding down when it strikes the lower wall.

If this matter is properly attended to and intelligently handled, there need be little danger of any deflection of the bore from the true course when it euters the lower wall. If the holc be neglected at this point, error is certain to result—iu fact, rods have been known to break off at the point where the bore changed its course, aud they could never be picked up again and the hole had to be abandoned.

Second Cause: Having small rods following a large core barrel.

This is an error that has often caused holes to throw off their course by reason of allowing too much opportunity for the top end of core barrel to get too far below the center line of bit.

The remedy for this is to use rods as near the size of the hole as is practicable.

The proportions of drill rods to holes is to have the drill rods three-sixteenths of an inch less in diameter thau the hole, and the core barrel (which is 10 feet loug) only one-sixteenth of an inch smaller in diameter than the hole to be drilled. This gives bnt little chance for the hole to go off the true course, whereas with much larger difference between size of bore and core barrel and rods, the bore could not go straight, especially on angle holes, as the top end of core barrel would coustantly be out of ceuter and would throw the bit steadily up, and, once started, the tendency to creep up would gradually increase.

Since so many angle holes have been required dnring the last few years, this feature has been carefully noted, and practical drillers have found that old methods must be revised and the sizes between holes and rods be reduced considerably, otherwise the hole would gradually rise from the true course.

The investigations on the deflection of angle holes brought close study to vertical holes, with the effect of soou exploding the whole theory that, because a hole was started vertical, it would continue exactly vertical because the law of gravitation would ensure its doing so. We find that even in vertical holes the top end of the core barrel constantly lies to one side of the bore hole, aud we have practically the same defect as on angle holes, but with the difference that in vertical holes the core barrel will not necessarily

*Abstract Monthly Report Chamber of Mines, Western Australia August, 1903.

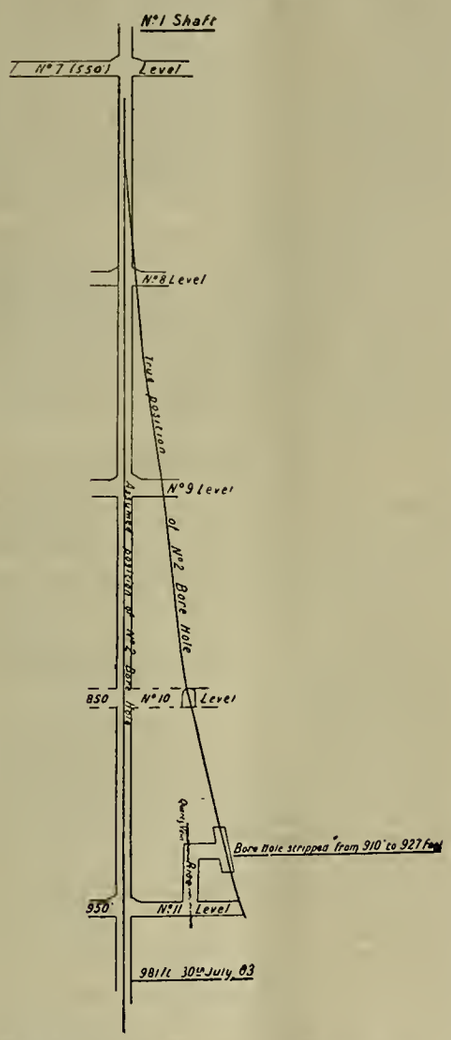
lie on one particular side of bore hole, but often changes from side to side, while in the case of angle holes it is constantly on the lower side, which throws the bottom end upwards. Vertical holes have often proved wavy, especially where large core barrels and small rods were used, the bore having gone off the true course and then thrown back again.

Another puzzling feature about all bore holes is that only one side of the top end of core barrel will wear. This is true of vertical as well as angle holes.

One remedy for this is to constautly change the rod immediately on top of core barrel; but, as this does not entirely remedy the wear, new rod couplings the exact size of core barrel are often used, being changed when the wear on core barrel becomes more than is deemed safe.

Third Cause: Setting diamonds with too great a clearance and cutting too large hole, and, in so doing, establishing the same defect as is experienced in using small rods in a large hole.

The writer has known drill men on the Rand in South Africa that made a practice of starting holes with as near a quarter of an inch clearance over



Bore Hole Associated Northern Mine, Western Australia.

metal size of bit as they could, and greatly reducing the size of each new bit as it was lowered to the bottom. This was with the idea that no reaming would be required when the diamonds in the previous bits lost their clearance, as the rock wore them down.

The correct way, and that which is practiced by up-to-date mill men, is to start the hole with as little clearance as possible and keep the same size the entire length of bore. This makes it necessary to ream new bits down from the point where previous bit began to loose its clearauce. This latter method is the better, as the hole is certain to go practically straight; but with excessive clearance it can not go straight.

Fourth Cause: Using a worn out core barrel too long.

This is another feature to be guarded against, as, when a core barrel is allowed to wear too thin at top end, the same results are obtained as by using small rods in a large hole.

This danger has proved to be great where holes have been tested, especially horizontal ones, and it was seen that when the core barrel was new the hole went straight, but, as it became worn, the hole began to strike an upward course.

The remedy for this is not to let the top end of barrel get worn very much before it is remedied by a new coupling, and before too late a new core barrel.

By a great deal of experiment it has been proved that horizontal holes can be bored straight, even where conditions of formation were all in favor of deflection.

On the Mount Lyell mine in Tasmania a bore was put out to strike a drive several hundred feet away and the data gained therefrom is of interest. This hole went true, as it not only struck the drive at the point expected, but a candle held at one end could be plainly seen at the other end.

This gave data for the proper clearance to give the diamond, and proved that the core barrel and rods used were of the proper proportions to give satisfactory results.

Another proof that they are the correct proportions is that in the Kalgoorlie field several tests have been made on angle holes. These tests were carried out on several different holes where soft ground was encountered below the casing where the ground was worn out by the action of the drill rods as the hole deepened and became much larger than the original hole. The operators plugged the holes below these soft places and poured and stamped cement into the holes until they were filled up, and after the cement had set it was bored out with diamonds, making core the whole distance, in fact, drilling a new hole through that part of the hole, and re-entering the old hole without any trouble whatever.

In several instances a length of over a hundred feet has been cemeuted in this way, and in each case the old hole struck without any trouble. This proves that holes can be bored straight if proper tools are used and careful and intelligent methods are employed, and it is also of equal importance that no neglect on the part of the meu, who should be especially trained for diamoud drill work, be allowed.

The most up-to-date machiues, tools aud methods are useless if carelessly used by unskilled and ignorant operators.

The practice of surveying bore holes with the methods lately introduced is valuable to both mine manager and drill operator; to the mine manager, it proves to his satisfaction whether the bore has been allowed to deflect, aud, if so, to what extent; and to the drill operator, it is valuable in helpiug him to perfect his methods. and indicating at what poiuts of wear he must make renewals. By frequeut exchanges of ideas aud experience betweeu mauagers, surveyors and drill operators, many points can be discussed and clearly demonstrated, and understood by all who are interested in the development and welfare of the mining industry.

Distribution of the Publications of the U. S. Geological Survey.

That people iu geueral do not take advautage of their opportunities is a truth as veuerable as society itself. A particular application of it is seen in the fact that many who would be benefited by a study of the publications of the United States Geological Survey do not apparently realize the privileges to which they are eutitled. The Government is at great expense to maintain scientific bureaus the chief ends of which are to increase the sum of humau knowledge aud to inform the people of the United States of the practical results of the investigations made. Every means is taken to give the public the widest possible benefit of the discoveries aud inventions of science. Large sums of money are annually expended in printing maps, folios, papers, bulletins, mouographs and scientific reports of one kind and another, the great majority of which are intended for geucral and gratuitous distribution.

Many of the publications of the Survey are of special iuterest to inhabitants of particular localities and should have a wide circulation in the areas they conceru. To further this end it seems advisable to call the attention of librarians throughout the country to a congressional act approved March 3, 1903, which provides that "the Director of the Geological Survey shall hereafter distribute to public libraries that have not already received them such copies of sale publications as may remain on hand at the expiration of five years after the date of delivery to the Survey document room, except a reserve which shall not exceed 200 copies."

This concerus only the sale publications of the Survey. The great number of pamphlets and reports intended for free distribution may be procured at any time by mere application to the Director of the U. S. Geological Survey, Washington, D. C. The sale publications are of three classes only—topographic maps, geologic folios and monographs.

The topographic maps are sold at the rate of 5 cents a sheet of staudard size. For 100 or more in one order, whether of the same sheet or of different sheets, the price is 2 cents a sheet for the standard size. Special maps and those of larger size are sold at proportionate rates and on the same conditions of discount. Prepayment is required and may be made by money order payable to the order of the Director of the U. S. Geological Survey, or in cash—the exact amount. Checks and postage stamps can not be accepted.

Geologic folios are usually 25 cents apiece, although ten of those issued have, on account of specially elaborate map work, sold for 50 cents. Only one—the geologic folio that treats of Yellowstone Park—sells for 75 cents. These folios should be of interest to miners, prospectors and land owners, and especially to teachers of geography or geology, and it is expected that there will be a growing demand for their use in schools.

Monographs range in price from 80 cents to $11, the average price being $2. The edition of one of the most elaborate—a $10 volume—has been exhausted. It was the work of Capt. C. E. Dutton and was entitled "The Tertiary History of the Grand Canyon of the Colorado." The subject naturally permitted great elaboratiou and great perfection of detail in the way of illustration, and these features brought up the price of the monograph.

Full circulars, descriptive of the publications and maps of the Geological Survey, can be obtained on application to the Director, at Washington, D. C.

Cyaniding Low Grade Slimes.*

Written by S. H. Pearce.

In a paper on work done in other fields of such importance and magnitude as that at the Homestake, one naturally makes comparisons with the work done on the Rand, especially as it is claimed that such work is on a higher plane than our own, and from that standpoiut this paper contains certain points that are worth consideration and discussion.

The first matter is that of finer crushing and larger plate area, where it is difficult to make a comparison; first, on account of the difference of weight of stamp, character of screen and height of discharge, and, secondly, by reasou of the very different class of ore under treatment. It is hard to believe that it would at present be commercially profitable to crush finer than the 1200 mesh used on some of the mines here (where 65% is obtained in the mill) on account of the loss in stamp duty, and the matter of quadrupliug our present plate area would be hardly justified in view of the fact that the bottom of our plates appear to be practically useless, and seem to show that further area is unnecessary. It is a fact, however, that it is quite usual to find amalgam in the launders below the traps and also in our spitzlutten concentrates, so that the matter is hardly finally settled, and observation on that point would be useful. The testimony of the effect of the temperature of the mill water is welcome in view of the difference of opinion here, and it might be noted that more water is used there than is our practice, which might perhaps account for the beneficial use of the extra plate area.

Mr. Merrill makes a great point of being able to produce, or rather, eliminate an unknown percentage of the pulp crushed as slimes unprofitable to treat. Any improved method of separating unleachable slimes from leachable sands is welcome indeed, but the method used there appears to uced more elevation of mill pulp in the first instance and produces results that do uot show any great improvement on those obtained here as regards the relative value of eliminated slimes to that of the leachable product. Those at the Homestake are given at $1.65 for sands and au average of 95 cents for slimes, or a ratio of 1 to 1.737, whereas the ratio on the Rand will be at least from 1 to 2 and up to 1 to 3, and this would either show that the old-fashioned German spitzkasten aud spitzlutten, as they are termed, are as good as Mr. Merrill's "coue system," or that he has an exceptionally difficult ore to treat by classification. It is probably fairer to suppose the latter is the case, as in the earlier stages of direct treatment on the Rand the spitzlutten were adopted which are now discarded for spitzkasten—the additional water being found to be unnecessary, as the further separatiou of the slimes is now effected in the filling tank. It is probable that our system of having a return spitzkasten for any overflow sauds as a safety valve is an important factor iu this matter of classification. In reference to Mr. Merrill's want of knowledge that slimes have been treated at a cost of less than that of those produced on the Homestake, viz., 95 cents, it might be pointed out that the average of the slimes costs for the Rand mines subsidiary companies for the first quarter of 1903 was 2s 8d, or 64 cents, and as the circumstances there are such that he is able to effect such a reductiou in cyauiding costs as those given, it is possible that even that grade might be a payable proposition, especially as the site there, being of a nature to allow of sluicing out treated sands, the slimes plant could be arrauged so that very little power would be necessary, gravitation being substituted.

Auother point which might be noted is the addition of lime, which it is stated that, if made to the mill direct, acts deleteriously to amalgamation, and also that it is advantageous to have the lime enter the vats in unslaked granules. This latter, in view of the wet crushing of the lime, would poiut to the character of the lime used as being of a very different nature to that obtained here. How can undissolved lime have any effect? CaO is an active agent in any lime. This might

* Journal Chemical, Metallurgical and Mining Society, S. A.

account for its different behavior in regard to amalgamation, although it might be noted that in more than one case upon starting up slimes plants here the mill plates have apparently deteriorated for a short period, and although this matter was not properly investigated at the time, it was probably due to accumulations in the mill water (through constant reusage for a long period), being precipitated out by the lime and causing the plates to appear coated, but that such was not detrimental to amalgamation was demonstrated by there being no appreciation of the value of the mill tailings whatever and the usual amount of amalgam being obtained. The use of lime in the mill undoubtedly has a tendency to harden the amalgam, and for that reason it is advisable to discard the use of "inside" plates, as any amalgam forming on them is soon scoured off, and in that "hard" condition is not so easily caught on the outside plates, and it is, perhaps, in this way that the Homestake mills fail to obtain equal results. Perhaps, indeed, the want of lime in the mill water (there being present only the small amount in the overflow of the cones coming back to the mill) might be another reason for so large a plate area being advisable.

In regard to the size of the lime granules having any effect upon the decomposition of cyanide we have no data here, but it seems hardly probable. The lime is usually passed through either the battery screen, or, where added subsequently in addition, is crushed to 900 or 1600 mesh. It has been noted, however, in several instances here, that even with this fine mesh, that where the lime is added to the pulp before separating out the sands there is a tendency for the undissolved particles of lime to remain in the sand treatment tanks, and with long contact with solutions are dissolved and increase the alkalinity of solutions to the detriment of precipitation.

The Butters & Mein type of distributor is in many cases discarded for the large vats in use here, but in the absence of return spitzkasten their use is justified.

The details of precipitation by zinc dust are very interesting, and it might be noted that the pumping of the full quantity of solution used through the filter press is overcome by a system of enrichment by successive use before precipitation. This is a system hardly to be recommended on these fields as likely to give more profitable results. Another point is that apparently large water washes are finally given to the charge as against our system of maintaining the treatment throughout with solution, and it would be interesting to know how the surplus solution so obtained is disposed of, and it is a pity that further details are not given, such as the method of sampling the charges, whereby such close results of actual and theoretical extractions are obtained.

The details given of the process of precipitation by means of zinc dust or fume are extremely interesting, being entirely new to the practice here, and although the system would have the drawback in our case of necessitating an enormous amount of pumping through filter presses, as well as the erection of further sump accommodation for precipitations, it appears a matter worthy of experiment, possessing, as it appears to do, the great advantage of a very high efficiency, and, further, what would appeal to many managers, a complete cleanup at any stated interval, nothing being left on zinc shavings, which constitutes a frequent source of disappointment by causing a temporary shortfall. The matter of pumping is not a very serious one, as it could be made to save the cost of excavation for sumps where solutions gravitate from the precipitation boxes, and would save the "lift" when pumping on to treatment tanks, which is a frequent source of annoyance by reason of losing the priming of the centrifugal pumps used. The matter of using solutions for a second leaching without precipitation is the principle adopted in our slimes treatment, and for the same purpose, i. e., of saving in the matter of box capacity, and, in view of a possible adoption of the fume precipitation, it could be carried out here to a certain extent, though hardly, I think, to the extent practiced on the Homestake.

It is interesting to note that lead furnaces are not used, but that the precipitates are slagged direct on the cupel after being treated with two acids, viz., hydrochloric and sulphuric. This acid treatment would be imperative in such a case, and one would almost think that the product would be sufficiently pure to melt direct. It is very probable, however, that the cost of such acid treatment would not be profitable here, where locally made H_2SO_4 costs 4d per pound and HCl over 1s; and, moreover, coal is cheap, so that it would appear that it would be better in our case to adopt the intermediate smelting in a lead furnace, especially as in either case it seems profitable to subsequently run the slags through a blast furnace. Our experience in this matter is, however, small, and the last word has yet to be said.

THE former plan of membership of 81 of the executive committee of the California Miners' Association was changed at last week's convention of that body to a more compact form of representation. The executive committee for the ensuing year consists of the following: J. H. Neff, W. C. Ralston, E. C. Voorhies, C. G. Yale, C. H. Dunton, H. Z. Osborne, J. Bermingham, Jr. The four elective officers of the Association, with the above, constitute the executive committee.

Method of Estimating Gold in Working Cyanide Solutions.*

Written by JAMES MOIR.

As is well known, the determination of gold in cyanide solutions by evaporation and fire assay, although possessing considerable accuracy, is an extremely cumbrous and lengthy process, especially when very weak solutions are dealt with. In consequence of this fact, control of the zinc precipitation of gold is rendered difficult, for the reason that the assay of the liquor from the foot of the zinc boxes is frequently not obtainable before the next day, by which time the solutions may have become seriously deranged, for example, gold-bearing solution may have been used for leaching.

Several processes have been introduced to ameliorate this condition of affairs; of these only the methods standing in the names of Mr. Crosse and of Professor Christy have met with technical success. These are precipitation processes and lessen the time required by eliminating the evaporation necessary; nevertheless, they still require a couple of hours to complete.

When my attention was first called to the necessity for a quick method of detecting traces of gold in the state of auro-cyanide I saw that not only the evaporation but also the fire assay must be cut out if the time required was to be materially reduced. The only alternative was a colorimetric method, and this we have ready to hand in the purple of Cassius test. This test, however, does not detect gold in presence of cyanide, probably because the auro-cyanogen iron has no tendency to dissociate into gold and cyanogen. The problem is just the same as that of detecting iron in potassium ferro-cyanide, which cannot be done by any direct test for iron. A second problem was that of making the purple of Cassius test sufficiently sensitive to detect one or two grains of gold per ton of solution. The test applied to gold trichloride fails to detect gold in a solution more dilute than one part in a million (14 grains per ton) and no other test is appreciably more sensitive. Finally, there were two more conditions which any such test must satisfy, viz.: (1) the free cyanide must be destroyed, or else the gold would redissolve; (2) all the impurities, such as zinc ferro-cyanide, must be kept in solution, else gold will be lost by being mechanically entangled in such flocculent precipitates. The latter condition was the stumbling block of my earlier efforts. I soon found that boiling the cyanide solution with aqua regia and precipitating the gold with zinc or aluminum satisfied all the other conditions, yet the zinc ferro-cyanide, which remained unaffected, retained the metallic gold so firmly that it was impossible to dissolve it in aqua regia, and, consequently, incorrect results were obtained with working solutions, although perfectly satisfactory results were obtainable with artificial auro-cyanide solutions. After some months of experimenting, during which I tried all ordinary reducing agents, and even such unusual ones as hydroxylamine, hydrazine and phosphorous acid, I gradually evolved the new process which I now recommend, and which takes less than twenty minutes to complete. The principle of this process is to precipitate the gold by means of the strongest available galvanic couple in a medium which destroys the cyanides and keeps the ferro-cyanides and other common impurities in solution. The metallic gold is then dissolved in aqua regia and tested for with stannous chloride in the usual way. The different intensities of color obtained are sufficiently distinct from one another to enable an estimation of the gold, within a few grains, to be made by comparison with a graduated color wedge or a set of standard colors, and after a little experience one can dispense with these and estimate within less than 0.2 dwt. by eye alone. The process is as follows:

100 c.c. of the cyanide solution is poured into an evaporating basin (of not more than 300 c.c. capacity), treated with one to two grams of sodium peroxide, and boiled for two minutes to destroy the cyanide. The quantity of peroxide and length of time of boiling is varied according to the amount of free cyanide present. Next, two drops of lead acetate solution (10%) are added, whereon a brown spot of PbO_2 forms and redissolves, showing whether enough Na_2O_2 has been employed. Next, the flame is removed and a small quantity (about 0.1 gram) of aluminum powder is added and the mixture vigorously stirred until hydrogen ceases to come off. If the aluminum is pure the liquid will not require to be heated. What happens is that metallic lead is first precipitated and the aluminum-lead couple electrolyzes the auro-cyanide, so that finally we have a black precipitate consisting of lead and gold, while the liquor no longer contains cyanide. The mixture is filtered through a small paper and the dish rinsed out into it. This is very easy with so alkaline a solution. The filtrate is rejected. Next 10 c.c. of aqua regia is warmed until it turns yellow and poured into the paper, and the filtrate is collected in a test-tube, boiled and poured through the paper again. This is repeated until the filter paper is perfectly clean, whereon it is washed out with a small quantity of water. The yellow filtrate is then treated with strong stannous chloride solution, added drop by drop until the yellow color has faded. If the original cyanide solution contained over .5 dwt. of gold the purplish blue shade appears at once, but if only a few grains of gold per ton were present the mixture must stand a few seconds. After half a minute the full intensity is attained and the comparison with the standards is made. For exact work the solution is poured into a cylinder exactly 1 inch in internal diameter and made up to a definite volume, say, 15 c.c. with water, before making this comparison. The purple solution fades through oxidation on keeping, and therefore, cannot be used for a standard. I, therefore, use a permanent imitation of the shade, made by adding copper sulphate solution to cobalt nitrate solution until the exact tint is obtained; the mixture is diluted for use and standardized by the results of the foregoing process applied to cyanide solutions of known gold-content.

For the range between .5 and 2 dwt. per ton the most convenient standard is an "indigo-prism" or triangular bottle, which, when filled with the above colored fluid, affords a gradually varying thickness of liquid, and can be graduated empirically once for all, so as to read directly in dwt. per ton. This is held horizontally and moved across the cylinder at the level of the gold-containing liquid until its color is matched, when the value is read off. Some practice in matching colors is required in order to read .1 dwt., but without practice one can read .2 dwt. Of course, it is more satisfactory to keep a set of standard tubes (15 c.c. in tubes of constant diameter) differing in value by, say, three grains, but this takes a longer time to prepare.

For quantities under ten grains per ton it is best to look down the tubes and make the comparison exactly as in "Nesslerizing." The lower limit is about two grains per ton, but if one starts with a larger quantity of the original cyanide solution than 100 c.c. the sensitiveness is proportionately increased, as the gold is still concentrated into the final 15 c.c. Thus, if 500 c.c. be taken, the limit is about 0.4 grain per ton (one part in 35,000,000). This should be easily sufficient to detect the gold in that low-grade proposition, the sea.

It should be noted that the differences of intensity are less marked for the darker solutions; anything over 3 dwt. per ton gives a nearly opaque solution. Therefore, if the solution to be tested is known to be strong, only 50 or even 25 c.c. should be taken for the experiment, diluting to 100 c.c. and multiplying the result by two or four respectively.

As a check against the occurrence of incomplete precipitation of the gold, it is advisable to test the filtrate from the lead with $FeSO_4$ and HCl for cyanide, which should be absent in a successful experiment. (Of course, if the original solution contains ferro-cyanides, the test is not applicable, except by comparison.)

The best mixture for the aqua regia is 100 c.c. conc. nitric acid, 300 c.c. conc. hydro-chloric acid and 400 c.c. water. This mixture keeps well and does not evolve chlorine until heated. Stannous chloride is best dissolved in dilute hydro-chloric acid; the trace of stannic salt usually present is advantageous, but the solution must be filtered until absolutely clear.

The best stout filter paper must be used, in order to resist the powerful re-agents used; the sheets are usually best.

The chemistry of the process is simple: The cyanide is hydrolyzed and oxidized to ammonia and carbon dioxide by the sodium peroxide—

$$KCN + Na_2O_2 + 2H_2O = Na_2CO_3 + NH_3 + KOH.$$

Part of the peroxide is decomposed into oxygen and caustic soda, which, with the aluminum-lead couple, gives nascent hydrogen, which reduces the auro-cyanide to gold.

$$Al + 6NaOH + 3KAuCy_2 = Al(ONa)_3 + 3KCN + 3NaCN + Au + 3H_2O.$$

The fate of the lead compounds is expressed in the following equations:

(1) $PbA_2 + Na_2O_4 = PbO_2 + 2NaA.$
(2) $PbO_2 + Na_2O_2 . Na_2PbO_3 + O.$
(3) $Na_2PbO_3 + 4H = Pb + 2NaOH + H_2O.$
(4) $Pb + Cl_2 = PbCl_2.$

For the benefit of those who can not at present obtain sodium peroxide, I have introduced a modification. A solution is made of 30% NaOH and .1% litharge; 10 c.c. of this is boiled with 100 c.c. of cyanide solution for five minutes, then the aluminum is added and the rest of the process is the same. In this case the cyanide is destroyed by nascent hydrogen and by hydrolysis, and rather more time is needed.

(1) $3KCN + 4Al + 9NaOH + 3H_2O = 3Al(ONa)_3 + 3CH_3NH_2 + Al(OK)_3.$
(2) $KCN + 2H_2O = NH_3 + HCO_2K.$

I have, in fact, succeeded in isolating methylamine from the products of this reaction.

Finally, I consider that the process is quite as accurate as a fire assay done on 100 c.c.; for the latter would be accurate only to three grains with a balance

*Journal Chemical, Metallurgical and Mining Society, S. A.

sensitive to $\frac{1}{10}$ mg., and, considering that the time required is so short, I am hopeful that the process will prove to be a real advance on previous work, and will conduce to fuller efficiency in our extraction processes.

California Gold Product.

The California State Mining Bureau has issued an elaborate table of California's gold product by years from 1848 to 1902, inclusive, from the compilations of various authorities during the years. The most complete and continuous is that furnished by C. G. Yale, statistician, and which is as follows:

Year.		Year.	
1848	$245,301	1876	15,610,723
1849	10,151,360	1877	10,501,268
1850	41,273,106	1878	18,839,141
1851	75,938,232	1879	19,620,654
1852	81,294,700	1880	20,030,761
1853	67,013,487	1881	19,223,155
1854	69,433,931	1882	17,146,416
1855	55,485,395	1883	24,310,873
1856	57,509,411	1884	13,600,000
1857	43,628,172	1885	12,661,044
1858	46,591,140	1886	14,716,506
1859	45,846,569	1887	13,588,614
1860	44,005,163	1888	12,750,000
1861	41,881,995	1889	11,312,013
1862	28,851,668	1890	12,309,793
1863	23,501,736	1891	12,728,869
1864	24,071,423	1892	12,571,900
1865	17,930,858	1893	12,422,811
1866	17,123,867	1894	13,923,281
1867	18,265,452	1895	15,334,317
1868	17,555,867	1896	17,181,562
1869	18,229,044	1897	15,871,401
1870	17,458,133	1898	15,906,478
1871	17,477,885	1899	15,336,031
1872	15,182,191	1900	15,863,355
1873	15,019,210	1901	16,989,044
1874	17,264,836	1902	16,910,320
1875	16,876,009		
		Totals	$1,379,275,408

Silver contained in gold has been parted and is not included in the tables.

This complete table to date is compiled from estimates of L. A. Garnett and the United States Mint Director's reports, these being considered by the compiler the most correct and complete of any extended continuous statements. The compiler, as statistician of the United States Mint at San Francisco, personally reported these figures to the Director of the Mint, from 1893 to date. Mr. Garnett's figures are for fiscal, and those of the Mint for calendar years. To account for the omission of the final six months of 1883 in Mr. Garnett's table, half of the total of that year's full figures of the Mint are added to his statement of the year, which will account for the apparently excessive product of 1883 as given. On consultation with Mr. Garnett, it was agreed that this was the only feasible method of reconciling the difference of fiscal and calendar years, in combining the two tables.

Sampling Custom Ores.

To the Editor:—On the subject of "Sampling of Custom Ores," I will briefly give my experience and methods of sampling herewith; and a sketch of an automatic sampler designed by the author and manufactured by the Colorado Iron Works Co., Denver, Colorado.

In many custom samplers, whether independent or in connection with a smelter, it is best to have every department simple and with as little mystery as possible so that the shipper will have his ore in plain sight all through—from the time it is weighed until he receives a portion of the pulp sealed with the sample works' seal. I have heard of cases where shippers also put their seal on the umpire sample before it is set aside. In this way he can make a perfect check on the assays of the purchaser and, if he is not satisfied with the methods of sampling, make his complaint before the sample is completed. Strange as it may seem, it is very seldom that a shipper will find fault in any way, but usually praises the method of sampling until he gets his returns, and then if they fall short of his expectations, he often complains. This cannot be said of regular and experienced shippers; and the same methods of sampling are always followed for every shipper.

We follow here the same methods of hand sampling usually adopted by the smelters in Colorado, as follows:

First, crush the ore to reduce the lumps all below a certain size; then take out every third, fifth or tenth shovelful for a sample as the ore is wheeled away to the storage bins. The proportion taken for sample depends either upon the size of the lot to be sampled or the richness of the ore. (In fact, the entire bulk of small lots of rich ore is often treated as a sample.) Every third shovelful of this sample is then taken and passed through a set of rolls; the rolls are then set up much closer, and half of the sample—by taking out every alternate shovelful—passes through the rolls again. This reduced sample is now taken to the sample room. This sample room is enclosed with a row of windows on three sides for light, and enables the shipper to watch the work. The floor where the sampling is done is covered with steel plates. The sample as brought from the rolls is deposited in two piles, then coned into one cone and carefully flattened out and cut into four quarters, two quarters being taken or sample and two quarters being rejected—care being taken to "alteruate"; that is, if the first two quarters taken up in the wheelbarrow are rejected and the remaining two quarters are reconed for sample, the next time the sample is coned and quartered the reverse is done by recoining the first two quarters lifted and rejecting the remaining two quarters on the plate. This is done in order to avoid any chance to favor either the shipper or purchaser.

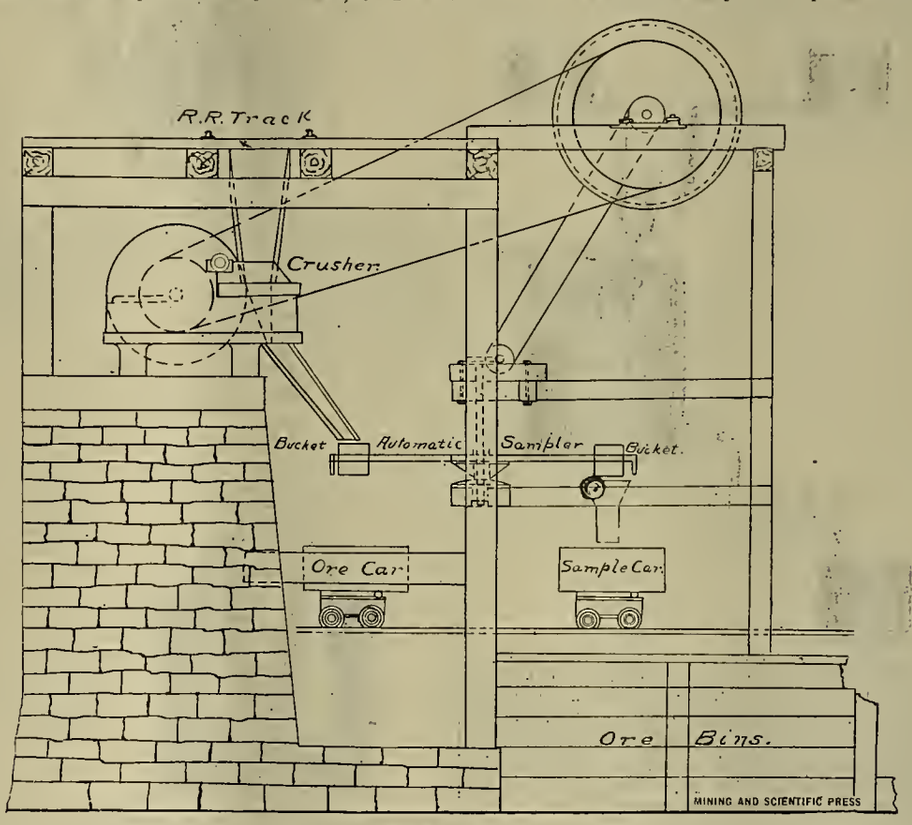
After the sample is reduced in weight to about 15 or 20 pounds, it is put through an ordinary sample grinder, which reduces it to a fine powder. From the grinder it is taken in covered buckets to the assay office where the assistant assayer thoroughly mixes it by continuing the operation of coning and quartering until sample is reduced in quantity to about 40 ounces. This 40 ounces is then passed through a 100 or 120-mesh sieve by grinding the pulp which is too coarse on a smooth, cast-iron bucking board with a heavy muller. (Should any scales of native gold or silver be caught in the sieve it is cupelled with a little lead, weighed, the pulp from which it was sieved also weighed, the percentage value calculated, and added to the assay). After the pulp is all through the sieve it is again thoroughly mixed and put into three different sample sacks—one to be assayed at the works; one to be sealed and set aside for umpire, in case an umpire should be called for; and one to be sealed and handed to the shipper, if present, or if not, the sample is mailed to him.

Settlements are made as soon as the assays are compared between the shipper and smelter, or else the settlements are forwarded on the smelter's assays and corrections made afterward if the shipper finds any material difference between his assays on the smelter's pulp and the assays of the smelter. Should the assays not agree a reassay is called for by both parties. If these repeated assays do not satisfactorily agree, then an umpire is called into requisition and sent to some reputable assayer mutually agreed upon between the shipper and purchaser, whose results are to be final.

The same methods as above described are followed in the sampling of concentrates, excepting that no crushing or rolliug are necessary.

In some sampling works and some smelters samples are first taken out by hand shoveling, then rolled and completed with automatic samplers. If the ore is very rich and spotted, such as the ores of Cripple Creek, Colorado, it is all rolled and the entire sampling done automatically.

To the owners of mills where they mill uone but their own ore and stockholders in general, the importance of expensive hand sampling for accuracy does not appeal; but to the metallurgist who is not only often interested and has to account to the stockholders for the difference between metals purchased and sold it does, especially when running a custom plant; and while considerable saving can be made by the usual methods of automatic sampling, much more may be lost by salting the samples of large lots with dust from small rich lots, at the same time not giving satisfaction to the shipper of either the low or high-grade ores, on accouut of the ore being at times lost to his view—the idea being entertained by them generally that the dust iu the machinery will depreciate the value of their ore, when a very little calculation would prove how unreasouable their fears are. If 291.7 ounces gold per ton only equal 1%, it would only require oue-tenth of 1% gold dust to salt a sample up to 29.1 ounces gold equal to $582 per ton; and for this reason a very little rich dust from the automatic sampling machinery carried over from one lot to another is very dangerous. To prove this we have often had lime rock, which has been used to clean the rolls and crusher only once after a rich sample, assayed and found it to contain anywhere from a trace to $2 per ton in gold when the original lime rock contained no gold; and even after taking all reasonable precautions to clean the machinery, some dust still remains to work out later. While it takes so little rich dust to increase the values of precious metals of a small sample representing a large lot of ore, for the same reason it would be impractical to reduce the values perceptibly by adding foreign material to the ore without being detected ou accouut of the bulk, color, etc. In addition to the danger of salting by accumulated dust or soft rich ore sticking to the machinery, there is also dauger of taking out an uneven sample (unless the ore is very fine) caused by the larger pieces of ore striking together at the entrance of the slot cup, or whatever it is, of the automatic sampler, and rebounding but allowing the fine ore to pass on to its proper place. This continued loss of coarser ore (the coarser the greater the discrepaney) causes quite a variatiou iu the sample by the time it is completed. After describing my objections to automatic samplers, I freely admit that hand sampling is expensive and you have to depend upon the laborers beiug careful about taking their sample shovelsful from exactly the same place they take the rejected portion; and for this reason I propose a compromise by taking out the first sample automatically and then completiug the sample by haud labor where there is only a small portion to deal with. To do this and take samples of both coars and fine ore as it comes from the crusher in plain sight economically and with as little danger of salting as there would be with shovel sampling, I have outlined the following system, which we inteud to follow:



Arrangement of Sampling Works.

The ore, as it is received by carload after being weighed, can be dumped or shoveled into a hopper, couveying it to a 10x20 Blake crusher; from the crusher it drops into an ordinary ore car by which it is conveyed over the ore bins or mixtures ready for smelting; between this ore car or chute from the crusher passes the buckets of the sampler, so arranged as to time, size and nuinber that an average sample of the coarse and fine is taken anywhere from one-tweutieth to one-fifth as desired. The buckets are large enough so that in passing under the stream of ore they catch it all, passing on around in a circle until arriving over the sample car where they are tripped completely over and discharge their contents, again righting themselves ready for another sample. The buckets are made of steel, one piece forming the bottom and sides so as to prevent joints for the ore to hang in and be easily cleaned. These buckets are hung on the ends of arms projecting from a revolving disc; either the buckets or the arms can be removed with little trouble. This arrangement is simple and strong in construction; can be in open view, so that anyone can watch it, and requires but little room between the crusher and the car. Such a sampler would be suitable for taking samples from headings between the crusher and the stamps in mills, as it would require but little care and could be depended upon to take the sample just as often as the mill men desired. But the greatest advantage this sampler

has over others is the sampling of very coarse ore after the first crushing, for which it was originally intended, as all smelter men appreciate the objectionable features of fine ore in the blast furnace, as well as the extra expense required to make it fine; and most of the automatic samplers are designed and only suitable for taking accurate samples out of finely crushed ore.

The accompanying sketch shows a narrow-gauge railroad track where they use bottom dump cars, and it is their intention not to use a shovel for handling the ore after it arrives at the smelter except to finish the sampling of the small sample and when the ore is smelted. Simple as this automatic sampler appears to be, a patent has been secured for it.

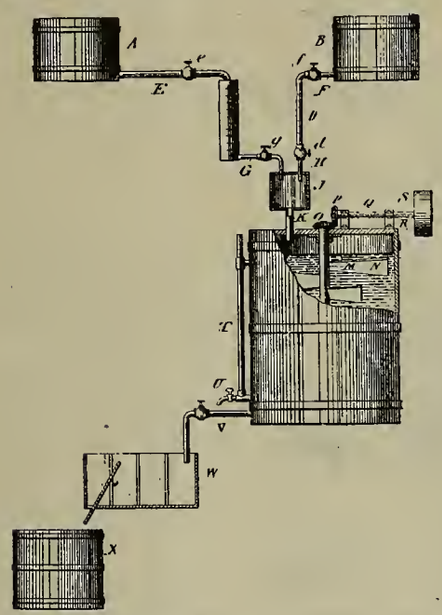
Val Verde, Ariz. SIDNEY E. BRETHERTON.

Mining and Metallurgical Patents.

PATENTS ISSUED NOVEMBER 17, 1903.

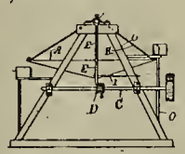
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

APPARATUS FOR EXTRACTING PRECIOUS METALS FROM CYANIDE SOLUTIONS.—No. 743,551; J. A. Ogden, Deadwood, S. D.



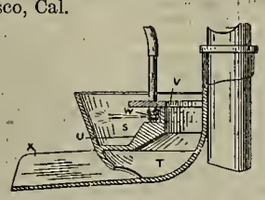
Apparatus for purpose of extracting precious metals from ores, consisting of primary and secondary solution tanks, each provided with discharge pipes with controlling cocks, and measuring glasses, mixing vessel adapted to receive the flow from measuring glasses, barrel with rotatable blades therein, and having glass gauge on outer face thereof, and settling tank adapted to receive discharge from barrel.

CONCENTRATOR FOR FINE ORES.—No. 744,021; F. L. Bartlett, Denver, Colo.



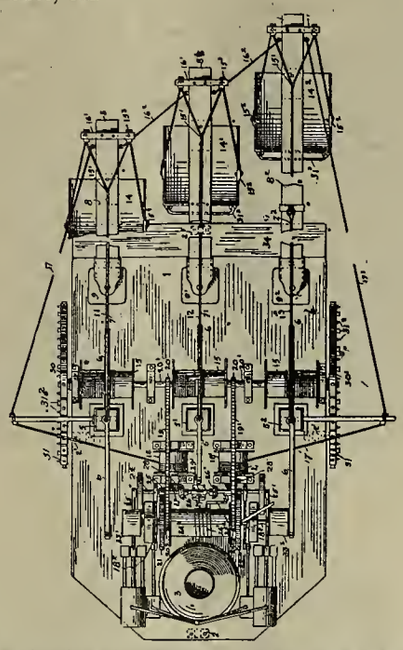
Concentrator comprising shallow pan, means for supporting pan and permitting it to swing latterly without jar, removable lining of fabric covering bottom and lateral sides of pan, and means for feeding ore or pulp to one side of pan, whereby gangue is caused to move across pan and discharged over the other side of pan.

ORE CONCENTRATOR.—No. 744,229; J. W. Pinder, San Francisco, Cal.



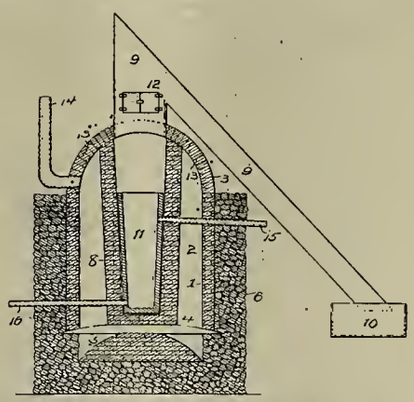
Concentrating pan or table having concave upper surface mounted on central support, that permits it to oscillate in horizontal plane, mercury and amalgam trap at center of table, spiral or involute riffles secured to upper surface of table and terminating at stated intervals on same circle near outer periphery of pan, distributing boxes adapted to deliver pulp at or near outer edge of series of riffles, means for imparting to pan oscillatory motion, and perforated water pipe surrounding outer edge of pan or table.

EXCAVATING MACHINE.—No. 744,490; W. Cole, San Francisco, Cal.



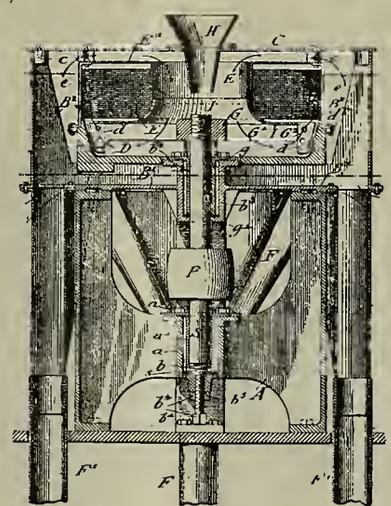
Combination with platform or base frame of a series of swinging arms pivoted to platform or base and projecting therefrom at inclination, hoist cable working over each swinging arm, excavating buckets attached to hoist cables, means for raising and lowering hoisting cables, and mechanism whereby arms are swung outward and inward.

PROSPECTOR'S SMELTER.—No. 744,305; B. F. Daniels and V. W. Clark, Nogales, Ariz.



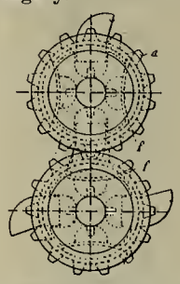
In smelter, combination with combustion chamber, grate in bottom thereof and stone wall inclosing wall of combustion chamber and grate, of muffler located within combustion chamber, crucible within muffler, lateral discharge pipes communicating with crucible, smokestack communicating with combustion chamber and fumestack communicating with muffler.

GRINDING MILL.—No. 744,452; M. F. Abbe, New York, N. Y.



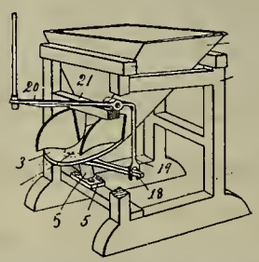
In grinding-mill combination, with stationary grinding-plate having circumferential grinding-ring, of cylindrical screen supported on circumference of grinding-ring, cover for screen provided with downwardly extending interior cylindrical portion, rotary beater arms provided with beaters at outer ends, annular cover supported on beater arms extending with its upper contracted end upwardly to interior cylindrical portion of screen cover, exterior casing provided with cover located at some distance above top of screen cover, and central hopper in casing cover for supply of material to be ground.

CRUSHING ROLL.—No. 744,296; M. Condula, Budapest, Austria-Hungary.



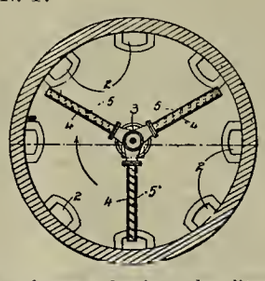
Combination of two crushing rolls forming roller pair, perimeter of which is provided with projections and grooves alternating with each other, projections of one roller registering at suitable intervals with grooves of adjacent roller, flat projecting blades on any of projections, alternating with slots at bottom of grooves and serving for reception of knives.

ORE FEEDER.—No. 744,264; L. R. Tulloch, Angels Camp, Cal.



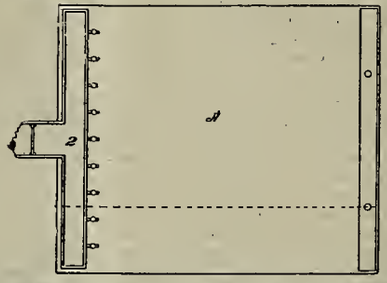
In ore feeder, combination with hopper, revolving feed table onto which ore is fed having a friction ring connected to revolve therewith, of plate having segment gear and rocking about axis of table, plate having eccentric, arm having collar about eccentric, and friction shoe carried by arm and arranged to engage friction ring by movement of eccentric.

ROASTING FURNACE.—No. 744,359; F. Klepetko, New York, N. Y.



In roasting furnace having plurality of hearths adapted to discharge alternately centrally and through marginal openings, series of pairs of rabble arms rotatable within hearths about vertical axis of furnace, series of angularly disposed blades carried by members of each pair of arms, but set reversely to one another whereby effective radial feed is neutralized, and additional rabble arms rotating conjointly with first set of arms, and blades disposed on additional rabbles for effectively feeding material radially along hearths.

PROCESS OF PREPARING CONCENTRATING SURFACES.—No. 744,322; A. De W. Foote, Grass Valley, Cal.



Process of preparing concentrating surface consisting of commingling petroleum and lime, and spreading same evenly over surface of concentrator.

Mining Summary.

SPECIALLY COMPILED AND REPORTED FOR THE MINING AND SCIENTIFIC PRESS.

ALASKA.

The owners of twenty-eight free milling quartz claims located on the Tanana the past season have consolidated and formed the Fjeld Mining Syndicate, says the Valdez News, with K. J. Fjeld as president and R. Blix as secretary.

C. Lane of San Francisco, Cal., and J. H. Conrad nf Prince of Wales Island, have bought the Heid and Smith mines on Windfall creek, near Juneau, says the Dispatch. The property consists of five claims and develnpment work will be increased.

ARIZONA.

Cochise County.

Next week the Copper Glance mine, near Bisbee, will put a diamond drill plant in operatiou to test the formation in the Glance district. Secretary Barker of the company says the drill is capable of sinking a hole 1200 feet deep, 2 inches in diameter. It will he placed on the 500-foot level.

Gila County.

A discovery of telluride ore is reported made near Rye.

The Old Dominion C. Co. at Globe four-compartment shaft is down 565 feet. The tenth lovel crosscut has heen driven to a point in line with the shaft at depth of 626 feet, and tbe station is heing cut out, from which a raise will he driven. The sbaft is expected to he opened to the tenth level by Dec. 15. Progress has heen made laying track and the rails are laid to the new shaft.

The Globe-Boston M. Co., G. S. Andrews, superintendent, and operating near Globe, bas removed its head offices from Boston, Mass., to Cincinnati, Ohio. Development wnrk is being increased.

At the Globe-Boston C. Co. mine, near Globe, the work of driving the Andrus, or north crosscut, and sinking the winze from the 460-foot level is progressing. At 100 feet in the winze drifts will be run both ways on the ledge. Sinking is also in progress on the Winchell claim of tbe Globe-Boston Co.

Graham County.

A strike has been made in the Northern Point mine, on the Shannon group near Clifton, the ore hody being cut at the end of a 300-foot tunnel. It averages 7% copper across the 60 feet that have heen openod. The Shannon concentrator is ready to receive the other half of the machinery it was built to accommodate. Much of this is on the ground. The completed concentrator will have a capacity for 600 tons of ore daily.

The Arizona C. Co. and the Detroit C. Co. at Clifton are roported preparing to huild a dam below the concentrators for the purpose of stopping tailings. The latter will he hauled from the dam and used for filling in old workings, as the Shannon Co. is doing.

L. H. Dunham has bought the Polin-Nelson-Hathaway claims, near the Copper King and Pilares mines near Morenci. Development work will he increased.

Maricopa Coonty.

(Special Correspondonce).—The Dorris-Heyman Co. has put men to work at the onyx quarries near Cave crcek. Onyx will he shipped to the East.

W. E. Thomas at Liherty reports cutting a hody of high-grade ore in a shaft which he is sinking on his group. The ore is a sulphide and carries values of gold, silver and copper.——A Phœnix company is preparing to work the Union mine, north of Phœnix. A good water supply has heen developed.——It is reported the Garcia mine, near Wickenburg, has been sold.

In the Eagle Tail mountains development work has been started hy the Eagle Tail M. Co. Should the Southern Pacific huild a railroad from Phœnix to Gila Bend, reduction works will he erected hy the Eagle Tail M. Co at some point on the proposed route.——B. Johnson is developing his claims near Morristown.——The Angel M. Co. has hought a group of claims west of Wickenhurg, in Vulture district. Men are at work at the Angel mine. W. Small is superintendent.

The Wickenhurg smelter made anotber run last week. The machinery bas heen repaired, so the plant is ready for a steady run when sufficient ore can be obtained.

Phœnix, Nov. 22.

The Mormon Girl M. Co. has enlarged its mill near Cave Creek to douhle its former capacity.

W. W. Waddington and J. G. Montgomery of Phœnix are preparing to develop their group of mining claims in the Eagle Tail mountains, 18 miles west of Arlington and 30 miles from Gila Bend. The group consists of seven claims. The ledge is 25 feet wide and the pay shoot in the shaft is 4 feet wide. They will sink the shaft to depth of 200 feet before drifting.

Mohave County.

C. T. Kennan of Milwaukee, Wis., has bonded the San Cloud group of mines and has started development work. The properties aro 50 miles west of the Junction.

Pima County.

The oil used in the oil smelter at Tucson is reported to cost 4 cents a gallon, or 32 cents to a ton of ore smelted.

Pinal County.

(Special Corresponcence). — Considerable development work is being done at Superior, notwithstanding the fact that the men went on a striko last week. The strikers' places have been filled by other men.

Phœnix, Nov. 22.

Yavapai County.

Manager J. B. Tomlinson of the Yeager Canyon M. Co. says he will put up a 50-ton concentrating mill for the Yeager Canyon property, near Prescott. Men are grading for the mill. Grading is being done for a 200,000 gallon rcservoir which will he huilt on the hill above the mill. It will be lined with rock and cement. Tbere are thirty men at work in the mine.

Superintendent G. Upton of the Oro Grande mine, north of Wickenhurg, says the company has men at work developing a supply of water to run the 5-stamp mill.

Superintendent Hall has started up work on the Alma group at Groom Creek with fifteen men.

M. C. Parmley of Prescott, of the Dividend Con. G. M. Co., says the company expects to increase the capacity of its mill to forty stamps, in addition to putting in a cyanide plant and heavier mine development machinery.

CALIFORNIA.

Amador County.

Work on the South Eureka mine on Sutter Hill, near Sutter Creek, is suspended, owing to a misunderstanding between the Miners' Union and tbe company.

Calaveras Couoty.

Superintendent Stone of the Red Gold mine, near Murphys, is opening up that property and is putting in a milling plant.——A strike of ore is reported by L. W. Grider, superintendent of the Obio or Cordelia mine at Indian Creek.

The Gold Cliff mine of the Utica G. M. Co., near Angels, will resume operations this week.——The Sultana mine, which has heen closed on account of lack of water, started up tbis week.——The Angels mine hegan work this week after a shut down of one month for repairs. The additional twenty stamps are completed, making forty stamps dropping.

Mining is resuming in and around Murphys, Vallecito and Douglas Flat since the recent heavy rains, says the Citizen.

El Dorado Coooty.

Work is progressing at the Euroka gold mine at Georgetown, operated by the El Dorado C. M. Co. The steam hoisting plant was completed last week and the triple-compartment shaft is down 70 feet.

Fresno County.

At Coalinga the M. K. & T. Oil Co. has one of its wells down 2400 feet deep and the drill is still working. Oil has not yet been struck in paying quantities.——The gusher on section 7, helonging to the Section 7 Oil Co., is still gushing.

Kern County.

The Peerless Oil Co., near Bakersfield, is pumping 5700 harrels per day from twenty-seven wells.

The Junction Oil Co. at Kern river, near Bakersfield, has five wells completed and will start tbis week on No. 6. The company has all its product contracted for, says J. M. Keith, part owner.

The Friday Gulch G. M. Co. will begin operation of the company's mine at Havilah this week. Machinery is on the ground, says H. L. Meacham, superintendent.

W. F. Ernst and S. A. Nelson continue developments on the Pinmore mine at Johanneshurg. The hlacksmith shop, which was hurned with the mill, has heen replaced, and the mill will he rehuilt.

At the Old St. John mine at Sageland at the foot of Piute mountain, near Randshurg, they are huilding a cyanide plant, says the Randshurg Miner.

Mariposa County.

C. C. Plyer, having hought the Barfield interests in the Golden Gate mine at Granite Springs, will, with J. Ruddle, develop the mine this winter.

At the Ward mine, near Coulterville, Manager Ward of San Francisco has twenty-two men at work.

Mono County.

Mon are at work cleaning out shafts and tunnels of the New Bodie M. Co., near Bodie, says Manager C. E. Loose of Provo, Utah.——Men are at work at the Golden Gate mne. Water was struck 60 feet belnw the workings in a winze which was being sunk, and a tunnel is being run to drain the property at depth nf 200 feet. The mill is not running at present.

Nevada Coonty.

The lower tunnel at the Snow Point gravel mine, above Monres Flat, near Grass Valley, which is heing oponed up by the Hudson River M. Co., has been cleaned out and pay gravel found. J. Watton of Bay City, Mich., part owner, says it is proposed to run a tunnel 150 feet lower down, which will tap the channel on the bedrock. Tho tunnel will be 1500 feet long.

In Wasbington district near Nevada City, the Ethel and six other locations have been sold to tbe Gaston Ridge G. M. Co., which is composed of Maltman, Myers, Goodwin, Humphreys, Grissel & Mead. They propose to open up the group and increase development. The tunnel on the Etbel is going ahead and is in 800 feet, and in 60 feet more it is expected the ledge will he cut at 300 feet below the shaft, wbich is 120 feet deep. As soon as tbis work is completed a boist will he placed on the shaft and sinking and upraising to connect the shaft and tunnel done. The ledge on the Ethel is a foot in widtb hut high grade, says the Union. In the spring a mill will he built.

A strike is reported in the Gold Point mine, near Grass Valley. Miller & Johnson, owners, have bad men at work running a tunnel. A shipment of the ore struck sent to tbe smelter gave high returns.

On the 23rd inst. the North Star M. Co., near Grass Valley, finished an 1800-foot raise from the bottom of their Central shaft to the hottom of tbe Nortb Star shaft. The Central shaft was started four years ago and sunk 1640 feet, vertically, in search of the Nortb Star ledge, which was cut at that depth. The company then started the raise, tapping tbe North Star shaft at the 2200-foot level. The raise was made on the vein all the way up, givlng 4000 feet of exposed ledge. A. DeW. Foote is manager and engineer.

The Shady Creek gravel mine, near Nevada City, operated by elevator process under Superintendent T. Graham, bas temporarily shut down. The mine is filled with water, caused by a hreak in the Milton ditch, which runs ahove the property. It is thought operations will not he resumed till spring. They report having heen getting pay gravel.

Plumas County.

Superintendent C. R. Thompson of the Empire mine in Rich gulch, near Quincy, reports development work progressing. The main tunnel is in 590 feet, cutting the ledge at depth of 200 feet, and drifting on the vein is under way. Besides the tunnel, 200 feet of crosscuts have been made during tbe past year. Tbe ore developed carries values partly as free gold, but mostly in sulpburets, which averages 5% of the ore.

Kelley & Borden, owners of the Golden Star quartz mine, 3 miles helow Nelson Point, near Quincy, report selling an interest in their property to J. O. Mercur for Minneapolis, Minn., men, who will incorporate a company to increase development. A mill and reduction works will he huilt.

The Five Bears M. Co. has heen incorporated, with principal place of husiness in Huron, S. Dak., hy G. M. Adams, Jr., J. D. Meidinger and K. S. Wolff of Chicago, Ill., and P. Lawrence and M. Hoke of Hnron, S. Dak. They will develop a group of properties, including the Centennial mine in Genesee valley, near Genesee. With tbe mine a water right is connected, a fall of 1100 feet being ohtainahle.

Sacramento County.

The dredger of the Ashhurton M. Co. of Folsom, which was recently destroyed hy fire, is being rehuilt; electric motors furnish the power, and 7-foot huckets will be used.

Sao Bernardloo Conuty.

The Coloseum mines, Nos. 1 and 2, in Clark mining district, 28 miles from Manvel, have heen sold to F. Langford for $24,000. He has put men at work developing the property.

It is said the Bullion mine, near Copper Camp, 20 miles northwest of Manvel, will be reopened.

The Bagdad M. & M. Co. and the Chase G. M. Co. are reported to have consolidated. The properties are adjoining and 8 miles south of Ludlow. The ore from the mines is shipped to Barstow, where it is treated in the company's stamp mill.

Sao Diego County.

In addition to the Little Blue and Big Pink claims, located by the Fano-Kunzite-Tourmaline M. Co. on Cahuilla mountain, near Cahuilla, eight adjacent claims have been located by the company. Several mincrals and gems have heen found on these claims, including lithia, amblygonite, kunzite and tourmaline. The mountain is well wooded, and at the Fano camp there is a spring nf water. The company has men at work on development.

San Joaqnin County.

At the window glass works at Stockton a flow of natural gas is reported at a depth of 2300 feet, and another well will be sunk to supply the plant with fuel for its furnaces. The well, finished, furnishes 75,000 cubic feot of gas per twenty-four hours. Fuel gas is worth $1 per 1000 feet. Another well of the same capacity will supply sufficiont fuel for the full operation of the glass works.

Shasta County.

Tbe ore body is reported opened up on tbe 672-foot level of the Bully Hill copper mine at De Lamar. It carries native copper and native silver associated, says the Searchlight.

J. A. Guther of Tonopah, Nev., proposes to huild a smelter of 2500 tons daily capacity, near Igo, on Clear creek, in West Side mining district.

The Stockton C. M. Co. bas men at work at its mine, near Pit river, near Burney, building roads and doing devclopment. T. W. Vaughn and J. N. Davis, part owners, say they expect to put in a small smelting plant, as the mine is in an isolated locality and the ore would not pay for shipping to tide water with present transportation facilities. Superintendent Henderson will put on more men.

Sierra County.

The Rosasco quartz mine has been honded to T. A. McCahe et al. of Tonopah, Nev. The Rosasco mine is 4 miles from Downieville.

C. F. Humphrey of tbe Empire quartz mine at Gold Valley, near Downieville, says they will reopen and develop the mine. A. N. Butts is superintendent. In the spring the 25-stamp mill will be started up.

Siskiyoo County.

Manager M. J. Wbitney bas resumed operations on the Pine Grove placer mine, ahove Oak Bar, on the Klamath river, near Yreka.

On French creek, near Etna, 30 miles west of Gazelle, the Scott Valley M. Co., of which J. O. Welsh is part owner, proposes to huild a smeltcr. Gazelle is the nearest railroad point.

The Greenhorn or Portuguese ditcb along Yreka flats, west of Yreka, carrying water from Greenhorn to Hawkinsville, is full, enahling the owners having claims on Rocky gulch and others to work. The Punch Creek quartz mine on Humbug has developed a 5-foot vein, says Manager G. W. Grayson. He will put up a 10-stamp mill, to he operated by electric powor. The mine has hcen renamed the Mono mine.

The M. Mott group, ahove Oak Bar, has been sold to C. Gresswell and W. Harvey of San Francisco, who will work the property extensively in the spring, when machinery will he put in. M. Mott is superintendent. It comprises eighty acres of Klamath river channel.

Trinity Conoty.

It is expected full operations will he resumod at the Chloride mine, near Dedrick, owned hy the Trinity County G. M. Co.

P. Joyce, superintendent of the Mason & Thayer quartz mine near Dedrick, says a 300-foot raise has been made through a body of high-grade ore.

Tuolomne County.

(Special Correspondence.)—The recent storms bave made it possihle for the Tuolumne Water Co. to furnish the mines in tbe county with water for power. United States Forest Ranger G. Taggart reports tbat owing to the unusually mild weather in the mountains there is less snow at the higher altitudes than usual.

The Rawhide mine, near Jamestown, has resumed operations, and will employ 200 men.

At the Republican mine, Jacksonville, development work is in progress. A raise in the ore shoot has heen run from the 200-foot level to the surface, and the twenty stamps will he dropping as soon as the Electric Co. can supply power.

At the Willietta mine, southeast of Jacksonville, ore has heen struck, and a test run is heing made in their 10-stamp mill.

Near Jamestown, at the Crystalline mine, a test run will be made on ore opened up hy recent development work.——The Little Gem mine, near the Golden Gate, near Sonora, has heen sold to S. Smith of Cleveland, Ohio. This mine has heen idle for several years. Smith will

sink to a depth of 500 feet, and run levels at every 100 feet.

At the Bonanza mine, in Sonora, where a pockot was taken out last spring, dead work has heen in progress in preparation for stoping on tbe same sboot. Last week $1400 in two pieces, one of $1000 and the other of $400 value, was picked up on the surface near this property.——Work in the Sell mine is progressing. At 400-feet deptb from the surface a drift has been run south 100 feet to the ore shoot, and stoping is under way,

The Hyapo mine, on the north side of the Stanislaus river, has been bonded by A. M. Divoll & Co. of Sonora, who will put in a compressor plant and operate with machine drills. They will also build 2600 feet of flume and construct a tramway from the road down to the river. Developments consist of a shaft 150 feet deep, a drift of 300 feet to the shoot, and a little stoping. The shoot is 100 feet wide.

At tbe Vine Spring mine, near Columbia, where development work continues, a cyanide plant will be built for the treatment of tbe amalgamation tailings.

Sonora, November 25.

The App mine, at Quartz, will start up with 100 men when electric power is available, says tbe Magnet.

El Rico M. Co., operating the Bell mine, near Tuttletown, is preparing to put up a 20-stamp mill. W. J. Rule is superintendent. The mine bas been developed to depth of 530 feet. Crosscuts at 100-foot level show tbe ledge 40 feet in width, averaging $3 per ton. Tbe tracks of the Angels branch of the Sierra Railroad pass within 600 feet of the sbaft.

F. W. Tallant of San Francisco bas bought tbe Black Hawk quartz mine and millsite near Jacksonville.

E. M. Britton of Santa Clara has taken over an interest in the Slap Jack and the Ora Vesta quartz mines, 2 miles from Groveland.

A. W. Bryant, superintendent of the Prudhommo mine, near Carters, has a bond on tbe Cordova mine, near Arastraville, for $16,000, and will start oporations next week.

The Tuolumne County Electric Powor Co. proposes to run wires and supply power to the mines and mills south of tbe Tuolumne river, near Groveland and Jacksonville.

Superintendent J. F. Campion of the Nonpareil mine, near Groveland, says work has begun on the milling plant to he huilt. The main shaft is down 250 feet, with a station cut and a chute put in. A crosscut will he driven to show the width of the ore body. An adit tunnel will he run from a point above the millsite, which will cut the sbaft at the 150-foot level. This will be 200 feet in length and will give hacks of 150 feet. All rock from the mine will he trammed to the mill by way of this tunnel.

J. M. Quinn has resumed work on the Queen claim, near Big Oak Flat.

The Eagle-Shawmut mine, south of Chinese, resumed operations last week, with 200 miners at work. The mill is run hy water power.

The Big Casino M. Co., near Groveland, has the hoist at the Mack mine in operation. The concentrator room is heing huilt and the roller quartz mill is in operation in the mill. The tramway from the Two Brothers mine to the mill is expected to be finished next week.

COLORADO.

Clear Creek County.

The name of the company oporating the Terrible mine, near Silver Plume, has heen changed to Whiting M. &. M. Co. S. Elkins is prinnipal owner.

The Linn Con. M. Co., near Georgetown, is increasing development work on the Mineral Chief group. Ore is exposed in the upper workings, and the company is opening up the veins at greater depth. The company is starting auotber level from the Moline tunnel, which will give an additional depth of 375 feet. At tbe point in the Moline tunnel where this lateral is started tbey have a hack of 300 feet, and will have 2700 feet of drifting through tbeir ground, gaining maximum depth of 1200 feet, says the Courier.

The Gold Anchor M. & M. Co., at Yankee Hill, has leased the concentrating plant of tbe Unity G. M. Co., at Alice, and has it in operation. It is a 20-stamp mill and ten stamps are dropping. If the mill proves to be adapted to the Gold Anchor ores, the other ten stamps will be overhauled and put in operation. The mine has ore blocked out.

Custer County.

It is reported O. W. Murphy & Co. of Florence propose to build a mill to treat the horn silver ores mined in their Silver Bar group in Custer county.

Gilpin County.

T. Tregay and J. Son have a lease on the Wise Boy claim in Lump gulch, near Rollinsville. The main shaft on the Wise Boy is down 98 feet, and the lessees will sink another shaft 200 feet soutb. They bave 18 inches of milling ore.——Sinking operations have been suspended at tbe General Garfield shaft of the Travis Gulch M. Co. in Travis gulch, near Rollinsville, on account of tbo water being difficult to handle, says Manager Willard. It is expected they will put in plant of macbinery and top buildings to increase developments of the entire group.

Colorado and Eastern men have organized tbe Granville G. M. & M. Co. and merged as its interests the Buckley mining property in Eureka district, the Eagle thirty-five rapid-drop stamp mill and the Alsdorf tailings mill, both on North Clear creek, near Black Hawk. J. Laughran is superintendent. Tbe mine has been developed by a 600-foot shaft and bas machinery equipment and buildings. Tbe company is breaking down ore in the 150 and 300-foot levels, and making daily shipments to tbe stamp mill. The company will deepen tbe sbaft and increase other development work. B. G. Granville, of Central City, is manager.

A plant of machinery and a shaft building bave been put up on tbe Federal mine, near Russell Gulch, and last week Manager R. Hughes started sinking tbe shaft witb double shifts. The shaft is 110 feet deep and will he sunk to 300 feet.

The Mammoth Gulch M., M. & Dev. Co. is operating a group of lode and placer claims near tbe bead of Mammoth gulch at James peak, near Central City, says tbe Register-Call. They are driving a crosscut tunnel whicb is in 100 feet. Work will continue all winter. J. McNerney is superintendent.

Gray & Gilbert of Centerville, Iowa, directors in tbe Mountain Monarch M. Co., operating in Gamble gulch, near Central City, report development work will be increased this winter. The main tunnel is in 300 feet and is being driven to open up tbe Gold Coin lode, between the Setb Thomas and Cbieftain lodes. F. Augustus is superintendont.

The Elk Park M. & M. Co., owning tbe Annie H. mine in Elk Park, near Central City, bas put in macbinery on the Annie H. and the workings have been unwatered. Tbo incline sbaft is down 300 feet. C. A. McNeill is superintendent.

Gunnison County.

Manager Lockwood and Superintendont Boyle of the Brooklyn M. Co., near Elko, report building a wagon road from Elko to tbe tunnel and will move the compressor to that point. Tbe ore can be concentrated and a mill will he huilt hy the company next season.

The Branch mine, near Vulcan, C. Forberg of Lake City principal owner, will be developed.

Hinsdale County.

The Tohasoo mine in Burrows Park, near Lake City, bas closed down for tho winter.

Lake County.

The surface plant on the Fortune mine, near Leadville, has been completed and tbe machinery set up. Shipments amount to forty tons of ore per day.

The Leadville Deep Mines Co. has been formed by S. Collins et al., says the Carbonate Chronicle, to reorganize and consolidate the Big Evans, Arnold, Reno and Empire companies at Leadville.

Osgood & Sullivan, lessees on the Sixth Street shaft at Leadville, will close the property down indefinitely. They have been mining in the upper ore horizon, and in addition to shipping considerable iron ore, have heon prospecting. With the retirement of the present operators from the Sixth Street, it is thought the property will he merged with the Coronado-Midas combination.

The shortage of cars is again in evidence, says the Leadville Chronicle. While the advent of railroads to mines has done much to bring cheaper transportation, it has also, in a measure, placed the properties at the mercy of the roads, so far as cars are concerned. The coal strike has something to do with tbe present situation. Coal dealers, large manufacturing establishments and other concerns are demanding coal, and every car that can be utilized is hauling coal. But the result is bearing hard on tbe local mining industry, shifts heing laid off. The Coronado, which is in position to ship 250 tons a day, is doing little. The A. Y. and Minnie mill is also closed down for the same cause. It is estimated the production is curtailed 1000 tons a day by this cause.

Churn drills are in operation and also diamond drill explorations under way on an area of placer ground south of California gulch, near Leadville. The property to he prospected includes the south half of tbe G. H. Quigg, Mike and Little Sister lodes, covering an area 2 miles long and a quarter of a mile wide and owned hy F. W. Owers. There will he a series of drill holes put down 1000 feet apart, the churn drills to penetrate the wash and the diamond drills in the rock work, says the Carbonate Chronicle. The blue limestone horizon extends along the territory.

Few Leaville mines will be affected by the coal strike, as the railroads and coal dealers have given the mine managers an assurance of an ample supply of coal, says the Carbonate Chronicle. Tbe larger mines have filled tbeir bins, and are increasing their supply as fast as transportation facilities will permit. The closing of tbe steel works will affect one or two properties wbich are shipping manganese.

Mineral County.

The ore output of the mines of Creede district for 1903 to Nov. 15 is as follows:

Month.	Tons.
January	5,283
February	5,788
March	7,072
April	5,715
May	5,645
June	5,711
July	5,636
August	6,896
September	6,891
October	6,914
November (to 15th)	2,747
Total	63,798

Park County.

A six years' leaso and option on tbe Moose group on Mt. Bross, near Alma, bas been given to J. Moynahan of Alma. Work bas hegun. The buildings are being repaired and the tunnels and other openings cleared.

Saguache County.

V. A. Robinson, chemist for the Steel Canyon M., M. & I. Co., oporating near Villa Grove, reports the presence of bismuth in their ores in values varying from $40 to $60 per ton. The metal occurs with the lead ores and in tbe extraction tbe lead would be recovered as a bi-product in marketable form. Should quantity of the ore warrant, the company proposes to build a plant for treatment on the ground.

San Juan County.

The Astor M. & M. Co. bas reacbed 800 feet on its crosscut tunnel wbich is being run at tbe moutb of Picayuno gulcb, near Silverton, and when completed will be 1200 feet in lengtb. It will cut the Toltec system of veins. The vein is 40 feet in widtb. When the vein is cut 700 feet depth will be attained. In tbe upper workings a milling proposition is indicated, and should the lower tunnel prove the same cbaracter of ore a concentrating plant will he huilt near the mouth of the tunnel, where the company holds a millsite and water power plant of 250 H. P., says Superintendent E. C. Condit. Tho railroad bas been completed to this point and passos just where the mill will he located.

San Miguel County.

F. Parker and C. Harris have a lease on the Yellow Girl, one of the loads of the Suffolk group, near Telluride, and have started work. A lower tunnel will he driven to get under the old workings.

There are twelve men at work at the Nellie mine, near Telluride, on development, and considerable ground has beeu opened since beginning of the strike, says the Telluride Examiner. C. Anderson, manager, will keep a few men at work all winter, or until the mills resume.

On the 24th inst. 500 members of the State militia arrived at Telluride and are encamped ahout the mines and mills of the district. One hundred men wore sent to Ophir Loop and Eames Station, 16 miles southwest. The Tomboy G. M. Co. is arranging to resume.

Summit County.

The Fremont-Vineta M. Co., near Breckenridge, has sold its holdings on the Swan to J. M. Thomas, and the El Dorado M. Co. has heen incorporated to operate the group. Mr. Tbomas will have general charge of operations.

Near Kokomo the Iron Mask mine, on Sheep mountain, is producing steadily. Sinking on tbe ore shoot shows copper sulphides with the iron.

Teller County.

Manager Bainhridge of the El Paso mine, on Beacon Hill, at Cripple Creek, says he is hreaking as much ore now as at any time in tbe bistory of the mine. Tbe ore is of average grade. The work of extending the drainage tunnel from the El Paso shaft, to cut the dikes that show in the top of Beacon hill, continues. However, it is not expected to be completed before the first of the year.

The Findley mine on Bull hill, Cripple Creek, bas fifty men at work in two shifts, and is shipping out a carload of ore a day, consisting of twenty-five tons, which gives returns of $25 per ton. The new hoist, similar to those on the Ajax and Strong mines, will be in oporation hy January 1.

C. C. Hamlin, secretary of the Mine Owners' Association at Cripple Creek, says the coal strike will not interfere with the mines of Cripple Creek camp. Many of the large mines are well supplied with coal, having enough on hand to run them for sixty or ninety days. The strike is over, in so far as tbe association is concerned; all of the properties are working, and will continue to work. Additional shifts are being put on.

Tbe shaft of the Granfiold lease on the C. K. & N. mine on Beacon bill, Cripple Creek, is down 525 feet and will be put to 600 feet. Two levels will be run, one at 450 and the other at 525 feet, to open tbe vein. Granfield will make tbe 525-foot level the main workings for the lower portion of the mine, as this is just tbe level of the El Paso drainage tunnel, and it is bis intention to connect the two mines at this depth. To do this it will be necessary to drive 300 feet from the 525-foot level connecting with a drift being run out by the El Paso Co. on the C. K. & N. vein in tbe former's ground. The lower C. K. & N. vein is slightly higber than tbe El Paso tunnel in order to give drainage, as it is intended to put in a pump in the C. K. & N. shaft to lift the water from tbe lower portion of that mine into the 525-foot level. Tbe C. K. & N. Co. management reports tbe El Paso drain is draining tbeir property so that tho water level is considerably lower than where tbey were working in tbe main shaft.——The El Paso Co. will increase its production in November to 1800 tons (output of October, 1000 tons). At tbe mine forty additional miners have been put to work, making 150 men on tbe payroll. This equals the output before the strike. The vein opened in tbe 500-foot level is improving. The drainage of the mine through the tunnel is discbarging 1600 to 1800 gallons per minute.

Several arrests have been made by the militia for suspected connection witb the explosion in the Vindicator mine, at Independence, which killed Superintendent McCormick and Foreman Beck. Evidence being collcted shows it was the result of a plot, and similar plans, involving two other mines in tbe district, are reported to havo been discovered and frustrated.

IDAHO.

Boise County.

Tbe Ingle M. Co., which bolds bonds on the Belsbazzar, Mountain Chief and Centennial quartz claims near Placerville, has made first payment and has operations under way. The claims show ore, the values being mostly in iron sulphidos. The Belshazzar ledge is 12 feot wide and has been doveloped to depth of 125 feet by tunnel.

Blaine County.

H. J. Hoyt of Muskegon, Mich., and F. M. Cook of Chicago, Ill., et al., have takon up the option on the Red Elepbant group of mines near Bullion, near Hailey.

Tbe Idaho Con M. Co., Ltd., owning twenty-five claims in Hailey district, has men at work. Its operations thus far are limited to claims on tho Minnie Moore vein between Star gulch and Broadford, where eighteen miners are working, besides teamstors getting in timbers and supplies. Next spring it will oxtend its operations to its other claims at and near Bullion.

The Minnie Moore mine, near Hailey, is shipping 1000 tons of ore per montb, the ore averaging 124 ounces silver and 50% lead. There are 100 men employed hy the Minnie Moore M. Co.——The Crœsus mine is sinking 1000 feet and 4 feet of ore have heen cut.——The Idaho Democrat is producing and making regular shipments of ore.——The Comet group on Deer creek is heing opened up.——Tbo Idabo Con. M. Co. has startod operations on its mines near the Minnie Moore.——Miners are said to he scarce around Hailey.

A. Brown of Salt Lake City, Utab, says the reported sale of tbe Red Elepbant group, near Hailey, did not occur.

Vancil & Carpenter report a strike in the Idaho Wonder group of five claims on Muldoon creek, 4 miles east of the Muldoon smelter and 28 miles from Hailey. The W. O'Connor group of eigbteen claims in Garfield guloh is west of the Idaho Wonder. In the Wonder the ledge outcrop shows a hody of ore 200 feet long, which contains 14 inches of galena assaying 70 ounces silver and 55% lead. The vein has heen stripped for 30 feet.

The Quincy Junior M. Co. has heen incorporated at Salt Lake City, Utab, to develop a group of claims in Mineral Hill mining district hy W. V. Rice, H. J. Hoyt and W. W. Armstrong.

Canyon County.

Manager R. B. Hennehery will start work on the Badger Girl group of mines west of the Dewey claims, near Emmett, next week. It is intended to sink a 200-foot incline shaft following the ledge. Hennebery is putting in a sawmill on Cottonwood to get out timbers for the mine.

Kootenai County.

At Tyson the Tyson Con. G. M. & M. Co. has settled its diffcrencos between

Neil, Tyson Bros. et al., and has bought the entire property. The deal, with the properties under option by the Con. Co., will give it 500 acres of proved placer ground. The amount paid for the Gold Nugget, the property in dispute, was $15,000. The company will put in a pumping plant, so as to have a continuous head of water for hydraulic mining. R. Neil says that when the hydraulic plant is in operation the ground can be worked eleven months in the year.

Latah County.

A. Walker, of Butte, Mont., has bought the Blue Diamond mines, near Moscow, and the Central Idaho M. Co., Ltd., will be formed to develop it. A 14-inch vein of ore has been opened that assays $14 per ton. A mile and a half from the Blue Diamond is the White Cross, operated by Moscow men with a 5-stamp mill. The company is preparing to put in an air compressor. They have been operating a steam drill.——M. J. Shields, owning placer ground 6½ miles from Moscow, will put in a dredge.

Lemhi County.

A discovery of tin in paying quantities is reported made near Salmon City by N. J. Andrews and J. M. Langsdorf. The ore has been assayed, showing 13% tin, says the News.

Owyhee County.

The Addio mill near Silver City is in operation on ore from the dump at the Empire mine. It will also crush Morning Star ore.

Shoshone County.

The North Franklin mine, near Mullan, will drive a tunnel 800 feet in length. The North Franklin consists of six claims adjoining the Morning mine side lines on the north, and this tunnel will be run about on a level with No. 5 tunnel of the Morning mine. The company expects to secure compressed air from the Morning plant for this work.

W. J. and W. S. Harris of Spokane, Wash., operating placer and lode holdings near Pierce City, say they will increase work in the spring. A two-compartment shaft will be sunk on the main vein. Two tunnels will also be started on the other two claims of the group. The placer ground which they will work lies along Orofino creek and comprises 160 acres. The ground is flat and averages 20 feet in depth to bedrock. Six prospecting shafts have been sunk. Four dredges, to be run by electricity, will be put on the ground. Some of the ground which was worked in former years, will be worked over by the dredges.

Washington County.

It is reported that the American S. & R. Co. has secured options and bonds on forty copper and lead properties in Heath mining district, 50 miles from Weisor. It also secured options and bonds on a number of claims in Sevon Devils district.

KANSAS.

Cherokee County.

The Murphy M. & R. Co. of Empire has been incorporated by J. and R. Murphy of Empire, with W. L. Crockett, H. C. and B. Murphy and W. J. Leffen of Joplin, Mo. They will operate in Empire district.

MICHIGAN.

Houghton County.

The Isle Royale mine, near Houghton, has stopped diamond drilling, after securing a complete cross section of its lands at a point 1 to 2 miles south of the present workings, and the machine has been removed to the Cliff mine, in Koweenaw county, where the drill will supplement and complete the exploratory work begun by trenching across the formation, says the Record.

The Mesnard shaft of the Quincy mine, at Hancock, is roported making a satisfactory showing, especially the bottom or eighteenth level, in the drifts extending to the Franklin boundary. A good showing is also made in the tenth level south.

The October yield of the Baltic mine, at Painesdale, was 720 tons of mineral, or over 1,000,000 pounds of refined copper. Baltic rock is said to be hard and in the matter of tonnage treated the mill results have not equaled the average of its neighbors. This feature has been overcome by the installation of sets of rolls by which the coarser rock is treated, with the result that one of the Baltic stamps has crushed 590 tons of rock in twenty-four hours, and also treated 550 tons of rock daily for an extended period. It is estimated that the four stamps will be crushing 2200 tons of rock daily before the end of the year. But little waste rock is hoisted, the surface discard varying from 4% to 8%.

Ontonagon County.

At the Michigan mine, at Rockland, the air compressor is in operation. Sinking and other extension of openings has been suspended temporarily, so that the stopes may be put in shape to feed the mill. Sixteen drills are working. The number will be increased. B shaft house will be ready next week. The Michigan mine management has decided, in lighting the rock house and power house, to use acetylene gas instead of electricity. Rockland, where the mine is situated, is said to use acetylene gas quite generally for illuminating purposes.

MISSOURI.

Coal is said to be mined in marketable quantity in thirty-seven counties in the State, the coal area covering 23,000 square miles and the annual production being of $5,000,000 value.

Christian County.

Of the iron ore recently found at Billings seven cars shipped to the St. Louis Blast Furnace Co. gave returns of 58% iron, says the News-Herald. The company, which has been organized, will put up blast furnaces at the mines.

Jasper County.

F. R. Breckwith, manager of the Premier M. Co., has put in machinery to sink a shaft on the Guinn land, north of Webb City. At depth of 200 feet the drill cuttings show an 18-foot face of zinc ore.

Prospect drilling is under way on the Holon Hare lease, near Joplin, for L. Winters.——The Ricksecker shaft on the Shoman lease is below the first 6-inch vein of coal struck. A core drill will be sunk to prospect the ground.

Lawrence County.

At the Bolle Alice mine, at Aurora, owned by J. T. Barbre & Co., a drift is being cut at depth of 167 feet, in which a body of ore has been faced up 50 feet in height by 30 feet in width. The company proposes putting up a mill.

MONTANA.

Cascade County.

The Cottonwood Coal Co. will increase operations at its mines at Stockett. The Great Northern has given orders to continue the movement of coal from the Stockett mines to its supply points between Devil's lake and Chester.——At Belt there are seventy pick miners steadily employed.

Deer Lodge County.

M. J. Kirkpatrick, who has been working a small mill on his mine at Nine Mile on Mill creek, near Anaconda, says they have discontinued for the winter, as the snow is too heavy there for work to be carried on successfully.

Fergus County.

J. Borg has bought the Bright one-third interest in the coal mine of the Spring Creek Coal Co., 3 miles up Spring creek from Lewistown, for $7000. This makes Borg & Green sole owners, who control 600 acres of coal land. They have thirty-five men employed in the mine. Considerable development work is being done, and they are taking out fifty tons per day. They are sending two carloads a day to points along the railroad, and this demand is said to be increasing. The vein runs 4 to 5 feet in thickness. Next month they expect to be taking out 100 tons a day.

M. Soloman of Kendall has bought the Missouri lode in North Moccasin mining district.

R. E. Hamilton has leased the W. G. Norman coal mine, 8 miles east of Lewistown, and is preparing to work the property. The mine will be developed to produce at least fifty tons per day.

A one-half interest in the J. J. Bullard group, adjoining the Barnes-King claims, near Kendall, has been sold to F. S. Wiedenborner and A. F. Lehman, of St. Paul, Minn., who will increase development work, with J. J. Bullard as superintendent.

C. A. Case, of Lewistown, has bonded the Bertha group of mines, in Cone Butte district. The group contains ten claims. An experimental cyanide plant was built the past summer and worked successfully until cold weather interfered. Surface assays run $4. According to the terms of the bond, Case will build a mill within one year. Development will be increased.

Flathead County.

A. Brown of Libby, part owner of the Huron group of claims in West Fisher district, says development work is under way on that group, which consists of the Huron, Goat Mountain, Mountain Forest, Gold Nugget and O K quartz lodes and the Holiday placer and Snowcloud millsite. The lode claims are on Great Northern mountain and the placer and millsite are on Fisher creek. The principal development is on the Huron. The ore carries free gold. Salt Lake City, Utah, men are negotiating for the group.

Jefferson County.

A gold strike is reported made on the slope of Gold Flint mountain, near Clancey, by W. Brown in an abandoned prospect. A portion of the side of the tunnel had caved, showing a streak of ore 10 inches wide, showing free gold assays.

Lewis and Clarke County.

The Cokedale coal mines, which have been idle for several years, have been unwatered after six months of steady pumping. The collieries are owned by the Amalgamated C. Co.; 300 men will be put to work and coal mined for the company's smelters at Anaconda, Great Falls and Butte. The operation of the Cokedale mines is expected to lessen the production of the coal mines at Diamondville, Wyo., and Pleasant Valley, Utah, where the Amalgamated Co. is now getting the greater part of the fuel used in its mines and smelters.

NEVADA.

Eureka County.

(Special Correspondence).—A shipment of eight tons of ore from the McNaughton mine, adjoining the Silver Connor, near Eureka, has returned $1080 net to the owner, J. McNaughton. This is the first shipment made for several months.

N. Daily will develop his Montezuma group of mines in the Diamond range this winter.

R. Robinson, working the Old Bay State mine at Newark, has taken out a shipment of ore assaying $50 per ton. The ore carries some copper. Native silver in paying quantities is carried by the ledge, which is 3 feet in width.

W. Laird and D. Morris are working their Sunset claim, west of the Albion. The ore shows silver chlorido.

The Eureka Con., the Richmond and the Diamond mines continue to make regular shipments of lead carbonate, carrying gold and silver. Ore is being taken from the sixth and ninth levels in the Eureka and a 200-foot drift on the third is showing values. Ore is being taken from the first and fourth levels, below tunnel No. 1, in the Diamond, and a crosscut is being run from the tunnel level west, which is in the limestone, 300 feet. Tributers are working from a winze below the main tunnel in the Richmond, and also in the sixth level of the 1200-foot shaft.

Eureka, Nov. 24.

Esmeralda County.

The Douglass mining property, southwest of Tonopah, has been sold to E. G. Minard of New York for the Tonopah M. & Ex. Co. of New York. The property consists of sixteen claims and a mill with water sufficient for milling purposes.

In Goldfield district, south of Tonopah, the Blue Bull group was bonded to J. P. Sweeney for $100,000. It has ledges showing gold values and comprises nine claims 1 mile east of the Combination group.

Lander County.

T. H. Borland of Oakland, Cal., superintendent of a group of claims in Blue canyon, near Battle mountain, which he has been developing, says operations are suspended for the winter. They will resume in the spring and a mill will be built.

Lincoln County.

A body of ore has been struck in the Wild Irish claim at Pikes Diggings, near Pioche, owned by Hollinger Bros. and D. Francis. They have men at work and the main shaft is down 100 feet with crosscut in the bottom showing a 10-foot ledge of free-milling gold ore. The owners propose to build a 30-ton capacity mill at the mine.

Nye County.

Turquoise is reported found ½ mile from Ray, north of Tonopah, by A. Kunze. He will develop it by sinking a shaft.

Washoe County.

At Olinghouse a prospecting core drill has been put in operation at mill No. 1 to get an artesian flow of water for the Springfield-Nevada M. Co. Lumber is on the ground for the Olinghouse stamp mill. Superintendent E. H. Proctor says he has mill No. 1 ready for custom work.

White Pine County.

Near Cherry Creek the Joanna mine deal, between W. Watson, the owner, and Cripple Creek, Colo., men, has fallen through, says the Cherry Creek Miner.

A new rate of $13 per ton on ore has been made from Cherry Creek to Salt Lake City, Utah, by the Southern Pacific Railroad, if same is shipped via Toans.

NEW JERSEY.

Morris County.

Notices were posted on the 24th inst. by the Empire Steel & Iron Co. in Mount Hope, Hibernia and the other mines in this county to the effect that a 10% reduction would be made in the wages of all miners, beginning Dec. 1. Also, that only one shift of men would be used where two formerly worked. The order affects 3000 men. This is in addition to the cut of 15% made Oct. 1, the shutting down of the Wharton mines and the blowing out of the Port Oram furnaces.

NEW MEXICO.

Bernalillo County.

Development work will be increased on the Nuestra Senorita de los Milagros gold mine in Hell Canyon, near Albuquerque. C. M. Nelson, Jr., of New York and A. F. Wuensch of Denver, Colo., are interested. A shaft is down 120 feet.

Sandoval County.

Another retort has been added to the equipment at the sulphur works of M. S. Otero at Sulphurs. The weight of the retort is 4600 pounds, and six horses were required to freight it from Albuquerque to Sulphurs, says the New Mexican.

Socorro County.

A company has been organized at Clifton, Ariz., by G. Williams, R. Wayland, C. Pinckney, C. Goldon, E. Gray, J. Kirby, M. Todd, G. Gray and A. Charles, to develop coal and oil prospects near Socorro.

OREGON.

Baker County.

Topping and Whittier of Sumpter, who have a bond on 160 acres of placer ground in Dead Mule gulch, are preparing to increase work. The plan is to prospect up the main gulch to define operations for the spring. The property is equipped with one giant, and they propose bringing in another ditch which will increase the water supply and lengthen the season.

N. Berkley of Pendleton, having a bond on the Buffalo mine, in Magnolia district, says he is arranging to reopen the mine. The Buffalo has been idle for two years.

Operation of the 10-stamp mill of the Octo M. Co. on the Elkhorn slope, near Baker City, began last week, says Manager A. B. Patterson.

Douglas County.

A. E. Carlson et al. last week bonded the Rowley copper group at Riddle for $50,000, says the Roguo River Courier. Work has been resumed.

Grant County.

The 5-stamp mill on the Colorado mine, in Quartzburg district, near Granite, owned by the Equity M. Co., is in operation, says Manager W. J. Hughes of Baker City. The plant has been overhauled and a table concentrator added. The mill is ½ mile from the tunnel on the Colorado mine and ore is haulod down by wagon. Development work continues.

Josephine County.

The Capital City G. M. Co. of Sacramento, Cal., has made final payment on the Baby mine, in Jump Off Joe district, near Grant's Pass, which it has had under bond. C. C. Higgins is superintendent. The ore carries free gold. The mine is being developed by a tunnel, tapping the ore body at depth, drifts being run on the vein.

The offices of the Golden Drift M. Co. have been changed from Chicago, Ill., to Grant's Pass, near which are located the mines of the company. Manager M. C. Ament says work is progressing on the dam being built on Rogue river. There are fifty men employed and they are filling up the 12-foot cribs with rock and earth, which is hauled on cars and dumped directly into the pits by a system of cables operated by a gasoline engine. The cars are filled by a steam shovel. The dam has a width of 120 feet on the river bed and 16 feet on top, while the length of the dam is 700 feet. There will be four 18-inch, five-step compound centrifugal pumps, each of which will deliver 9000 gallons of water per minute, which will raise the water from the reservoir, says the Rogue River Courier. This will supply water for six pipes equipped with 2⅜-inch nozzles. Power will be generated by sixteen 46-inch turbines working under a 20-foot head, and developing approximately 5000 H. P. Generators will be installed and electric power transmitted.

Colorado parties have bought the Queen of Bronze copper mine, on Illinois river, near Waldo, and they are increasing development work under Superintendent A. Murphy. A vertical shaft will be sunk for 500 feet.

The Gold King M. Co., which is developing the Gold King mine, on Josephine creek, near Grants Pass, has bought the adjoining placer claims of Bour & Day. These claims are accompanied by water rights, which will be used in supplying power for developing and working the Gold King mine.

SOUTH DAKOTA.

Lawrence County.

The semi-monthly cleanup by the Spearfish Co. last week produced $16,000 in gold bullion. The foundation has been

laid for the air compressor at the mill. This machine will have capacity to operate twelve drills, and to convey air to the mine will require 3500 feet of piping. The company propose the addition of a third more tanks to the leaching department.

The 20-stamp wet crushing cyanide mill of the Lexington Hill G. M. Co. in Spruce gulch, near Deadwood, was closed down last week temporarily pending placing of amalgamating plates, says Manager E. F. Woodworth. The character of the ore has changed. The ore is mined from the Cambrian ore measures and tests show it to carry free gold. The ore will be crushed in water, amalgamated and concentrated and then cyanided. Tahles will be used for the concentration.

After a shut down of several weeks, during which time the process of treatment has been changed, the 60-stamp mill of the Hidden Fortune M. Co., near Lead, is again in operation. The slimes capacity of the plant has been increased by the addition of three vats 16 feet deep and 24 feet diameter. This gives the slimes plant eight vats, five of them being 16 feet deep and 12 feet diameter. To save the free gold an equipment of silver plated copper plates has been put in at the lower end of the mill, over which the sands will flow after having been subjected to cyanide treatment. Riffles are also set between the batteries and the vats in the launders through which the pulp flows to save the coarser particles of free gold.

Work has been resumed on the Safe Investment group near Greenwood, on Box Elder creek, 6 miles southeast of Perry, says W. H. White of Chicago, Ill., who is interested.

The Tinton M. Co. at Tinton has the framework of the tin reduction plant up, and the machinery is being set up.

Manager McLaughlin has the entire 120 stamps of the Horseshoe mill, near Terry, dropping, says the Lead City Call. Superintendent Griggs says the machinery is working satisfactorily.

TEXAS.

The Reporter says it is estimated hy operators familiar with the situation that 13,000,000 harrels of oil, the product of Sour Lake (Hardin county) and Beaumont (Jefferson county) wells, is in storage at present. The principal stocks are estimated as follows: J. M. Guffey Petroleum Co. (Sour Lake, Beaumont, Port Arthur, New Orleans and eastern stations), 4,500,000 barrels; Security Oil Co., Burt refinery (Beaumont, Sour Lake and Sahine Pass), 3,000,000 harrels; the Texas Co. (Beaumont, Sour Lake, Port Arthur, Sahine Pass and New Orleans), 2,000,000 harrels; Southern Pacific Co. (Texas and Louisiana points), 1,500,000 barrels; Higgins Oil & Fuel Co. (Beaumont and Sour Lake), 500,000 harrels; Sun Co. (Beaumont, Sun and eastern stations), 200,000 harrels; Santa Fe Railroad (at various points on Gulf division), 200,000 barrels; International & Great Northern Railroad (points in Texas), 100,000 barrels; Sour Lake and Beaumont (miscellaneous storage), 1,500,000 harrels. On August 1st the amount of Texas oil in storage was put at 7,500,000 to 8,000,000 barrels. The increase since that time is attributed directly to the large production at Sour Lake. For a while the production there was 75,000 barrels a day, though it has now fallen to 55,000 barrels daily. The pipe lines of the Guffey Co. and the Texas Co. are taking from 24,000 to 26,000 harrels a day to Beaumont and Port Arthur. The Southern Pacific Co. from the 1st to the 12th of October averaged eighty-six cars a day, including all shipments. Most of these cars are of 300 barrels capacity each.

UTAH.

Beaver County.

Operations will be resumed at the Copper Ranch and the Copper Mountain mines, of which B. T. Lloyd of Salt Lake City is manager.

Box Elder County.

The Barker M. Co. has been incorporated at Ogden to develop a group in Willard mining district by J. N. Barker, H. E. Steele and B. Ternes.

Carbon County.

Superintendent N. F. Cameron last week posted the following notice at the Winter Quarters mine, near Scofield, says the Trihune: The company will raise the price of $2.50, paid to inside drivers and day men, to $2.75 per day, and the pay of hoys will he raised proportionately. Also the price of $2.75, paid to inspectors, head timhermen and head tracklayers, will he raised to $3 per day, while outside laborers will he given an increase of 10%. In addition to the above, the mine superintendent will make the pay of miners working in places where they have to contend with water, bad roof, clod or any other drawhack so that the pay of such miner will equal the miners' average earnings throughout the mine under average conditions.

The entire State militia, numbering 400 men and consisting of infantry, artillery, cavalry and signal corps, has heen sent to the coal fields of Carhon county—Scofield, Sunnyside, Winter Quarters and Clear Creek. This action of Governor Wells was taken after official investigation into the conditions in the striking camps. Brigade headquarters have been established at Scofield. State Coal Mine Inspector Thomas reports that more miners are on strike than has heen previously reported. At Sunnyside less than 100 men out of 850 are at work. At Castle Gate only twenty-four men are at work. The main point of difference hetween the miners and their employers is recognition of the union, and this the coal companies refuse to consider.

Joab County.

The Bullion-Beck mill at Eureka will he put in operation, and hy January 1 will be treating 300 tons of ore daily, says the Tintic Miner. W. H. Peck, who has a lease on the low-grade ores that have been accumulating in the old workings of the mine, is repairing and adding to the machinery. The plant will keep fifty men at work.

The holdings of the Silver-Copper King M. Co. of West Tintic, near Eureka, have heen sold to W. Groesbeck of Salt Lake City for Eastern men for $50,000. Work will he started this week to develop the veins which are exposed on the surface.

Plute County.

The Surprise G. M. Co. was incorporated last week at Salt Lake City to work a group in Gold Mountain district, near Marysvale. The officers are W. James, W. F. Snyder, W. Armstrong and H. G. Fisher.

Salt Lake County.

Operations will he resumed this week at the Peruvian mine at Alta, says Manager Clays. During the winter work will he directed to the tunnel to cut the vein. After this a raise will be made and a drift-hack he cut. The ore carries copper values.

The ores forwarded hy the Boston Con. of Bingham to the furnaces of the United States M. Co. are maintaining an average of nearly 8% copper, with $2.50 gold and some silver, says the Trihune.

The Highland Boy Con. M. Co., owning and operating the Parnell group of mines at Bingham, has been taken over hy A. J. Orem of Salt Lake City, as president of the Apex M. Co., operating in same camp. The consideration is said to he $150,000. Just what influence the transaction will exert on the litigation existing hetween the Highland Boy Con. and the Petro M. Co. is not known, hut it is thought action will be called off. The Highland Boy Con. adjoins the Highland Boy mine.

The Ohio C. Co. has heen organized at Miamisburg, Ohio, with H. Catrow and A. J. Bettles as officers. This company recently took over the holdings of the Columbia M. Co. at Bingham for $225,000. The ores in the All's Well ledge show 13% copper in addition to the silver and gold, says Manager Tibhitts.

The Dewey mill in Bingham canyon, near Bingham, is in operation on second-class ores from the Fortune mine, says R. Bemis, manager.

Another copper furnace will he added to the equipment at the United States smelters, near Salt Lake City. This will be No. 6, and it will hring the smelter up to its full capacity, says Managing Director Holden.

An electric locomotive will be put in hy the Boston Con. C. Co. of Bingham on the Copper Belt railroad.

Manager J. P. Sprunt of the Kilmenack mine, 12 miles north of Salt Lake City, says the tunnel which is heing driven to cut the vein at depth of 250 feet helow the surface has 110 feet remaining to be driven. The ledge runs east to west and is 8 feet wide at the surface, showing copper. The concentrates show a value of $24 gold, 11% copper and 38% iron.

Operations will be resumed at the Galena mine at Bingham by the United States M. Co. Superintendent Leon will put up a shaft house and other surface improvements and begin development.

The Shawmut M. Co. property at Bingham, consisting of the Cuha group of eight claims and the Shawmut mill, was transferred to E. W. Foote, C. A. Hardy and E. F. Barnes for $9100, being sold under foreclosure. It is expected they will increase development.

Sanpete County.

A hond and lease on the Viking mine of Sanpete county has heen given to J. N. Jacobson of Salt Lake City, who will hegin development work next week.

Summit County.

An electric plant, including 100-kilowatt three phase, 60-cycle generator, has heen put in at the Daly-West mine, at Park City, for supplying power to the slimes plant, and to the crushing machinery to he added to the mill; also, for lighting the mill and mine, and for the surface plant of the Quincy mine.

Negotiations are reported under way hy the Diamond-Nimrod M. Co. to buy the West Ontario group of claims, near Park City. A cage is heing put in at the shaft and the 85 H. P. boiler and 65 H. P. engine are in place. Sinking will he resumed. The shaft is down 170 feet and will be sunk to the contact vein. A 2800-foot water line has heen laid from a spring on the Daly-West ground.

S. Spiro, of the Silver King Con. mine at Park City, says the new plant at the mine is in operation.

Tooele County.

A. Murphy has a hond and option on the Daisy mine, on the west dip of Camp Floyd district, near Mercur, says the Mercur Miner, and has begun operation of the property, wbich is equipped with a cyanide mill.

The holdings of the Silver Eagle G. M. & M. Co. of Chillicothe, Mo. (formerly the West Argent M. Co.), at Stockton, have heen leased hy Mackelson & Cornue. The Honerine tunnel is draining a portion of the Silver Eagle ground.

Manager Trenam of the Stockton mine, at Stockton, says a double station is heing cut at the 700-foot level and drifting will be started at east and west from the shaft. On the 600-foot level the drift is nearing the vein which was opened up on the 500-foot level which showed values. ——The frame of the Honorine mine is going up.

Utah County.

Gold ore is reported found near Springville.

Weber County.

At the Southern Pacific mine, near Ogden, Manager Burnham of Salt Lake City reports work going ahead. A main tunnel is being run to open the ledge several hundred feet below the surface. Work is also being done in the shaft. Assays of the ore show values of 15% copper.

WASHINGTON.

Okanogan County.

At Bodie the Gold Dust mine, adjoining the Bodie mine on the north, has been sold to President Parker of Spokane of the Toroda M. Co., operating a group south of the Bodie.——E. J. Delhridge, manager of the California mine, near Republic, has taken an option on the Elk group, 2000 feet east of the Bodie mine, on a parallel vein, and W. G. Madison, president and manager of the Bodie M. Co., has a bond on the Agitator group, 1 mile east of Bodie.

Snohomish County.

Improvements will be made at the smolter at Everett to the extent of $100,000, says Manager E. B. Braden of Helena, Mont. The Everett plant will employ 150 men at the start. Bradeu will also he in charge of the Monte Cristo mines, which will be worked by the company.

Stevens County.

J. Gray of Spokane, manager of the Crystal M. Co., says a smelter will be built at the Crystal mine, ¾ of a mile from Fort Spokane and 25 miles north of Davenport, on the Columbia river. When tho smelter is running they will mine 100 tons a day. There are 3000 tons of ore on the dump. The ore is galena, with values run in silver and lead, with copper and gold. The mine has a 50 H. P. boiler and a 32 H. P. hoist. Tbe Bellingham Bay railway is surveyed through the town site, which has been laid out.

With 180 men on the payroll in all departments, the smelter is treating 800 to 1000 tons of ore daily in four furnaces, says Manager E. J. Wilson of the Northport smelter of the Le Roi No. 2 C. Co. of Rossland, B. C. The system of automatically dumping the ore into the furnaces from the cars is working economically and has reduced the crew. The supply of Crow's Nest coke keeps up.

Whitman County.

The Bucyrus Dredging Co. of Bucyrus, Ohio, will remove its dredger from Alder Creek, Mont., to the Hoodoo district, on the Palouse river, east of Palouse, and put it to work on a strip of placer ground 7 miles in length, lying along the river hottom, to which this company has ohtained title, says Manager F. M. McNeal. ——The Blue Bird quartz claim, in the lower part of the camp, will resume work. It is owned hy Iowa men as the Chickasaw M. & M. Co.

J. C. Northrup & Sons have ten quartz claims at Hoodoo which they are developing. They have driven 100 feet of tunnel on the Black Diamond claim and opened 10 feet of ore carrying $10 in free gold. The tunnel was started on the Black Diamond, hut tapped the ledge on the Apex claim.

WYOMING.

Carbon County.

Ore containing platinum in commercial quantities is reported heing produced by the New Ramhler mine, near Ramhler.

Uinta County.

There are three rigs at work in the oil field at Fossil, says the News. At the Glohe well Manager Smithers is piping the gas from the well to run his hoilers. This well is down 540 feet. The Idaho people company is still drilling, heing down 1500 feet. The short rig is also in operation.

FOREIGN.

AFRICA.

Rhodesia.

Manager T. G. Davey of the Rhodesia C. Co. reports from the Bulawayo office, under date of Nov. 4: Rhodesia Broken Hill developments progressing with satisfactory results. Work has hegun on the B'wana N'Kuha; also 140 new claims have heen pegged.

Transvaal.

The East Rand G. M. Co. reports recent borings near the properties indicate that the main reef has heen struck and will run through several of the company's farms.

AUSTRALIA.

Western Australia.

At Black Range, near Kalgoorlie, the Black Range G. M. Co. has put up a 10-stamp mill. —— Wilke, Wilkinson, Laidlaw & Denholm, owners of the Princess Alix mine, report opening up the reef, showing 2 feet wide, with values of five ounces gold per ton.

The Rohinson mine's main lode at Kanowna is being crosscut at the 500-foot level, and the whole of the 20-head stamp mill will he utilized for tho mine's own rock instead of using some of the stamps for customs work. It is the intention of the management to deepen the main shaft with a view of picking up the continuation of the Rohinson lode at vertical depth of 700 feet.

The Nullagine Conglomerate mine, at Nullagine, Pilbarra goldfield, has closed down for an indefinite period, owing to firewood supplies heing shut off. It is thought locally that unless some movement takes place at an early date in connection with building the proposed railway, from the coast to Nullagino, other mines will be compelled to suspend operations, says the W. A. Journal.

A second cyanide plant has heen built for Lambert's Treatment Co. at Sandy Creek, 20 miles from Nullagine. A large dump of tailings has accumulated and after they havo heen treated the company intend to cyanide the sands at Mosquito creek.

BRITISH COLUMBIA.

Boundary District.

Several small properties in the Boundary district have had development work started on them. Averill et al. are working the Eagle and also the Minnie, in Summit camp, near the Emma mine. C. Simpson is working the Iron Chief, adjoining the Betts & Hesperus group. W. T. Smith has started work on the Emma fraction in Summit camp. J. K. Fraser is working the Evening Star, and G. W. Rumberger is developing the King in the same camp.

G. A. Rendell, who leased the Ethiopia mine, in Long Lake camp, has men at work and shipping ore is heing taken out.

The Granby smelter at Grand Forks is in full operation, No. 5 and No. 6 stacks having heen blown in. The smelter is handling 2000 tons of ore daily. During October the output of the Granby mines was 39,398 tons, which is expected to he increased this month. The Mother Lode mine at Deadwood sent out 12,665 tons and the Snowshoe, at Greenwood, 9480 tons. A number of miners from Butte, Mont., have found work in the Boundary mines since the shutdown of the Amalgamated properties.

The Bank of England mine at Phœnix, and near the Snowshoe mine, is under lease and hond for $20,000 to W. W. Carter, who has men at work on the mine. Arrangements have heen made for a test shipment to one of the Boundary smelters.

At the Granby mines, at Phœnix, the company proposes to do away with the haulage of mine cars hy horse or mule power, and will put in two small steam locomotives. It is expected they will haul from five to seven mine cars each, and will he used in No. 1 and No. 2 tunnels of the mine. Shipments have heen increased to a 2000-ton daily rate.

Cassiar District.

D. Yule of Queen Charlotte Island reports finding mineral on the east coast, consisting of three parallel ledges respect-

ively 40, 5 and 2 feet. An annlysis shows 35% cent of zinc, with copper, silvor and gold. Yulo, with Seattlo, Wasb., men, will put in machinery for development of the property.

East Kootenay District.

The coke situation at Fernie nnd Michel is n serious one, which not only causes many temporary stoppages, but which threatens the closing down of the whole works, says the Rossland Miner. Nearly 4000 tons of coke nre piled up for shipment, and the C. P. R. is unable to handle it. Great Northern cars have been secured at Morrissey by the coal company. The smelters have been well supplied with fuel, and it is probable that they have overstocked to the extent that so far they have experienced no inconvenience.

At Windomere the Paradise mine has ceased shipping ore for this winter, but will continue development work and block out ore to be handled next spring by the tramway under construction. A sawmill is being put up to get out timber for the tramway and ore bins.——The Ptarmigan M. Co. continues development, and is opening up ore by machine drills. The aerial tramway is conveying ore from the mine to the concentrator site.——The Pretty Girl mine is shipping high-grade ore, as also the Black Diamond mine on Toby creek.

Nelson District.

The October cleanup at the Wilcox mine at Ymir nmounted to $7000, says the Spokesman-Review. From the gold saved on the plates a bar weighing 325 ounces was produced, having value of $4000. In addition, four carloads of ore and concentrates were shipped, producing net smelter returns of $5000. During October ore from the Wilcox vein was run through the mill for the first time, the mill having hitherto been supplied by the Fourth of July vein. This ore carries a larger proportion of gold to silver than does the Fourth of July ore. The control of the Broken Hill M. Co., which owns the Wilcox mine, has passed to Chicago, Ill., and Philadelphia, Pa., men, and A. H. Tuttle is secretary and local manager.——G. H. Barnhart, who has leased the Porto Rico mine from the Canadian Pacific Exploration Co., has repaired the stamp mill. He will also mill ore from the Spotted Horse group.——Wolfle & Dewault have built a 20-stamp mill for the Gold Cup mine, and ore is being sent down from the mine. Should its operation prove successful a larger plant and aerial tramway will be put up.——Hughes & Dimmick, who have leased the Ore Hill group, report making their initial cleanup with satisfactory results.——The Ymir mine is crushing good-grade ore.——With the seven producing mines in continuous operation the output from Ymir section during the winter is expected to exceed that during any previous year. The Queen and the Atlin may also resume.

Rossland District.

Arrangements have been made for building a 50-ton oil ore concentrator by the Rossland Power Co., subsidiary to the War Eagle-Center Star mines, at Rossland. The plant will be supplementary to their cyanide mill near Trail.

The oil process concentrator at the Le Roi No. 2 mine at Rossland is in full operation. The structure is on the "step-down" gravity plan, each floor being utilized for a separate stage of the process. Ore dumps of 20,000 tons supply the product to the concentrator over a surface tramway. In the initial stages the ore is reduced to 3-inch size in a jaw crusher, and then to ½-inch size in a gyratory crusher, while a rotary mill crushes it to 30-mesh fineness. The plant is in two units of twenty-five tons capacity each, with a rotary mill for each unit. Table concentrators receive the material from the rotary crushers and the first concentration is made. The material saved on the tables is collected in launders and handled in the manner common to all systems of concentration. The residue from the tables is conducted to sets of horizontal iron tanks, fed with refuse petroleum from 2000-gallon oil tanks. The horizontal tanks (mixers) are arranged in sets of three, one above the other. Each drum is revolved slowly by a spiral shaft and the oil picks up the mineral. At the end of the upper tank a quantity of oil carrying minoral is delivered, while the balance of the contents of the first drum passes into the second drum, and thence to the third, the last drum collecting such mineral as remains. The oil bearing material passes into a centrifugal separator, revolving at 1000 revolutions per minute, the effect of which is to throw out the oil. This does not recover all of the oil, however, and a further recovery is made in a perforated separator, also a centrifugal. From the perforated separator the concentrates are drawn ready for shipment, while the oil is returned to the tanks for further use. Such oil as remains in the concentrated product is valuable as a binder in the briquetting process at the smelter. Arrangements will be made for steel cars to ship the concentrates in bulk. Five men, per 12-hour shift, are required at the works. The machinery operates continuously, the system working automatically.

Slocan District.

During the year 1800 tons of zinc ore have been shipped from the Slocan to Kansas. There are, says the Ledge, 2500 tons ready for shipment, which will be sent out before February. This supply will be principally drawn from the Payne, Ruth, Ivanhoe and Wakefield, near Sandon. If advisable, the Slocan mines could, it is claimed, ship 15,000 tons of zinc ore yearly. The Wakefield sold 200 tons during the last week of October which ran 45% zinc, 30 ounces in silver and 4% lead. The magnetic separator is in operation at the Payne, which enables that mine to send out a product running 55% zinc, 16 ounces silver and a trace in lead. The process at the Payne separates the iron from the zinc.

Vancouver Island.

The Lenora mine at Mount Sicker, in Victoria district, is shipping 100 tons a day from material which was formerly considered not worth treatment, and has been used as filling. This has been found to carry gold, so that though the copper values are low the general return on the ore is sufficient to give profit at the smelter. On the Tregear vein work is progressing. A shaft is being sunk which is in ore, giving average values of 15%, says Manager Tregear. He is also preparing to do further work in some of the old workings which are being pumped out.

West Kootenay District.

The completion of the concentrator at Five-Mile will permit the Silver Cup and Nettie L. mines near Ferguson, in the Lardeau, to reduce the shipping bulk of their ore from 30 to 1.

Near Ferguson, Manager Forbes has closed down work at the Nettie L. mine, on instructions from the London office, as the company desires to hold all shipments until completion of the combination 20-stamp silver mill, which is being built jointly by the Nettie L. M. Co. and the Silver Cup M. Co. It is expected to be ready for operation by March 1st. There are ninety men employed on the construction of the mill. At the Silver Cup fifty men are employed.

CANADA.

Ontario.

Toronto reports say nickel has been found along the line of the Government's Temiskaming Railway. Some of the deposits run up to 24% nickel. The Government has reserved a strip of land along the railway, taking in the newly found deposits.

CUBA.

The province of Santiago de Cuba contains the principal commercially producing mines of iron and manganese, says the report of the Division of Mining and Mineral Resources. Copper is produced in small quantities in Santiago de Cuba, Puerto Principe and Mantanzas. Asphalt is produced on a commercial scale in four provinces — Habana, Mantanzas, Santa Clara and Puerto Principe.

MEXICO.

Chihuahua.

H. T. Cowell, manager of the Barranca del Cobre copper mines of Chihuahua, says he is preparing to build a sulphuric acid leaching plant at this mine. The plant will have a capacity of treating fifty tons of tailings daily.

T. H. Oxnam of Los Angeles, Cal., manager of the Palmarejo & Mexican Gold Fields, Ltd., at Palmarejo, Western Chihuahua, reports work progressing. The cyanide slimes and concentrates are sold at the mine monthly to the National Metal Co., and the former are shipped out via Chihuahua and the latter via Agabampo on the west coast. A slimes plant will be put in to treat slimes that the present system does not save. The Oxnam Prospecting Co. has unwatered the Todos Santos mine and a development shaft is being sunk. Pumping machinery has been set up to unwater the Gueraltirino mine.

The Parral M. Co. has its mill at Parral in full operation. Ore has been blocked out.

The Americana mine at Terrazas which is worked by the Cia. Metalurgica de Torreon, S. A., reports 3000 tons of ore stacked up at Terrazas station last week waiting for cars to move it. The question of draining the caves of the large body of seepage water is under consideration, and plans are being drawn for a pumping plant of 1000 gallons per minute capacity. Development work is kept ahead of ore extraction.

Coahuila.

The Monterey News says the San Carlos C. Co. will start work soon on its railroad from Linares to its mines.

Elgin & Murphy, who bought the Salvador and Porvenir mines, near Las Esperanzas coal mine at Barroteran, will put in machinery and the work of building a concentrator began last week.

Durango.

G. W. Milne of London, England, reports buying the Watterson mine, for $600,000, for his company.

Durango reports negotiations under way for the sale of the Reyos mine, near Santiago Papasquiaro, owned by E. R. Arnolds and H. Lozayo, to St. Louis, Mo., men; also that an offer of $30,000 has been made for the Providence mine, in the same section, by the Wilson Co. of Cincinnati, Ohio.

Oaxaca.

S. Compton et al. of Kansas City, Mo., are forming a company to take over and work the El Resurreccion group of five mines, near Tlacolula, in the Tlacolula valley. A branch railroad is being built from Oaxaca to Tlacolula, a distance of 35 miles.

The extension of the Oaxaca-Ocotlan Railroad, owned by G. Teruel of Mexico City, is reported completed half way from Ocotlan to Ejutla, in the gold fields.

Sonora.

R. Gayou, superintendent of the silver mines at Planchas de Plata, reports in the Ladera tunnel a body of high-grade silver ore has been cut which mills 200 ounces silver per ton. The mill is in full operation.

G. Spindle and A. R. English, part owners of the Guadalupe gold-bearing group, south of Cananea, report organizing the Pittsburg & Sonora M. Co., to develop the ground. The ore is low grade and a mill will be built to handle it.

The Arizona & Mexico G. M. Co. has been organized at Phœnix, Ariz., with the following directors: F. W. Sheridan, R. Toohey, J. Cope, C. Pompa and J. Ackle. F. W. Sheridan of Cananea is secretary and manager. Their holdings are gold claims in the Quitaca gold belt, 30 miles west of Cananea. They will sink 250 feet on the main ledge.

RUSSIA.

The Gazette de St. Petersburg says in accordance with the law recently put in force, no foreign subjects can either exploit themselves or participate in the exploitation of the gold beds situated in a zone 100 versts (66 miles) broad from the whole length of the Pacific coast in Russian territory, as also on the island of Saghalien and neighboring islands.

SPAIN.

Huelva reports that the efforts of the Prefect have failed to settle the strike at the Rio Tinto mines, which has been in progress three weeks, the manager refusing to comply with the demands of the strikers. About 1500 miners at Penahierra, near Rio Tinto, have struck in sympathy with the Rio Tinto strikers. At Santander there is little change in the strike situation. The troops are patrolling the streets.

TASMANIA.

Ore smelting in No. 2 plant of the Mount Lyell Co. has been continued since the middle of November, 1902, without the use of coke (but with heated blast, although of a lower temperature than that formerly used), and at No. 1 plant both ore and matte have been smelted without the use of the hot blast (but with the former addition of a small percentage of coke). These innovations have been attended with no trouble whatsoever, and may now be considered permanently established, the results being favorable and tending towards an increase of furnace capacity. They effect a considerable annual saving, and it is expected that still further improvements and economies will be achievable in the course of time. Four furnaces are now doing the work formerly done by five, three of the four being constantly on ore, and the fourth concentrating the first matte into converter matte. The treatment costs for the company's half year ended Sept. 30, 1902, were as follows: Mining, 2s 1.01d; removal of overburden, 2s 1d; smelting, 14s 0.24d; converting, 1s 6.06d; total, 19s 8.31d. During the half year mentioned there were treated 159,450 tons of Mount Lyell ore of an average value of: Copper, 2.36%; silver, 2.23 ounces, and gold, 0.069 ounce, together with 18,537 tons of metal-bearing fluxes, of an average assay value of: copper, 1.70%; silver, 0.24 ounce, and gold, 0.026 ounce, and 5689 tons of purchased ores, making the grand total for the half year 183,676 tons, and raising the grand total since the beginning to 1,532,306 tons of ore.

Personal.

J. M. COLLINS of Nome, Alaskn, is in San Francisco, Cal.

F. C. HELM, interested in Alaska mines, is in San Francisco, Cal.

C. J. CAUGHEY of Salt Lake City, Utah, of the Majestic C. Co. is in the East.

R. E. GLASS of the Big Four Co. is in Chicago, Ill., from Deadwood, S. Dak.

L. H. ALLEN of Kansas City, Mo., is in San Francisco, Cal., on mining business.

I. COPELAND is in San Francisco, Cal., from Sierra Co., Cal., on mining business.

H. CALLAHAN of San Francisco, Cal., returned this week from an extended Eastern trip.

H. H. NICHOLSON, of Lincoln, Neb., is examining mining property in Boulder county, Colo.

H. L. MEACHAM is superintendent Friday Gulch G. M. Co. at Havilah, Kern county, Cal.

G. W. MIDDLETON of Prescott, Ariz., returned there last week from a trip East on mining business.

H. FRANKLIN of the Golden Reward mine is in New York City from Deadwood, S. Dak., on business.

P. MCPHERSON of Park City, Utah, is manager of the Keith O'Brien M. Co. of Salt Lake City, Utah.

FRED DUNHAM, formerly of Deadwood, S. Dak., is visiting at Sturgis, S. Dak., from Nome City, Alaska.

N. CLERE is superintendent of the San Jose mine, in Moctezuma district, near Nacozari, Sonora, Mexico.

A. N. BUTTS is superintendent of the Empire mine at Gold Valley, near Downieville, Sierra county, Cal.

R. A. LEWIS of New York, of the Green Con. C. Co. of Cananea, Sonora, Mexico, is in San Francisco, Cal.

E. D. R. THOMPSON, mining lawyer and operator of Salt Lake City, Utah, is in New York on mining business.

J. B. TOMLINSON, manager of the Yeager Canyon M. Co., near Prescott, Ariz., is in Denver, Colo., on business.

W. F. LANIGAN has resigned as assistant manager of the Royal Con. M. Co. at Hodson, Cal., and has gone East.

A. J. UNDERWOOD of Salt Lake City, Utah, is manager of the Lluvia de Oro mine near Urique, Chihuahua, Mexico.

G. R. RYALL of Baltimore, Md., of the Hays Con. M., M. & L. Co., operating in Sonora, Mexico, is visiting their mines.

REESE LLEWELLYN, president and manager of the Llewellyn Iron Works, Los Angeles, Cal., is in San Francisco, Cal.

B. C. COOK has resigned as metallurgist for the Lexington Hill G. M. Co., and will go to Mexico to conduct a cyanide plant.

W. F. SNYDER of Salt Lake City, Utah, interested in the Balaklala copper mine in Shasta county, Cal., is in San Francisco, Cal.

A. S. GOODELL has resigned as manager of the Montreal & Boston C. Co.'s smelter at Boundary Falls, B. C., and is in Spokane, Wash.

H. HAAS is smelter superintendent at the Afterthought copper mine of the Great Western G. Co., near Bella Vista, Shasta county, Cal.

R. H. BINNS, treasurer of the Horseshoe M. Co., has returned to Pittsburg, Pa., from a trip to the company's mines in the Black Hills, S. Dak.

M. J. SCHNEIDER of Monterey, Nuevo Leon, Mex., is manager of the San Pablo and San Antonio mines of the J. W. Leedom estate, near Santa Catarina, Nuevo Leon.

D. G. JEWETT has returned to Los Angeles, Cal., from Berry Creek, Butte Co., Cal., where he has been examining mining properties for J. H. Rowand of Helena, Mont.

E. B. BRADEN of Helena, Mont., manager of the Great Falls and the East Helena smelters of the American S. & R. Co., is also manager of the smelter at Everett, Wash.

L. W. HAGGERTY, recently of Amador City, Cal., is superintendent of the Nevills mining properties, near Jamestown, Tuolumne Co., Cal. (including the App and Rawhide mines), vice W. L. Turner, resigned.

Obituary.

J. WEAVER, a pioneer miner of Boise county, Idaho, aged 75, died at Boise on the 14th inst. He went to Pioneerville, Idaho, from Baltimere, Md., in 1865.

J. B. CLEMMONS, a Colorado mining man of the San Juan section, died on the 11th inst. at Denver, Colo. Deceased was superintendent of the Bachelor mine. He leaves a wife and three children.

B. T. RIGGS, a pioneer of Arizona and one of the original owners of the Hillside mine in western Yavapai county, Ariz., died at his home in San Diego, Cal., on the 10th inst., after a long period of failing health.

G. W. HOFFMAN, a pioneer miner and merchant of California, died at San Jose, Cal., on the 21st inst., aged 78 years. He went to California in 1852 and engagod in mining in Shasta county. He is survived by three sens.

M. GARVER, a pioneer mining man and mechanical engineer, and a former State Assemblyman from Nevada county, Cal., died at Nevada Clty, Cal., on the 19th inst. Deceased was a native of Ohio, aged 79 years. He was a veteran of the Mexican war and went to California in 1852.

A. F. MILLER, a pioneer miner of Silver City, Owyhee Co., Idaho, died at Silver City on the 11th inst. Deceased was 80 years of age, a German, and served as an engineer in the Russian navy during the Crimean war. He formerly owned the Calaveras mine, near Silver City, Idaho.

A. DOTEN, a pioneer miner of Nevada and California, died at Carson, Nev., on the 13th inst. Deceased was a native of Plymouth, Mass., born July, 1829. He went to California in 1849, and engaged in placer mining, going to Como, Nev., in 1863. He is survived by a wife, daughter and two sons.

S. H. EDWARDS, a pioneer miner of Oregon and California, died at Eugene, Or., on the 15th inst., after an illness of several months. The deceased was born in Monmouth county, N. J., in 1824, and in 1849 went to the California gold fields, following mining until 1856, when he went to Oregon.

J. H. CROCHERON, a pioneer miner of Oregon, California and Idaho, died at Mountainhome, Idaho, on the 19th inst. Deceased was born in New York City, April, 1828. In 1849 he left New York for California via Cape Horn. He mined in several districts in California and Oregon, as well as one season in Cariboo, B. C. He went to Silver City, Idaho, in 1867. He is survived by a widow and one son.

CHARLES MCCORMICK, superintendent of the Vindicater mine, at Cripple Creek, Colo., and M. H. Beck, mine foreman, were killed on the 21st inst. by an explosion in the sixth level of the Vindicator mine. The explosion occurred while McCormick and Beck were descending into the mine on the cage. They were the only passengers. As the cage reached the sixth level the explosion occurred, wrecking the level, cage and shaft at that point and instantly killing both men. It is asserted by officers of the Vindicator M. Co. that the explosion was caused by a trap. This statement was made after a thorough examination had been made of the shaft. The trap, containing dynamite, was placed in the sixth level, which is part of the abandoned workings of the mine, within a few inches of the shaft. Then a loaded revolver was fixed in the shaft with its barrel pointing directly toward the box of dynamite. To the triggor of the revolver was attached a string, which was thrown across the shaft in such a manner that when the cage came down and encountered the string the revolver would explode, the bullet striking the dynamite. Piecos of this revolvor have been recovered from the bottom of the shaft. A detail of soldiers were sent from Camp Goldfield to the mine and took charge of the property. Several miners charged with being implicated in the murder have been arrested.

Commercial Paragraphs.

A. R. PARTRIDGE of San Francisco, Cal., is in Lassen county, Cal., putting up a centrifugal impact pulverizer for the Hayden Hill M. Co.

THE Llewellyn Iron Works, Los Angeles, Cal., reports closing contract for a 10-stamp mill for the B. E. Chase G. M. Co. at Stagg, Cal.

THE Calkins Co. of Los Angeles, Cal., manufacturers of assayers' and laboratory supplies, has been reorganized, with Chas. Wier of San Francisco, Cal., as president. They are arranging for establishing branch works in San Francisco.

THE Crocker-Wheeler Co., of Ampere, N. J., has established headquarters for the Southern representative of its Washington office at 425 Empire building, Atlanta, Ga. Mr. S. M. Conant, of the company's selling forces, will be in charge.

THE Brown-Corliss Engine Co. of Corliss, Wis., have added a full line of sawmill machinery and have opened a special department in that line in the Wells Building, Milwaukee, Wis., in charge of Theo. S. Wilkin. The company is now contracting with a foreign corporation to carry a line of blast furnace gas engines. These lines are to be carried on in connection with their Corliss engine and rolling mill work.

THE Circuit Court for Wayne county, State of Michigan, issued an injunction on Nov. 17th in favor of the Detroit Lubricator Co., and against the Michigan Lubricator Co., restraining them from using the words "Detroit Lubricators," "Improved Standard Lubricators," "Detroit Improved Standard Lubricators," in connection with their lubricators or advertising matter; also restraining them from using boxes or packages for their lubricators bearing the words "Detroit," or "Detroit, Mich.," unless their firm name be also given. It is alleged that for some time past the Michigan Lubricator Co. has been making lubricators resembling these made by the Detroit Lubricator Co. in outward appearanco, and stamped on these lubricators and on the boxes containing them are only the words, "Detroit, Mich.," making no mention of their firm name. To protect their customers from being deceived the Detroit Lubricator Co. secured this injunction.

Catalogues Received.

The Blackmer rotary pump is the subject of a brochure issued by the Detroit Pump Co., Hammond Bldg., Detroit, Mich.

Cable lines and automatic telpher plants are the subjects of catalogues 37 and 38, from the United Telpherage Co., 20–22 Broad St., New York City.

Bulletin No. 39, from the Crocker-Wheeler Co., Ampere, N. J., describes a particularly interesting electrical equipment at the Orange Brewery, Orange, N. J.

The Gunckel patent cable haulage system is the subject of an illustrated catalogue describing it in detail and issued by the Macomber & Whyte Rope Co., 19–21 South Canal St., Chicago, Ill.

The Mecklenburg Iron Works, Charlotte, N. C., send a standard size description of their various makes of mining machinery and a description of the Thies chlorination precess.

"Graphite Suggestions," from the Jos. Dixon Crucible Co., Jersey City, N. J., is a dainty portrayal of the value afforded in a variety of industrial ways by the graphite they furnish in such multifarious forms.

"Labor Saving Tools, Operated by Compressed Air," is a fine 32-page portrayal of economical devices supplied by the pneumatic tool department of the Ingersoll-Sergeant Drill Co., 26 Cortlandt street, New York City, N. Y.

Latest Market Reports.

SAN FRANCISCO, November 27, 1903.

METALS.

SILVER.—Per oz., Troy: London, 27½d (standard ounce, 925 fine); New York, bar silver, 57¾c, refined (1000 fine): San Francisco, 57¾c; Mexican dollars, 46@47½c San Francisco, 44½c New York.

Silver remains practically unchanged since last week's quotations.

COPPER.—New York: Standard, $12.50; Lake, 1 to 3 casks, $12.50; Electrolytic, 1 to 3 casks, $12.50; Casting, 1 to 3 casks, $12.50; San Francisco: $15.00. Mill copper plates, $17.00; bars, 18@24c. London: £54 15d spot per ton.

A slight falling off in copper is noticeable, the strong buying movement held in anticipation having not materialized as yet.

LEAD.—New York, $4.25; Salt Lake City, $3.50; St. Louis, $4.00; San Francisco, $4.50, carload lots; 4¾c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5¾c: pig, $4.75. London: £11 ₱ long ton.

SPELTER.—New York, $5.75; St. Louis, $5.10; London, £21 ₱ ton; San Francisco, ton lots, 6¾c; 100-lb. lots, 7c.

TIN.—New York, pig, $25.25 @ 25.50; San Francisco, ton lots, 27c; 500 lbs., 28c; 200 lbs., 28c; less, 28½c; bar tin, ₱ lb., 30@32c. London, £116.

PLATINUM. — San Francisco, crude, $18.00 ₱ oz.; New York, ingot, $19.00 ₱ Troy oz. Platinum ware, 75 @ 80c ₱ gram.

QUICKSILVER. — New York, $46.00@47.00, large lots; London, £8 7s 6d; San Francisco, local, $43.50@44 ₱ flask of 76½ lbs.; Denver, $49.50. Export, $42.50@43.00.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

SOLDER. — Half-and-half, 100-lb. lots, 18.00c; San Francisco, Plumbers', 100-lb. lots, 15.25c.

ZINC.—Metallic, chemically pure, ₱ lb., 50c; dust, ₱ lb., 10c; sulphate, ₱ lb., .04c.

NICKEL.—New York, 50@60c ₱ lb.; ton lots, 40@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30@34c.

ANTIMONY. — New York, Cookson's, 7½c; Hallett's, 6¾c; San Francisco, 1000-lb. lots, 8c; 300@500-lbs., 8½c; 100-lb. lots, 10½c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, $15.85 @16.10; gray forge, $13.50; San Francisco, bar, 3c ₱ lb., 3½c in small quantities.

STEEL. — Bessemer billets, Pittsburg, $23.00@25.00; open hearth billets, $23.00 @26.00; San Francisco, bar, 7c to 12c ₱ lb.

CHICAGO CURRENT QUOTATIONS.

Bessemor	$16 50@17 00
Foundry Northern 1	15 50@16 00
Northern 2	15 00@15 50
Northern 3	14 50@15 00
Southern 1	14 35@——
Southern 2	13 35@——
Southern 3	12 85@——
Forge	12 35@——
Charcoal	17 00@18 00
Billets, Bessemer	24 00@——
Bars, iron	1 40@——
Bars, steel	1 46½@——
Rails, standard	28 00@30 00
Rails, light	28 00@32 00
Plates, boiler	1 90@ 2 00
Tank	1 75@ 1 80
Sheets, 26 store	2 90@ 3 00
Angles	1 75@——
Beams	1 75@——
Tees	1 80@——
Zees	1 75@——
Channels	1 75@——
Steel melting scrap	12 00@12 50
Relaying rails	23 00@25 00
Dealors forge	10 00@10 50
No. 1 railroad wrought	13 00@13 50
No. 1 cast, net ton	12 00@12 50
Iron rails	16 50@17 00
Car wheels	16 00@17 00
Cast borings	4 50@ 5 00
Turnings	8 50@ 9 50

LUMBER. — (Rctail): Pine, ordinary sizes, $24.00@25.00; extra sizes higher; redwood, $28.00@30,00; lath, 4 feet, $4.50 @5.00; pickets, $21.00; shingles, $2.50 for No. 1 and $2.25 for No. 2; shakes, $13.50 for split and $15.00 for sawed; rustic, $28.00 @35.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, $3.35; Cut, $3.55; 10d to 16d, Wire, $3.45; Cut, $3.35; 8d Wire, $3.50; Cut, $3.50; 6d and 7d, Wire, $3.60; Cut, $3.60; 4 and 5d, Wire, $3.70; Cut, $3.70; 3d, Wire, $3.85; Cut, $3.85; 2d, Wire, $4.10; Cut, $4.10. Special rates for carload lots.

LIME.—Santa Cruz, $1.60 country, $1.75 city ₱ bbl.

CEMENT.—Imported, $2.50@2.75 ₱ bbl.; California carload lots, $2.25 f. o. b. at works; small lots, $2.50 ₱ bbl. in sacks, 4 sacks to bbl.

GENERAL SUPPLIES.

OILS.—Linseed, boiled, bbl., 49c; cs., 54c; raw, bbl., 47c; cs., 52c; Lucol oil boiled, bbl., 44c; cs., 49c; raw, bbl., 42c; cs., 47c. Kerosene—Pearl, per gal., 22c; Astral, 22c; Star, 22c; Extra Star, 26c; Eocene, 25c; Elaine, 28c; Water White, in bulk, 15½c; Minoral Seal, iron bbls., 19c; wooden bbls., 21½c; cs., 25c; Mineral Sperm, cs., 26½c.; Deodorized Stove Gasoline, bulk, 17c; do., cs., 23½c; 86° Gasoline, bulk, 21c; do., cs., 27½c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19½c; Lard Oil, E W. S., bbl., 85c; cs., 90c; Neats-foot Oil, pure, bbl., 75c; cs., 80c; Sperm, crudo, 50@55c; Natural White, 70c; Bleached, do., 75c; Whale Oil, cs., 50@55c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2.00 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c ₱ set; 14 oz., 40s., 10c.

CHEMICALS. — Cyanide of potassium, 98%–99%, jobbing, 23@24c ₱ lb.; carloads, 23@23½c; in tins, 30c; soda ash, $2.00 ₱ 100 lbs.; hyposulphite of soda, 3@3½c per lb.; caustic soda, in drums, 3@3½c ₱ lb.; Cal. s. soda, bbls., $1.20@1.40 ₱ 100 lbs.; sks., $1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb. tins; roll sulphur, 2½@2¾c; powdered sulphur, 2@3c; flour sulphur, French, 3½@3¾c; alum, $2.00@2.25; California refined, 1¾@2c; sulphide of iron, 8c ₱ lb.; copper sulphate, 5¼@5¾c; chloride of lime, spot, $2.50@2.75; sulphuric acid, in carboys, 66% B, 1¾@2c ₱ lb.; nitric acid, carboys, 8c ₱ lb.

BONE ASH.—Extra No. 1, 5@6c ₱ lb. No. 1, 4@5c.

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6½c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails, ½c ₱ lb. above keg price; in 1 and 5-lb tin cans, 100 lbs. per case, ½c. per lb. above keg price. Dry Lead—In bbls., 1 ton and over, 6½c; do. in kegs, 7c.

RED LEAD.—500 lbs. and over at one purchase, ₱ lb., 6½c; less than 500 lbs., 7c.

LITHARGE.—Pure, in 25-lb. bags, 8@9c ₱ lb.

BORAX.—Concentrated, 6@7c ₱ lb; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

MANGANESE.—Pure, ₱ lb., 60c.

SODIUM.—Metal, ₱ lb., $1.00.

BISMUTH.—Subnitrate, ₱ lb., $1.75.

MERCURY.—Bichloride, ₱ lb., 90c.

MOLYBDENUM.—$2.00 ₱ lb.

CHROMIUM.—90% and over, ₱ lb., $1.00.

PHOSPHORUS.—American, ₱ lb., 75c.

SILVER.—Chlorido, ₱ oz., 90c@$1.00; nitrate, 55c.

ALUMINUM.—No. 1., 99%, small lots, 37c ₱ lb.; 100 lbs., 35c; 1000 lbs, 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

URANIUM.—Oxide, ₱ lb., $3.50.

(These prices aro wholesale, f. o. b. San Francisco, unless otherwise notod.)

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific Coast inventors:

FOR THE WEEK ENDING NOVEMBER 17, 1903.

744,271.—WRENCH—J. H. Adams, Fullerton, Cal.
744,272.—PUMP—R. Addison, Pasadena, Cal.
744,159.—SWITCH TURNER—L. L. Bigelow, Seattle, Wash.
744,029.—GOPHER TRAP—C. H. Birdsall, Corona, Cal.
744,288.—WATER ELEVATOR—J. L. Brown, Los Angeles, Cal.
744,163.—CONVEYOR—J. A. Brown, Portland, Or.
744,474.—PENCIL—A. E. Buckingham, Oakland, Cal.
744,289.—RAILROAD SWITCH—G. C. Calentine, Tacoma, Wash.
744,047.—PAPER HOLDER—E. D. Casterline, Los Angeles, Cal.
744,048.—CAN FILLING MACHINE—A. Cerruti, S. F.
744,049.—CAN FILLING MACHINE—A. Cerrutti, S. F.
744,490.—EXCAVATOR—W. Cole, S. F.
744,491.—EXCAVATOR—W. Cole, S. F.
744,168.—SWITCH—J. M. Comer, Spokane, Wash.
744,494.—PRESSURE REGULATOR—E. R. Cook, Sacramento, Cal.
744,297.—GAS REGULATOR—E. R. Cook, Sacramento, Cal.
744,497.—TELEPHONE—H. L. Cutter, Los Angeles, Cal.
744,305.—SMELTER—Daniels & Clark, Nogales, Ariz.
744,502.—PLAYING CARDS—H. S. Delamere, Ferndale, Cal.
744,508.—HAY PRESS—J. M. Dolan, Livermore, Cal.
744,516.—GRAIN CLEANER RIDDLE—E. Early, Lathrop, Cal.
744,181.—POTATO PLANTER—G. H. Elmer, Pleasant Valley, Or.
744,322.—CONCENTRATING—A. D. Foote, Grass Valley, Cal.
744,326.—CARD DISPLAY DEVICE—R. B. Friend, Oakland, Cal.
744,528.—GAS BURNER—W. Ghiglieri, Stockton, Cal.
744,192.—SCALE—F. W. Grey, Los Angeles, Cal.
744,337.—TELEPHONE MOUTHPIECE—Griffin, Sanker & Keith, Riverside, Cal.
744,703.—DREDGER—M. C. Harris, S. F.
744,541.—PAVING—J. Heenan, Portland, Or.
744,551.—LOCOMOTIVES—C. Houston, Benson, Ariz.
744,078.—SHOE SOLE STRETCHER—C. R. Johnston, Eureka, Cal.
744,370.—BATHING APPARATUS—L. V. Levinger, S. F.
744,214.—GATE VALVE—L. P. Lowe, S. F.
744,220.—FUEL BURNER—A. Neu, Colton, Cal.
744,387.—REFLECTOR—D. J. O'Brien, S. F.
744,602.—PHOTO DEVELOPING APPARATUS—E. E. Park, S. F.
744,229.—CONCENTRATOR—J. W. Pinder, S. F.
744,406.—ROPE CLIP—B. C. Riblet, Spokane, Wash.
744,614.—ROTARY ENGINE—M. A. Rice, Los Angeles, Cal.
744,693.—MATCH SPLINT MACHINE—W. Scharnweber, Seattle, Wash.
744,119.—PAPER HOLDER—A. E. Sexton, Los Angeles, Cal.
744,418.—ENGINE MUFFLER—R. C. Sheperd, Los Angeles, Cal.
747,250.—BOILER FEEDER—F. W. & H. L. Shupert, Spokane, Wash.
744,636.—DREDGER BEARINGS—P. Small, Oroville, Cal.
744,264.—ORE FEEDER—L. R. Tullock, Angels Camp, Cal.
744,447.—ROTARY ENGINE—E. S. Ward, San Jose, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

RIDDLES FOR GRAIN CLEANERS. — No. 744,516. Nov. 17, 1903. E. Early, Lathrop, Cal. This invention consists in the combination in a grain-cleaning device of a riddle consisting of side frames, transverse plates or surfaces extending between said frames, each successive plate being located below and in advance of the front edge of the preceding one, having upturned rear edges and inclining downwardly therefrom. Wire pins project from the front edges over the intermediate spaces and above the succeeding plates, said wires being alternately bent upward and downward so as to provide an increasing distance between them from the base to the discharge ends, and there are means for delivering material to be separated upon the uppermost of said plates.

CARD DISPLAY DEVICE.—No. 744,326. Nov. 17, 1903. R. B. Friend, Oakland, Cal. This invention consists of hollow supports with hinge pins adapted to receive the hinges of independent card or notice holders, which project horizontally outward and are turnable about these pins, said holders having suitable means for readily attaching or detaching the required cards or notices. The pins and hinges are so arranged that the card-holders may stand in line, or either one of them may be turned out of line and detached and removed. The device may be used in real estate and other like offices where it is desirable to display cards or notices of real estate for sale or other matter in an attractive form in the windows, or upon desks or counters convenient for the inspection of customers.

PROCESS OF PREPARING CONCENTRATING SURFACE. — No. 744,322. Nov. 17, 1903. A. De Wint Foote, Grass Valley, Cal. This invention consists of a process of preparing a surface for concentrating and collecting the mineral contents of tailings or wastes from mills or factories; and it consists in commingling petroleum and lime and spreading the same evenly over the surface of a concentrator.

PENCIL.—No. 744,474. Nov. 17, 1903. A. E. Buckingham, East Oakland, Cal. Three-fourths assigned to Frank Tindell, F. Klingeberg and G. F. Foye, of Oakland, Cal. This invention relates to pencils of that class having a wooden body and an interior graphite or other marking substance. It consists in constructing the wooden outer body with an axial interior hole having a slight curve from end to end, so that the graphite or other marking body will be made to conform to this curve, and thus bind sufficiently within the tube to prevent its being moved by ordinary pressure upon the point. An open slot is made in the side of the outer body and a sleeve surrounding and slidable upon this body has an inwardly projecting spur or arm, which may be either free or connected with the rear end of the marking substance, and by which the latter may be advanced as the point is worn away.

PHOTOGRAPHIC DEVELOPING APPARATUS.—No. 744,602. Nov. 17, 1903. E. E. Park, San Francisco, Cal. This invention consists of one or more hinged or tilting plates dipping into the trays containing the developing solution so as to lie beneath the plates which are being developed, means for alternately raising and lowering the plates so as to agitate the developing liquid and also to serve to rinse the plate out of the liquid when it is desired to remove them, and means by which said tilting plate or plates may be actuated.

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MINING ENGINEER AND METALLURGIST, with sixteen years of practical experience as superintendent, manager and consulting engineer of mines and mills, desires position on or after January 1st. Speaks Spanish fluently. Address P. O. Box 77, Durango, Mex.

MINING ENGINEER OF GOOD STANDING, with twelve years' experience in mines and mills, wants position as expert. School of Mines graduate. Address V. X., this office.

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WANTED—POSITION AS SUPERINTENDENT or assistant of copper mines and smelters; competent all round man, good assayer, analyst and draughtsman; can handle labor; speaks Spanish. Address "Smelter," care this office.

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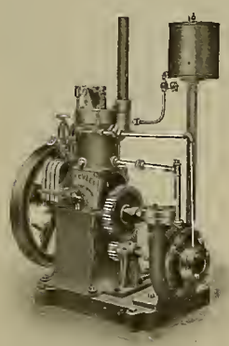
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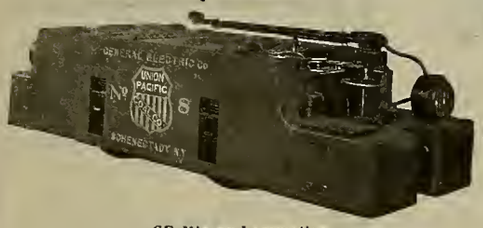
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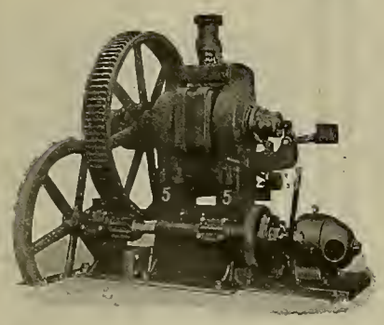
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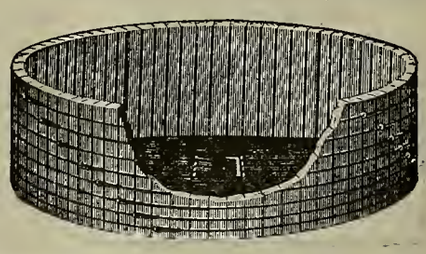
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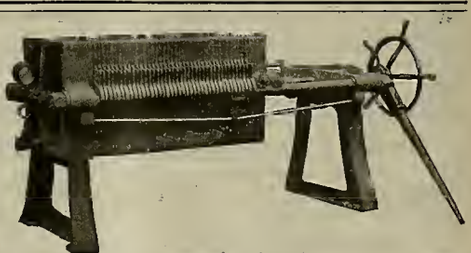
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Whole No. 2263.—VOLUME LXXXVII. Number 23. SAN FRANCISCO, CAL., SATURDAY, DECEMBER 5, 1903. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Ore Handling.

In these days of modern mining methods, and large operations, the problem of economical handling of great quantities of ore is receiving constantly increasing attention. The various systems of open cut and underground mining, as far as breaking rock is concerned, are usually well understood and in general use, but the handling of this broken ore is another proposition. Undoubtedly the cheapest mining that can be done is by the open-cut system, where the rock broken in the sloping sides of the cut passes downward by gravity through mill holes to underground chutes, where it is drawn out into cars and trammed through a tunnel to the mill or smelter for treatment, or to the railroad for shipment. This system is recognized as the most economical, but it is not always applicable, owing to the topographical situation. At some mines where this method has been in vogue it has from necessity either been abandoned or modified, by the ore having been worked out to the tunnel level. In that event it is the best practice to sink a shaft to a level below the bottom of the cut, connect it with the ore body by drift or crosscut, raise to the bottom of the original open cut and continue to mine as before, hoisting to the surface through the shaft. This is the practice at the Alaska-Treadwell mine on Douglas Island.



Traveling Bridge Over Cyanide Vats, Kofa, Ariz. (See Page 367.)

In the Lake Superior iron ranges the method of mining is largely by the open-cut system, but the cuts are of such large superficial area, and the topography of the greater portion of the region is so flat, that the mill-hole system is not generally adopted, though it is in use in some of the largest mines. In the greater number of mines the steam shovel is an important factor in handling both the overburden and the underlying ore. Recently the steam shovel has been introduced into gold and copper mines of British Columbia, and its successful application to the open-cut system of mining there has determined the management of the Granby mines at Phœnix to try the shovel in underground mining.

Where the distance from mine to mill is considerable, with a very material difference in elevation between the two points, the aerial tramway has proven an economical method of ore handling. Where the distance between mine and mill is great, with no considerable difference in elevation, cars in train drawn by a motor of some description, on a crooked road or by rope haulage, if the line be fairly straight, afford an economical means of moving ore from place to place. At the docks on the Great Lakes, where millions of tons of iron ore are loaded and unloaded annually, the traveling steel cranes are a feature in ore handling not yet introduced into other branches of metal-ore handling.

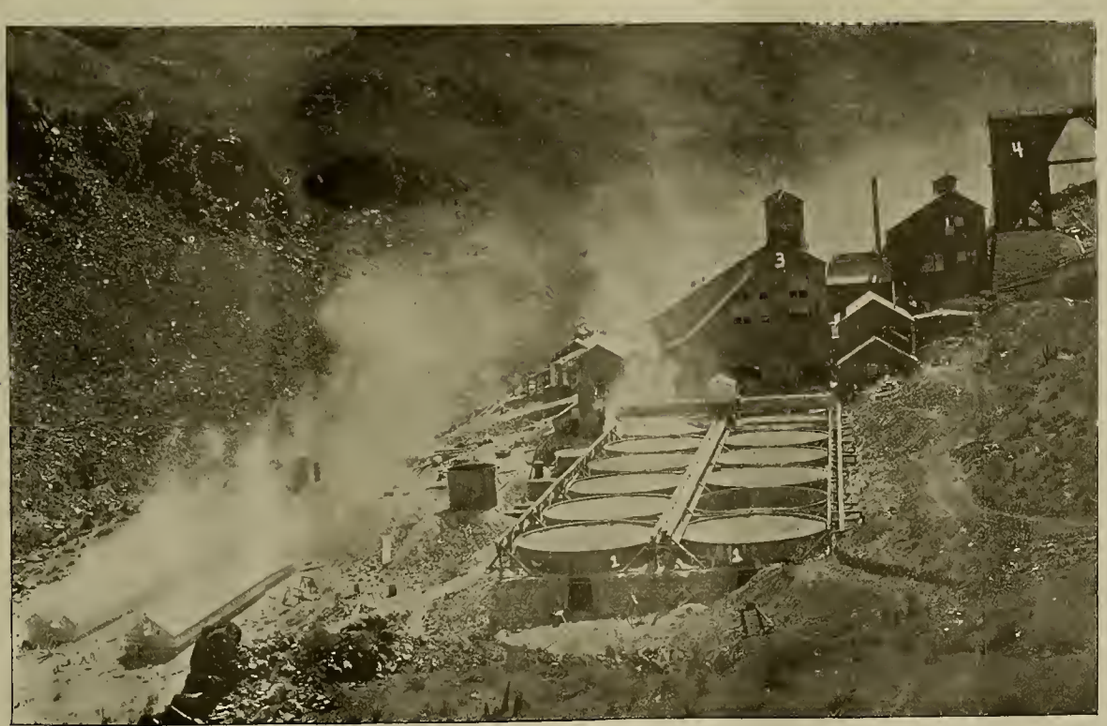
This method of handling ore is particularly adapted to cases where ore is loaded from cars, or from accumulated piles into ships, or vice versa. In a few instances ore is handled by means of large buckets, which are lowered from a rigid rope extending horizontally over an open cut, the bucket when filled being hoisted vertically to near the ropeway and then carried along it horizontally to some point beyond the rim of the cut and dumped. This method, while mechanically successful, is not as economical as when the ore can be handled by gravity.

The aim is constantly to introduce mechanical devices which will lessen or do away with manual labor to as great an extent as possible. In this field electricity is entering more prominently every day, and electrically operated cranes, hoists and motors and other classes of mining machinery are coming into more common use about mining and metallurgical plants.

The wheelbarrow as a factor in ore handling is almost obsolete, for it has been found economy to lay tracks and employ cars on even so transitory a proposition as grading for buildings.

In large mines underground mechanical haulage is no longer an experiment, and the utility of the various types of motors has long since been demonstrated. In these latter steam, compressed air and electricity are the most important means of power.

As between these, the choice must be determined by local conditions. Where free or cheap water power is available, it lies between compressed air and electricity. Where water power cannot be obtained and steam is employed, it remains to choose either steam, air or electricity, either being dependent on the steam plant for generation of power which may be applied to either system which may have been selected.



Traveling Distributor Over Vats, Gold Roads Plant, Acme, Ariz. (See Page 367.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market Street, San Francisco, Cal. Telephone, Davis 771.

ANNUAL SUBSCRIPTION.

United States, Mexico and Canada.....$3 00
All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

BRANCH OFFICES:

NEW YORK CITY, 720 Park Row Bldg. BOSTON, 27 School St.
CHICAGO, 1115 Monadnock Block. DENVER, 606 Mack Block.

J. F. HALLORAN.....Publisher

SAN FRANCISCO, DECEMBER 5, 1903.

TABLE OF CONTENTS.

ILLUSTRATIONS: Page.

Traveling Bridge Over Cyanide Vats, Kofa, Ariz.....364
Traveling Distributor Over Vats, Gold Roads Plant, Acme, Ariz.364
Butters Distributor, Carried by Crane Over Vats, Butters Plant, Virginia City, Nevada.....367
Excavator at Butters Plant, Virginia City, Nevada.....367
300-Ton Cyanide Plant, Virginia City, Nevada.....368
Powder Thawer.....369
The New Whitehorse Placer Fields.....370
New Standard Reynolds Corliss Engine.....373
Mining and Metallurgical Patents.....374

EDITORIAL:

Ore Handling.....364
American Mining Congress in Portland, Or.....365
Zinc Miners of the Missouri Region.....365
Public Lands Subject to Mineral Entry.....365
Mining Directors.....365
Sudden Rise of the Yuba River, Cal.....365
Nitro Powder in the Mill.....365
Use of Underground Water.....365
A Ditch Through Yosemite Park, Cal.....365

MINING SUMMARY.....375-376-377-378-379

LATEST MARKET REPORTS.....380

MISCELLANEOUS:

Concentrates.....366
Aluminum Not Easily Soldered or Plated.....367
Mexican Bullion Tax.....367
Cocoa Matting.....367
Cyanide Plant Machinery.....367
Power Transmitted by Shafting.....368
Foot Boards for Well Regulated Mills.....368
Causes of Gold Mill Losses.....368
Treatment of Telluride Ores at Kalgoorlie, Western Australia.369
Design for Powder Thawer.....369
The Alsek Placer District, Yukon Territory.....370
Accessibility as a Factor in Mining and Related Business.....371
To Determine the Current Flow of an Electrical Circuit.....371
Underground Hoisting Problems on the Witwatersrand.....372
A Sulphur Mine in Nevada.....372
Notes on Quartz Milling on the Rand.....373
New Standard Reynolds Corliss Engine.....373
Refining Silver in British Columbia.....373
Mining and Metallurgical Patents.....374
Obituary.....379
Books Received.....379
Dividends.....379
Personal.....379
Commercial Paragraphs.....379
Catalogues Received.....379
New Patents.....379
Notices of Recent Patents.....379

THE executive committee of the American Mining Congress meets in Portland, Or., on the 10th inst. The principal business before the committee will be the arraugement of details for the next annual convention to be held in Portland in 1904.

THE zinc miners of the Missouri region are again strnggling with falling prices for spelter and are striving to nphold the price by cnrtailing the output. The producers are organized, but evidently all the prodncers of the region are not members, as they are apparently not a unit on the method to be pursned in attaining the desired end — higher prices for spelter.

ALL public lands included in forest reserves are subject to mineral entry, and Secretary Hitchcock is quoted as saying that there is no good reason why lands temporarily withdrawn should form an exception to the rule. In keeping with this, on the 24th ult. the Secretary ruled that mineral entries should be received on such lands. This applies to forest reserves only, and it shonld not be understood that mineral locations may be made in National Park reservations, with the exception of the Mount Rainier Park in Washington. To this park and reserve by special act of Congress the mineral laws are applicable. Not so the Yellowstone Park and the park reserves about Yosemite valley, Cal. Iudian and military reservations are also excepted from the operation of the mining laws. Formerly only those claims located within forest reserves, previous to their being set apart as such, were allowed to stand, but under this recent decision the forest reserves are subject to geueral mineral eutry under the same conditions as govern their location elsewhere on the public domain.

Mining Directors.

The duties of a board of directors of a mining company require that they shall assnme the responsibility for every investment, and for the success or failnre of the enterprise. The directors are usually men of business experience and affairs, but often have no practical knowledge of mining or metallurgy. They are elected by majority vote of the stockholders, the directors themselves often holding large blocks of stock—that is, in going concerns. In new mining corporations it is not infreqnently noticed that the names of the directors are those of meu prominent in political and commercial circles, and almost as often these men have no mining experience or practical knowledge of miniug and metallurgical business. To this fact may be traced the cause of uumerous failures in mine investmeut—the fact that the directors have no knowledge of the business they are trying to manage. In snch cases the company must rely wholly upon the superintendent, who himself may be sadly deficient in experience, though also with good business ideas and a reputation for honesty, integrity, etc. He is placed in the responsible position of superintendent or manager because he or his relatives, or possibly his friends, have invested heavily in the enterprise, and they feel secure under his management. Still, he may not know the difference between a sheave wheel and the snmp. The recommendations made by such managers, though honestly advised, are ofteu amusiug as well as absnrdly foolish and unnecessary. One such manager was much surprised when informed that in ordinary smelting operations either copper or lead were nccessary. He had thought that all that was required was a large furnace with plenty of ore of any kind and abundance of coke. In order to insnre the best results, every board of miuing directors should possess at least one competent mining engineer, who, by reason of his experience, is fitted to advise and to correct and prevent the blnnders so frequently made by inexperienced managers and boards. The superintendent would be better satisfied to have a managing director with whom to advise on difficult problems, such as the advisability of new installations or extensions of plant, and many other things.

Frequently, when the superintendent is doing his best, the directors find all manner of fault with him without canse, or, if there be a cause, the board of directors are themselves responsible for the difficulties which cause the lack of success of which they complain. Having a competent engineer on the board would often prevent the unnecessary expenditure of large sums of money, and it would tend to harmonize the mauy conflicting opinions so commonly occurring in mining boards.

A SUDDEN rise in the Yuba river, California, last week swept away the upper completed barrier, and the lower uncompleted dam east of Marysville, which were built under direction of the California Debris Commission. The members of the commission have gone to the site of the dams to investigate and will report to Washington the reason for the destruction of the dams, with possible recommendations for their reconstruction, presnmably on somewhat different lines. The upper dam was constructed as an experiment—built of mats of brnsh, rock and earth—on the theory that the silt aud sand carried in by the waters of the stream would fill the iuterstitial spaces, rendering it a solid mass of earth interwoven with brush, a material not dissimilar from the river bed itself. These calcnlations were wholly overthrown by the suddenness of the freshet. The principal agent of destruction as far as known was the battering of the crest of the dam by drifting snags, which tore a breach in the structure before it had become solidly compacted by the settliug within it of the silt and sand. The impression has been eutertained by some that these dams were constrncted with a view to the resumption of hydraulic mining ad libitnm on the streams tributary to the Yuba above the site of the dams. There was no such expressed purpose in the building of these restraiuing barriers, the primary object being stated to prevent the flow of fiue debris into the Sacramento river. Any mine at any point above the dams could only be operated under the permit of the Debris Commission as heretofore.

Nitro Powder in the Mill.

In the comparison of two types of mills in use in the treatment of telluride ores in the Kalgoorlie district of Western Australia, the author makes the remarkable statement that it is not an uncommon thiug for the muckers in the mine to shovel up a stick of nitro powder with the ore and send it to the mill; that in one of these mills the damage is considerable, as it sometimes blows the bottom out, while in the other mill, owing to its greater size, there is more room for the expansive force of the powder, and the damage is small. Uudoubtedly the frequent, or even occasional, explosion of a stick of nitro powder in the mortar or other crnshing receptacle of a quartz mill must prove annoying to the mill men, and incidentally to the owners, but it is strange that if this is the case in Western Australia no similar occurreuce has ever been reported in America, or if such be the fact it has never become generally known or excited more than passing comment. In the United States it is customary to take care of so dangerous an article as nitro powder and to see that it is not sent to mill with the ore.

It would be difficult to find a mucker in an American mine so absolutely devoid of instinct as to fail to pick up a piece of nitro powder should he see it in the muck or ore he is shoveling. A single day in a mine is generally sufficient to teach the veriest novice the danger that lurks in a stick of dynamite, and it is only the old experienced miners who, long accustomed to its use, become careless in its handling. Powder is sometimes blown ont from a hole into the drift or stope by the explosion of a neighboring blast, being cut off, but it rarely if ever reaches the mill in a condition to do damage. It would seem from the statement of the Australian writer that this branch of the business required closer supervision.

THE redecisiou of the Snpreme Court of California upon appeal of a case involving the nse of underground or percolating water has affirmed a new principle in the water law of the West. There is abundance of mining law, and most of it is sufficiently definite for all purposes, aud, with the possible exception of the extralateral right law, it is generally satisfactory. With regard to water, however, the law is less positive, and it is sometimes difficult to get a legal determination on a water qnestion without resort to the courts. Iu some sections of the United States the "riparian right" theory is strictly enforced; in other sections, where mining is an important industry, the lines are less rigidly drawn. Under the common law, no right of absolute appropriation of water for any purpose is recognized. The case upon which the Snpreme Court of California has passed for a second time did not involve the right to the use of water in a stream, but of snbterranean water flowing or percolating through the rocks. The case arose over the plaintiff having driven a well, securing an abundant artesian flow. On a neighboring rauch defendant snnk artesiau wells which drained the well of plaintiff. The court decided that defendant, who sold water from these wells, should only have the use of such water as could be used on the premises, and that the wells must be capped, or regulated in such manner as would restore the flow to the well of plaintiff. The fear was expressed at the time of the origiual decision that it would have a far-reachiug effect, and that rights in the oil fields would become involved. There seems no likelihood of that, however, as petroleum mining is regarded as an entirely separate and distinct indnstry. The application of the theory upon which the artesian well decision is based, to the oil fields, would precipitate a conflict of ownership which could not be settled in several geuerations; but of this there is no present likelihood.

SECRETARY HITCHCOCK has denied the application of an electric power compauy to constrnct a ditch through Yosemite Park, Cal., for the reason that a ditch would mar the scenery, and moreover be a source of expense to the Park Commission, without any commensurate beuefit. It is believed that this decision indicates the fate of similar applications for water privileges, dam sites, etc., in the Park and Hetch-hetchy valley on the Tuolumne river, Cal.

CONCENTRATES.

IN order to take advantage of the right to follow a vein on its dip beyond the side lines of a claim, the locator must include within his boundaries some portion of the apex of a discovered vein.

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THE ore samples from Grant's Pass, Or., are iron, which is evidently a pseudomorph after garnet. That is, originally garnet, it has been altered to iron ore, by the change which has taken place atom for atom.

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THE mineral samples from Gilpin county, Colo., are: No. 1 quartz with micaceous or specular iron, a form of iron oxide: No. 2 is iron oxide and black oxido of manganese. No uranium present in either sample.

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BEFORE the advent of circular saws for sawing logs into lumber, the straight upright saw was used exclusively. In many localities it was run by power derivod from some form of water wheel. The action of a saw of this description was vertical—similar to the "whip" saw run by hand power.

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ASSESSMENT WORK on all unpatented claims located prior to January 1, 1902, must have the assessment work for 1903 finished, or work actually begun upon them before January 1, 1904. The recommencement of work is only a step, for it must be continued until completed or the claim is subject to relocation.

✣✣✣✣

PHOSPHORUS is an element not ordinarily desirable in iron ore, but for the operation of what is known as the basic Bessemer process it is essential that the pig iron contain not less than 1.8% phosphorus. The process is largely in use in Europe, but it has a limited application in the United States, where the acid process is in general use.

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THE owner of a placer claim can not follow a vein or lode beyond the surface boundaries of his claim extended vertically downward. In order to secure the extralateral right it is necessary that the owner of the placer claim make a lode location on the vein discovered in the placer, the same as though it were situated elsewhere on the public domain.

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TELLURIDE ORES may be concentrated by passing the pulp after crushing through hydraulic classifiers and sending each class to a separate concentrating machine, the tailings being passed over canvas tables. This class of ores is difficult of concentration. They should be hand sorted, the poorer ores only being concentrated, the richer being shipped.

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THE speed at which a flywheel may be safely run is determined largely by the strength in tension of the arms of the wheel. The safe speed is placed at a mile per minute, but specially constructed wheels are run at much higher speeds. A wire-wound flywheel in Wales is 20 feet in diameter, and is wound with seventy tons of wire. It runs 240 revolutions per minute, or with a peripheral speed of 15,080 feet per minute.

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BY catenary curve is meant the curve of any flexible cord or similar object, when suspended from its ends. It is used to denote the curve of a surveyor's tape line when held suspended in the air. By laying it on the ground and stretching the tape tightly the loss by catenary is almost nothing and may be neglected in calculations, but in measuring across gulches, open cuts and the like, with long tapes, there is a certain loss by the catenary curve.

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HYDROCYANIC ACID is formed by the action of acids upon cyanides. It is obtained by pouring a cold mixture of seven parts of sulphuric acid and fourteen parts water upon ten parts of coarsely powdered potassium ferro-cyanide, contained in a large retort, the neck of which is turned upward so that only the most volatile portions will pass over during distillation. In the preparation of an aqueous solution the vapors are cooled and received in water. This is prussic acid.

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THE microscopic study of rocks demonstrates that rocks contain minerals in three distinct classes: Native metals, such as gold, silver and copper; definite chemical compounds, like feldspar, mica, quartz, galena, pyrite, hornblende, etc., and glass-like minerals, in which the several component elements are united, not in a definite ratio, but indeterminately. The constituents of rocks sometimes occur in microscopic crystals, the same mineral in another rock may form the largest portion of the mass.

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BRICKS are of two kinds—common or pressed building bricks and fire bricks. The former are often red, from iron oxide contained in the clay. The light colored bricks contain little or no iron. Fire bricks are made by mixing the clay with previously burned fire clay to prevent cracking or drying. Fire bricks are moulded for furnace linings in segments to suit the size of the furnace. Where fire bricks can not readily be obtained, a good substitute for furnace lining is often found by mixing clay and sand with salt water and plastering the inside of the furnace with it, or by setting a cylinder or other form having essentially the shape of the furnace within it, but allowing a space between the form and the side of the furnace, to be carefully packed with the wet mixture of clay, sand and salt. This is allowed to dry when the form is removed and a slow fire started. The heat may then be raised gradually. The salt melts and glazes the clay and the entire mass forms a solid brick, which, if properly made from suitable materials, will endure for a long time.

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WHERE it is desired to divide water as accurately as possible for the purpose of supplying different parties with a definite amount, this may be accomplished approximately by placing upright divisions in a large box, under and over which the water flows alternately. By increasing the size of the several compartments as the water passes from one to another the water is brought into a comparative state of quietude, and then may be divided by passing it through apertures of stated size, or by allowing it to flow into a flume in which a dividing partition has been placed, by means of which a stated proportion may be sent to either side.

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ORE FEEDERS are operated by means of an upright rod placed beside the central stamp of the battery and has secured at the top a rubber bumper. This is arranged at such a height that the tappet on the stamp stem strikes the bumper each time the stamp drops, the upright rod being connected with a spring on the bottom, which is so adjusted as to regulate the feed of the machine. Feeders are also operated by having a split collar fixed to the stamp stem underneath the cam floor, the collar striking a "U"-shaped yoke with each drop of the stamp. These devices are not so satisfactory as the bumping rod, for the yokes wear rapidly and require frequent repairs.

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THE time within which the statute of limitation begins to run in the case of trespass upon the ore bodies of a mine varies in the different states. In the case of surface trespass, where there is every opportunity for observation, the statute runs from the date of trespass, but in the case of underground trespass has been the subject of much discussion. It is the rule, however, that in the case of underground trespass the statute runs from the date of the discovery by the injured party that his property has been illegally invaded. The measure of damage from trespass depends upon whether the trespass was intentional or was the result of inadvertence or lack of the actual position of the dividing line. In the former case plaintiff is entitled to actual and exemplary damages.

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WHEN figuring the width of belt necessary to run machinery at high speed the centrifugal force should be considered. The tendency of the particles of the belt is to move straight ahead and not to pass around the pulley. This forces the belt away from the pulley, so that as the speed increases the belt adheres less and less to the surface of the pulley, and a wider belt is required to transmit a given power than would otherwise be the case. For this reason, doubling the belt does not double the power it will transmit, but multiplies it by something less than two, and for this reason, also, there is a limiting maximum speed above which a belt cannot be run without great loss of power. For laced belts this is about 5400 feet per minute, and for cemented belts about 6300 feet per minute.

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IN STOPING, excepting in very small veins, or where it is necessary to keep ore and waste separated as carefully as possible, there is no doubt of the advantage and economy of machine drills over hand work. In small veins it is often necessary to employ hand drilling only, and in very loose ground where the heavy blasting incident to rounds of machine holes, shake down the rocks and render mining difficult and dangerous, hand work is sometimes preferable to machine. The statement that a machine drill of a certain manufacturer is inferior to that made hy another, because the former shook down the loose ground, seems a point in its favor, rather than against it, for a machine drill that will not strike a heavy blow cuts ground slowly. If the ground is so had that the operation of the machine causes it to fall. hand drilling had better he resorted to for a time until the loose rock has been passed.

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BLAST FURNACES employed in the manufacture of iron are much larger than those used in copper smelting. The largest iron furnaces are 100 feet in height, with a maximum diameter of 25 feet. The furnace, when in operation, is filled from top to bottom with iron ore, limestone and coke, or other fuel, though the lower portion of the column is fuel only, as the iron ore is melted by the great heat generated by the hot blast from the tuyeres, leaving the coke as the only solid substance in the lower part of the furnace. The limestone is changed to lime long before reaching the fusion zone of the furnace. Ore or other material charged at the top of the furnace passes downward to the bottom in twelve to fifteen hours. The siliceous and aluminous portion of the ore, the lime and the ash of the fuel unite to form slag, under which collects the molten iron. In its operation the furnace deoxidizes the iron, carburizes it, melts it and scorifies the slag, delivering slag and iron as separate products of the fusion. It is a principle in smelting any ore that oxidized bodies will not unite with unoxidized ones.

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PORTLAND CEMENT is named from its resemblance to Portland, England, sandstone. It is manufactured from river mud (chiefly clay) and limestone, calcined at a high temperature. The so-called Portland cements of America, although imitations of the English article, are in many instances in no way inferior to the latter. Hydraulic cement is made from pure calcium carbonate, mixed with 10% to 30% clay. In some works a small quantity of fluor spar is added. The mixture is ground fine, calcined at a very high temperature, and the so-called clinker reground. In the process of calcining the carbonic acid gas is expelled, and the lime combines with a portion of the silica and alumina of the clay, producing tricalcium silicate, $3\,CaO,\,SiO_2$; and tricalcium aluminate $3\,CaO,\,Al_2O_3$. When the calcined material has been ground to powder (not less than 100 mesh), and the powder is mixed with water these silicates, which are anhydrous, unite with the water to form hydrons silicates, with the liberation of free calcium oxide (lime) which dissolves in water and immediately recrystallizes, thus causing the cement to "set." Roman cement consists of calcium carbonate and 25% clay, treated as above described. It sets rapidly after mixing with water.

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COMMISSIONER WILLIAMSON of the General Land Office thus gives the view of the department concerning character of annual assessment on mining claims. "All improvements made on a mining claim having a direct relation to the development thereof may be taken into consideration. Any building, machinery, roadway, or other improvements, used in connection with, and essential to, the practical development of the claim will enter into and form a part of the expenditures for improvements. Necessarily, however, improvements of the character indicated must be associated with actual excavations, such as tunnels, cuts, shafts, etc., to clearly show that they are intended for use in connection with the claims under consideration." A house in which to live may be considered a necessity, but it is doubtful if the house could be charged up against annual expenditure on one or more claims, for if this were so a person might locate twenty claims and build a $2000 house in the center of the group, ostensibly for the benefit of the entire group. The next year he might build a barn or add to the house another $2000 worth, thereby holding the claims a second year, though not a dollar was spent in the development of the group. The principle involved is the same for one location or two. A hoist building or a blacksmith shop; gallows frame or other construction, or machinery for the actual benefit of one or more locations may properly be charged to annual assessment.

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REPLYING to the Silver City, N. M., correspondent: Evidently the instructions laid down by Stotefeldt have been followed, and the roasted sulphides have formed a matte with the iron and the earthy fluxes employed. The heat evidently was insufficient to accomplish the desired result. Melting and refining silver sulphides, precipitated from hyposulphite solutions, has formed one of the most difficult problems of metallurgy, and has been the subject of several patents for processes. C. H. Aaron, in his work on "Leaching Gold and Silver Ores," p. 73, says: "The dried precipitate is roasted in a small reverberatory to burn off the greater part of the sulphur, beginning with only sufficient heat to ignite the sulphur, gradually increasing the temperature to dark red, or to such a degree as it will bear without melting. It must be stirred while melting, and shifted from end to end of the furnace. If but little base metal is present, the roasting is continued until as little as possible of sulphur remains. The roasted sulphide is melted in a black lead (graphite) crucible, in a wind furnace, with coke or charcoal for fuel (coal is not advised). If the precipitate, before roasting, contained but little base metal sulphide, the silver may be seen in the form of threads in the roasted mass, which still contains a considerable quantity of sulphur. The crucible, containing some scrap iron, is filled with sulphides and placed in the furnace, standing on a piece of fire brick, for, as melting occupies a considerable time, even a thick layer of the best coke does not last long enough to prevent the crucible from settling down to the grate. A little borax is added and the whole heated till there is room in the pot for more material, when it is refilled, using a scoop and funnel. As fast as the scrap iron disappears more is added, but if such addition is made after full fusion the iron is first heated. If the roasted precipitate contains much copper or iron, more borax is added, and a little clean quartz sand is useful, especially if the roasting has been excessive. Charcoal is also added. When the pot of sulphides is thoroughly melted matter and pieces of iron, a test is made by placing the end of a red-hot iron in the molten mass. After allowing it to remain a few minutes it is withdrawn, and if it be found that part of the iron is melted more time is allowed. When iron is no longer consumed the melt is complete, and slag and matte are dipped out with a small red-hot crucible, handled with the tongs, and poured into a mould or an iron pan. The pot is now refilled with roasted precipitate, adding it slowly until the melted mass is somewhat chilled. When all the precipitate has been thus treated, or the pot contains a sufficient amount of metal, a part of the slag and matte is removed as before, and the remainder is poured, together with the silver, into a heated mould. If it is intended to plunge the moulded silver bar into water to cool it, the matte must first be removed, or an explosion is likely to occur, if the matte has not also been solidified. If the melting has been properly conducted the matte will be brittle and separate easily from the metal. All slag and matte should be carefully examined for large silver buttons. The former may be sold to smelters and the latter crushed and reroasted and worked for silver."

Aluminum Not Easily Soldered or Plated.

The ever-present, invisible film on an aluminum surface has a great influence on the success of various operations, especially soldering. The film is supposed to have considerable strength and continuity, aud if it is broken or removed by mechanical meaus the aluminum immediately forms a new one. In soldering aluminum the principal difficulty seems to be due to the failure of the alloy used as solder to adhere to the aluminum, a condition attributable to the protective film, which must be eliminated before the metal can unite. A successful solder consists of about 21% of ziuc, 76% of tin and 3% of aluminum; it may be applied directly to a cleaned aluminum surface without the use of a flux and at a temperature but little above that which is necessary for soldering copper or iron. There are certain advantages in the apparent complication which the use of a flux involves; a suitable solvent for the oxide film increases the rapidity of the soldering process, increases the certainty of adhesion and enables cheaper soldering mixtures to be used. The requirement for such a flux is that it should dissolve the coating and leave a clean surface for the solder to unite with, upon application of heat. It seems that water can not be a component of a suitable flux. A material which for certain solders forms an admirable flux is stearic acid; by applying it to a freshly scraped aluminum surface and then a tin-lead zinc alloy, the matter of soldering aluminum presents scarcely greater difficulties than does the soldering of other metals. This almost ever-present coating upon aluminum is also the source of difficulty in the deposition of a permaneut coating of other metals upon aluminum surfaces. While it is very easy to deposit a layer of metal upon aluminum from almost any plating solutiou, in the great majority of operatious the resulting coating can be readily removed, sometimes in remarkably thiu and continuous layers. The prime requisite in successful depositions on aluminum is the complete removal of the protection film, so that the electro-deposited metal may be applied over the complete surface of and in intimate coutact with the aluminum. If this condition is fulfilled, and the coating is nou-porous, it will be durable. The couverse of this operation—that is, the electro-deposition of aluminum upon other metals—appears to be impossible from aqueous solution, says Electro-Chemical Industries.

Mexican Bullion Tax.

The taxes levied for amonedacion or coinage, or, in other words, for turniug gold and silver bullion from Mexican mines into coin or specie, says the Mexican Investor, are as follows:

Federal taxes:

1. A coinage duty of 2%.
2. A stamp duty of 3%.
3. A Government assayer's fee of $2.50 per bar of 35 kilograms or auy fraction thereof.

State taxes:

1. An export duty of 2%.
2. A stamp duty of 25% on the State export duty of 2%.

The collection of Federal taxes ou bullion is based on the fixed valuatiou of silver at $40,915 per kilogram and of gold at $675,416; to the latter is added the rate of exchange resulting from the average of exchange of New York during the first twenty-five days of the previous mouth, which rate is decided mouthly by the Treasury Department and opportunely wired to all offices and maritime and froutier custom houses.

In every statement of taxes the Mexican dollar is the unit.

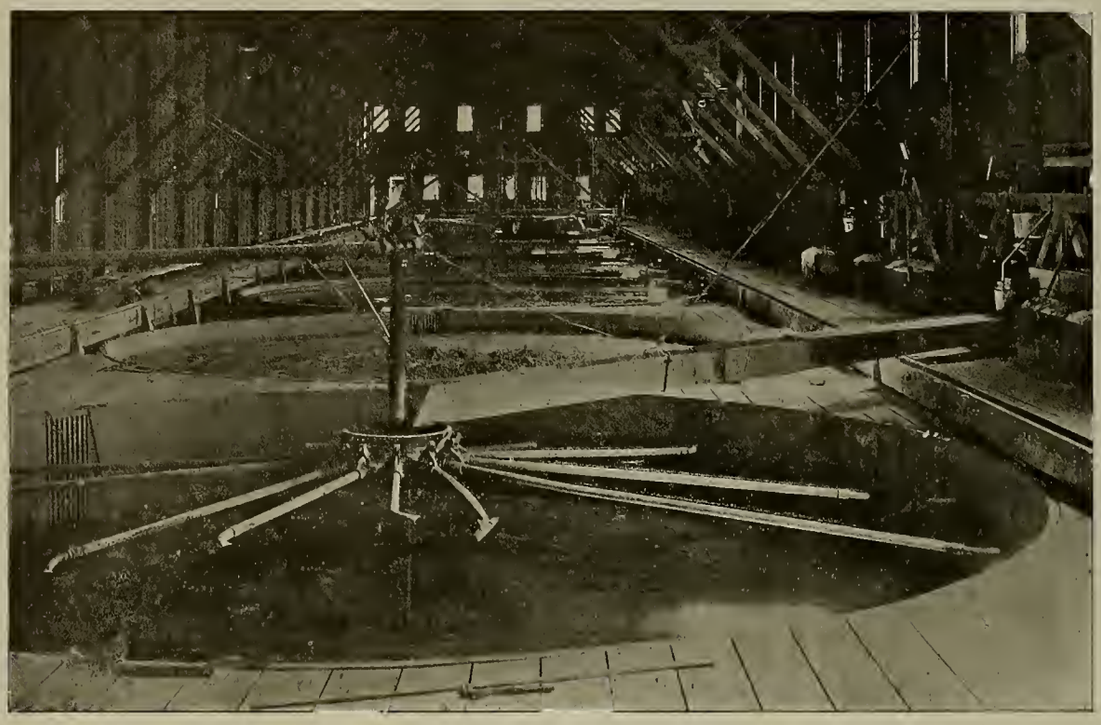
COCOA MATTINO used in cyanide aud other mills, aud for covering of uudercurrents to act as a riffle iu catching fine gold and black sand, is a coarse fabric made of the fiber obtained from the outer shell or husk of the cocoanut. It is similar to cocoa floor matting, but inferior in make, more open, and designed especially for the purpose for which it is used.

Cyanide Plant Machinery.

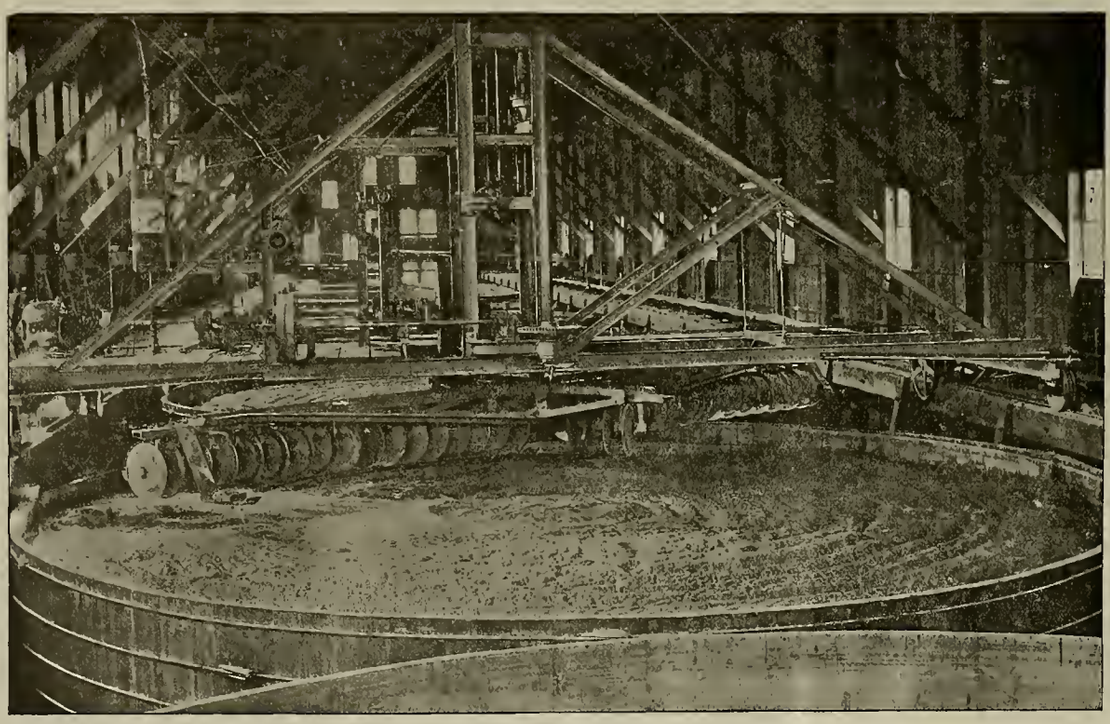
Since the introduction of the cyanide process in the treatment of ores great changes have taken place, both in methods and in the character of machinery employed in the process. In small plants the means of handling material is essentially the same, but in larger installations, aud particularly in those where slimes are troublesome, many unusual and ingenious devices have been introduced aud are successfully employed.

In the operation of the cyanide process, owiug to the low grade of material usually treated, the handling of sands and slimes must be reduced to a minimum. To accomplish this various mechanical devices have been introduced, and among these some of the most interesting are those illustrated herewith, and also on the front page, mauufactured by the H. W. Blaisdell Co. of Los Angeles, Cal.

When tanks are to be filled with mill tailings or crushed ore for cyanide treatment, it is desirable to charge the tanks with the material as uniformly as possible, and to prevent the segregation of slimes from the sands, and particularly to overcome the formation of layers or floors of slimes, which render percolation slow and difficult, and sometimes impossible. To obviate this mechanical distributors are employed, one form of which is illustrated in the accompanying engravings. It is in use at the Butters cyanide plant at Virginia City, Nev. The distributor is carried by a traveling crane over the vats. At the rear end of the building is shown an excavator in the act of removing the pulp from a tank. The excavator does away with manual labor almost entirely. A nearer view of one iu operation is shown in another of the illustrations, working in a tank 30 feet in diameter in the Butters plant at Virginia City, Nev. It is what is described as a bottom discharge machine, with a capacity of 100 tons per hour, and it daily removes 300 tons of sands from the vats to a 16-inch conveyor running beneath them. This excavator, as will be noticed, is moved along the building from tank to tank by a traveling crane, so that one machine is sufficient for the entire plant.



Butters Distributor, Carried by Crane Over Vats, Butters Plant, Virginia City, Nevada.



Excavator at Butters Plant, Virginia City, Novada.

In another engraving is shown an exterior view of the Butters Virginia City plant, with mechanical haulage of cars up into the mill.

A traveling bridge over a line of cyanide vats, illustrated on front page, is in use at the King of Arizona mine at Kofa, Ariz. A double row of vats at the Gold Roads mine, Acme, Ariz., is also shown on the same page, where a mechanical distributor is moved

from tank to tank by means of a bridge carrier.

In modern plants manual labor is dispensed with as far as possible, and the introduction of such devices as here described and illustrated makes the process almost automatic. In some plants tailings are sluiced from the tanks through doors in the lower portion of the side or arranged in the bottom, but in a region where water is scarce it is not economy to employ this means. In such cases the mechanical excavator proves its value.

Power Transmitted by Shafting.

Shafting must be of a size and kind suited to the amount of work required of it. To find the amount of horse power a given shaft will transmit, take from the table given below the factor given for the size and character of shaft and multiply by the number of revolutions per minute:

To find the size shaft required to transmit a given amount of power: Divide the number of horse powers required by the number of revolutions per minute; the result will be the factor given in the table opposite the required size of shafting.

TABLE SHOWING POWER FOR EACH REVOLUTION OF THE MAIN SHAFT.

Size. Inches.	Iron. Rolled.	Steel. Turned.
1⅝	.107	.060
1⅞	.132	.073
2	.160	.089
2⅛	.190	.106
2¼	.220	.126
3⅜	.270	.150
2½	.310	.170
2¾	.410	.230
3	.540	.300

HORSE POWER FOR EACH REVOLUTION OF COUNTER SHAFT.

Size. Inches.	Iron. Rolled.	Steel. Turned.
1⅝	.142	.086
1¾	.180	.107
1⅞	.220	.132
2	.260	.160
2⅛	.320	.190
2¼	.380	.220

ALL well regulated mills are supplied with foot boards to be placed across the plates in front of the battery. These should be so constructed as to be removed when cleanup is in progress. In some mills the plates next the battery are movable, the upright supports being provided with castors which run upon a half-round track. By this means, when work is to be done in the battery, such as renewing shoes and dies, the plate may be run backward, the upper plate overlapping the next plate below. This affords room to work at the mortar and makes the handling of the heavy castings much easier.

A PLACER CLAIM must be staked in the same manner as quartz claims, even though they conform to the legal subdivisions of the survey. If a claim is not so staked others than the locator may remain in ignorance of the fact that a claim has been taken. It is not a matter of State or local custom, but of federal law.

THE loss of mercury is much greater in mills where inside amalgamation is practiced than where the quicksilver is spread on the outside plates only.

Causes of Gold Mill Losses.

Written for the MINING AND SCIENTIFIC PRESS.

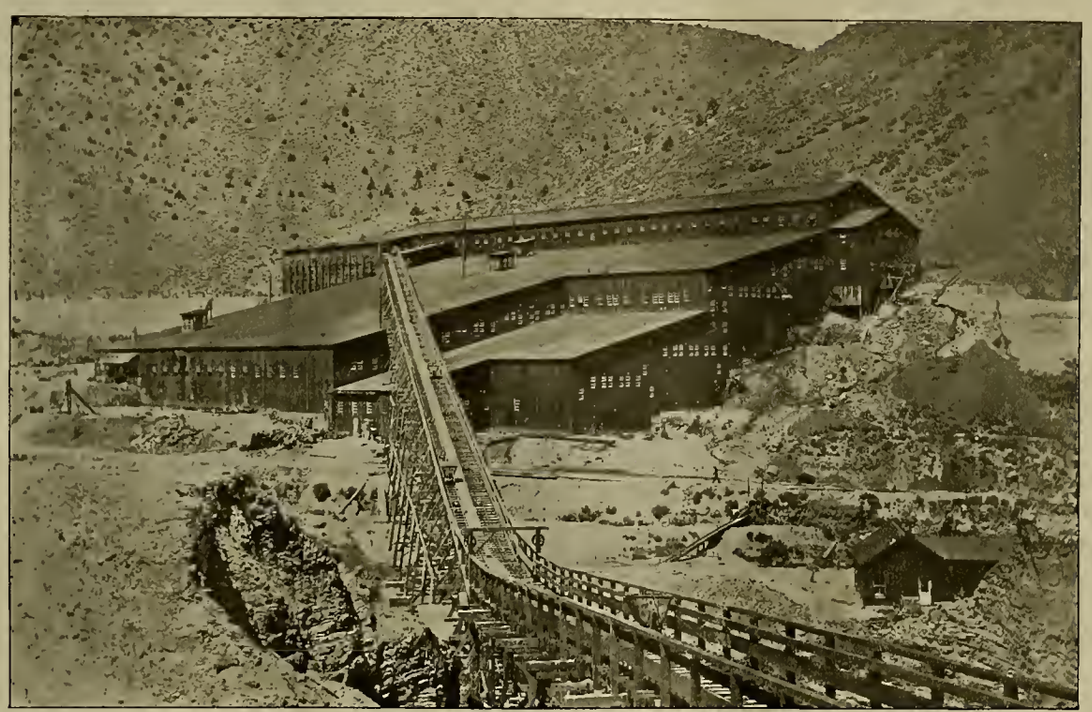
When it is learned, through the medium of assays of tailings, that there is a high percentage of loss in milling gold ores, the first step to be taken to correct such loss is by locating the form in which such loss occurs. Loss of gold may occur in any one of a number of ways, or in several ways, a little being lost in each stage of the operation after crushing. It may be that the mercury is flouring and carrying away gold; gold already amalgamated and attached to outside plates may be scoured off and if not caught on the concentrators is lost; or the loss may be in imperfect concentration. Still another cause of loss, and one not generally suspected, is in the fact that golden particles remain in uncrushed grains of the gangue. In other words, the crushing is too coarse.

Amalgamation on copper plates or silver-plated copper plates is a metallurgical process that has long been in successful use, and it is one well adapted to the treatment of a wide range of gold-bearing ores, if the mill man thoroughly understands his business. "Rule of thumb" methods in a gold mill are not prolific of the best results. A mill man may have learned by experience, or through instruction, how to treat the ore of a certain mine with a fair degree of success, but at another mine his practice would, perhaps, fail to accomplish satisfactory results. It is not an uncommon thing to find the ore at a mine unoxidized. Amalgamation is still practiced. Sizing and classifying devices are employed and the tailings are cyanided in two classes—the sands and the slimes. The present practice was fully described in the MINING AND SCIENTIFIC PRESS in the issues of October 3 and 10, 1903.

The above is cited as an illustration of the career of many mines. In Arizona many veins contain free milling gold ore in the oxidized zone. At depth the sulphides of copper, iron and lead appear, and in some districts veins which show no trace of zinc in the upper portion of the veins, produce the sulphide of that metal in abundance in greater depth. It is usually the last sulphide to appear. This change in the character of the ore usually necessitates a radical change in milling methods.

In many mining regions where the ores are considered free milling, where amalgamation is practiced, and concentrators are in use, not over 85% to 90% of the values are saved, and the cyanide process is employed to extract additional value from the tailings. In some of these mills it is no doubt a fact that an increased saving could be made by finer crushing, and by sizing and classifying the pulp from the amalgamating plates before attempting concentration.

The most common causes of loss of value in gold mills are: Direct loss of gold, amalgam or quicksilver, due to either scouring or flouring of the mercury; gold imbedded in the grains of the gangue not crushed sufficiently to free the gold and render it susceptible to amalgamation; gold imbedded in sulphurets; gold in slimes, and gold in a condition which renders it impossible of amalgamation on copper plates—as in the case of gold covered with a film of silica, iron oxide, or other impenetrable substance; or gold alloyed with other minerals as is the case with some telluride ores.



300-Ton Cyanide Plant, Virginia City, Nevada.

The only way in which gold remaining imbedded in grains of the gangue can be caught is by finer crushing or grinding. Gold which is imbedded in particles of sulphide ore which may escape amalgamation should be caught on concentrators if the devices are of proper kind and the man in charge understands the adjustment of the machines. Gold in slimes which cannot be amalgamated offer a difficult problem to the mill man, and the only remedy is to lower the discharge of the battery, add more water and use every endeavor to facilitate the discharge of the pulp from the mortars as soon as possible after being reduced in size to pass the apertures of the screen, but when this is attempted a loss may be caused by incomplete amalgamation. It is the theory of the high, slow-drop as practiced in the Gilpin county, Colo., mill that with high discharge the mercury is thoroughly mingled with the pulp and a more complete amalgamation results, which is doubtless the case. In a mill where losses occur in the slimes, however, the cyanide process is thus far the best solution of the problem that has at yet been offered. Where the particles of gold are covered with a film of any sort which is impervious to the action of the mercury then attrition is usually beneficial, and this is accomplished by crushing in one of the many forms of rotary grinding mills, or in an arrastra.

When the gold is not susceptible to amalgamation, as in certain telluride ores, it must be treated by some other method than amalgamation, for even roasting does not render all the gold subject to amalgamation. The ores of the Cripple Creek, Colo., district, and those of the Cambrian beds of the Black Hills, are of this class, and in these districts, as well as those of Western Australia, the various wet processes of chlorination and cyanidation find their most satisfactory application. Some of these ores are previously treated by amalgamation, the tailings being treated by a wet process.

If there are losses in amalgamation the tailings assays will detect it, but the testing of tailings by fire assay will not locate the character of the loss, nor the particular place where it occurs. To arrive at definite knowledge of this sort it is necessary to make a thorough and systematic series of tests.

A sample of tailings should be carefully panned to determine whether it contains free gold, amalgam or quicksilver. Finding either of these, a change must at once be made in the method of amalgamation. When samples no longer show gold, amalgam or mercury, a sample should then be screened through two sizes of screen—say 60 and 100 mesh. This will result in giving three sizes of pulp—that which remains on a 60 (supposing the mill screen to be a 30 or 40 mesh), that which remains on the 100, and that which passes the 100 screen. Separate assays should be made of the three products of screening. Should the coarsest particles contain the highest values, finer crushing will probably reduce the loss if the values contained justify it. If this coarse material change materially with increasing depth. The Homestake mines of South Dakota form a good example of this fact. In the early history of the mine the ore was an oxidized, highly ferruginous quartzose rock with semi-schistose to massive structure. The rock was a typical free-milling ore and no attempt further than straight amalgamation inside the batteries and out was made to save the gold. There was always a certain loss, however, which was detected by tailings assays. It was found that quicksilver and amalgam escaped, presumably scoured off the plates. To check this loss mercury traps were placed in the mill. The mills ran from 1877–'78 to about 1886 without these traps. In a single month in the Homestake mill, at that time containing 80 stamps, 80 ounces of amalgam and 144 ounces of quicksilver were saved in the inside traps, and in the outside traps 10 to 12 ounces of amalgam and 40 ounces of quicksilver. This saving represented a value of about $520, or about $0.065 per ton, a trifling amount in itself, but when it is considered that at that time the company operated 580 stamps, and if a proportional amount were saved in each mill it would have amounted to nearly $45,000 per annum. So far as known, no authoritative statement as to the total amount thus saved has ever been made public.

Prior to the introduction of the mercury traps the only attempt made to save values escaping in the tailings was that of running the tailings over long lines of narrow inclined planes, the floor of which was covered with full widths of Brussels carpet. These caught a large percentage of the sulphurets which had appeared in the ore with depth, and also a great quantity of low-grade sand. The sulphurets were stated to be worth about $25 per ton.

Since then many changes have taken place in the milling methods. Nearly all the ore treated now is

contains sulphurets, sizing and classifyiug may result in increasing the saving on the conceutrators aud finer crushing may not have to be resorted to. This can usually be determined by grinding the coarse sand in an iron mortar with mercury. If the gold be in a free state after the removal of the quicksilver and amalgam, an assay of tailings from this operation will show a decrease in values in the sample.

Should the several samples of screened pulp show no great variation in value it is doubtful if finer crushing is advisable as it will diminish capacity without increasing the saving.

In case the fines contain the highest values a coarser screen in the battery may be tried. This will increase capacity and may not materially increase the loss. Should the percentage of loss increase with coarser crushing theu cyaniding of the slimes may be resorted to. Sometimes a change of screeu—from slotted screens to woven wire, or needle punched, or vice versa, is advisable. In fact a series of experiments must be made to locate and stop the loss of values.

In the average gold ore a system of concentration after amalgamation is necessary, aud the result is usually satisfactory. In some districts the conceutrates are too low in grade to permit their being shipped at a profit. In such case they may be treated at the mine by chlorination or cyauide. Sometimes the former is considered not justified by the amount of sulphurets produced. In such case they may be stacked and accumulated until a sufficient quantity is on hand to justify the erection of works. Attempts have been and are now being made at various mines to cyanide sulphides direct. Thus far fair success has attended these efforts on very fine material such as that collected on cauvas plants, but the results from the direct treatment of coucentrates from the machines has not always proveu satisfactory. When this is the case grinding may be resorted to with good results.

Generally speaking, if the amalgamators and concentrator men in stamp mills understand their business thoroughly the canvas plant will have a limited field of usefulness.

Treatment of Telluride Ores at Kalgoorlie, Western Australia.*

Written by W. E. SIMPSON.

The discovery of the various tellurides of gold on the Kalgoorlie gold fields entailed a large amount of metallurgical activity aud experimental research, resulting in the devising of many different processes for the extractiou of the precious metal.

Ordinary battery treatment with subsequent concentration and cyauidatiou of both tailings and slimes gave poor and nuremunerative results. The tellurides floured badly, escaped concentratiou, floated over into the slimes, aud, being practically insoluble in plain cyanide, passed out with the residues. Ordinary cyanide, the worker of such wonders on other gold fields, had reluctantly to be voted an unqualified failure ou these refractory ores. Smelting was certainly a success so far as the extraction of the gold was concerned, but the cost was so great that only ores of very high assay value could repay it. Chloriuation was out of the question for analyses of the ores showed the presence, in some cases, of as much as 20% of carbonate and sulphate of lime. Cyaniding was then tried; the ore was roasted and allowed to cool, and charged into vats. A solution of cyanide was pumped into the vats and allowed to percolate through the roasted material. The originators of this style of treatment had overlooked the fact that the sulphate of lime preseut in the ore, as well as that formed in the furnace by the action of burning sulphur on the carbouate of lime, would become converted into plaster of Paris. When moistened in the vats this set hard, became impervious to the solution, resisted further percolation, and, after perhaps a month's treatment, yielded less than half its gold. Another objection too, was that the "residues" had practically to be quarried out of the vats, a process which nearly always required the aid of a little dynamite.

Many other examples can be quoted of "processes" which sprang up like mushrooms, only to again sink into oblivion, and at the preseut time there only remain two which have survived—viz., the "Diehl" process and the Dry or all-roasting process. The former consists, with certain modifications, of wet crushing, amalgamation on copper plates, coucentration aud separate treatment of the concentrates by roasting or by smelting, sliming the remainder, agitation, in presence of cyanogen-bromide to attack the .tellurium, and cyanide to dissolve the gold, followed by the treatment of the pulp by filter-pressing. The latter, which is equally efficient, begins with dry crushing, followed in succession by roasting, sliming in amalgamators, agitation with plain cyanide and filter-pressing. Precipitation on zinc shavings is common to both processes.

DRY CRUSHING AND ROASTING PROCESS.—The first "all-roasting" plant to give satisfactory results on a large scale was that of the Boulder Main Reef, Ltd., and it speaks highly for the process that, although slight improvements have been introduced from time to time in some minor details, the main principles have been but slightly altered. Despite the fact that it is now the oldest sulphide plant on the field, it still continues in active operation, and for efficiency and ecouomy it is still able to hold its own with its more modern and mammoth neighbors.

The plaut proper consists essentially of one No. 3 Gates rock crusher, two No. 5 ball-mills, three mechanical roasters, six grinding pans, four agitation vats, with mechanical stirrers, four filter presses, one small clarifying press, three precipitation boxes, with sumps, pumps, piping, and the other usual accessories attached to a plant. A 250 H. P. Fraser & Chalmers Tandem Corliss engine drives the whole plant, and a battery of four 22 feet by 6 feet 6 inch boilers supplies all the necessary steam for this, as well as for the air compressor, dynamo aud windiug engine.

The ore mined and treated varies considerably in chemical composition, being very calcareous from the surface down to the 600-foot level, aud becoming more siliceous as depth is attained. Analyses show the amount of each constituent to range within the following limits:

Silica	40 per cent	to 60 per cent.	
Alumina	13 "	to 16 "	
Ferric sulphide	6 "	to 10 "	
Ferric oxide	7 "	to 10 "	
Carbonate of lime	15 "	to 20 "	
Magnesia	4 "	to 7 "	

With traces of copper, lead, zinc, arsenic, etc. There is practically no free gold, all being combined with tellurium.

CRUSHING AND MILLING.—The ore, as it comes from the mine, is dumped on to a grizzly the bars of which are set 2 inches apart. The smalls pass through, leaving the blocks to be roughly spalled by hand and crushed by the Gates rock breaker; the stuff falls into a 100-ton bin, from which it is fed, by means of a Challenge ore feeder and a Robins belt conveyor to the ball mills; these deliver it by a bucket elevator and screw conveyor to one of two small bins over the roasters. The mills are uot now fully employed, as the shaft furnace, the original roaster, has been discarded, aud ouly sufficient ore is milled to supply the three furnaces.

On the Kalgoorlie field two classes of dry crushers are used—viz., ball mills and Griffin mills. Ball mills for years have given satisfaction on the Associated, Kalgurli, Hannan's Star and Boulder Main Reef gold mines, while the Griffin mills claim supporters on the Perseverance, South Kalgurli aud Great Boulder Proprietary. As the Great Boulder Proprietary and the Boulder Main Reef are adjacent mines, working the same lode, which is practically ideutical in character, chemical composition and physical properties in both leases, a comparison between the efficiency of the two crushers is possible; bnt comparisons of costs, other than those of geueral maintenauce, etc., are scarcely fair, because in the larger plants power can be produced at a much lower rate per unit, and the cost of supervision, etc., is divided over the greater tonnage treated.

In comparing the output of these mills, it must be recollected that the Griffin is fed with pieces no bigger than walnuts, whilst the ball mills take lumps as big as the fist. It was found on one occasion that 75% of the ore fed to the ball mills at the Boulder Main Reef was too large to pass through a 2-inch ring; indeed, 3% proved too large to pass through a 6-inch ring. These mills were each treating thirty-three tons a day.

Of the twelve Griffin mills installed on the Great Boulder Proprietary mine, uever more than ten are running at one time. The wearing parts—i.e., the roll shells and followers, costing £3 5s. to £2 2s. each respectively—require renewing every eight days, while the die rings, costiug £4 each, and the roll bodies, costing £3 3s. each, last about six or eight weeks. On the South Kalgurli the pendulum shafts are replaced on an average every two months, at a cost of abont £10 for material alone. Driving belts also suffer severely, and require to be renewed twice a year. The power required is 20 I. H. P. per mill, and the output is 1.25 tons per hour of running. The screen area of the ball mill is large and sufficient to secure the discharge of the ore immediately it has been reduced to the required degree of fineness, and as the screens themselves revolve they are subjected to internal scouring, which keeps them clean and in proper trim for efficient working. The cost of maintenance is moderate, one steel ball, weighing eighteen pounds, beiug put in each mill every day with the charge of ore in order to make up for the consumptiou of metal. The other wearing parts are the grinding plates and side liners, which are replaced in complete sets every seven or eight months, and cost £180 delivered on the mine. The driving belts on the Boulder Main Reef, which are of camel's hair, have been in use continuously for over four and a half years, and look as if they would still last a loug time. Each mill makes twenty-five revolutions per minute, requires about 24 I. H. P., and has an output of over one and a half tons per hour. The total weight of the steel balls in each mill varies from one ton to twenty-two cwt.

An examination of the powdered ore leaviug the ball mills on the Boulder Main Reef, where a screeu of twenty holes to the linear inch is used, furnished interesting data. A sample assaying 16 dwt. per ton was treated on a series of brass wire sieves. The portion retained on each was carefully weighed and assayed separately with the following result:

					Oz.	dwt.	gr.
Retained on	40-mesh sieve	24.1%	assaying		0	7	20
Passing 40	" 60	" "	9.4%	"	0	11	18
" 60	" 80	" "	6.2%	"	0	13	7
" 80	" 100	" "	6.6%	"	0	17	0
" 100	" 150	" "	3.3%	"	0	18	7
" 150	" 200	" "	4.3%	"	0	18	7
" 200	" ...	" "	46.3%	"	1	0	6

It will thus be seen that as regards value the ball mills produce only two qualities. The coarse, largely made up of hard particles of quartz, is comparatively poor, while the fine contains most of the gold, owing to the friability of the sulphides and tellurides.

(TO BE CONTINUED.)

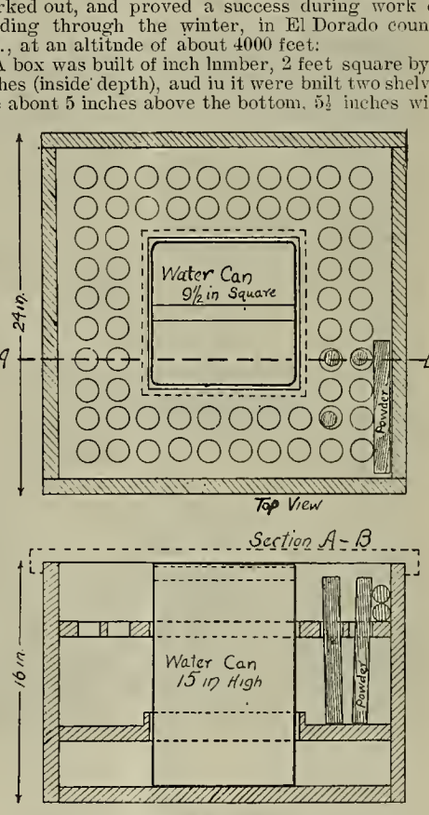
*Abstract Trans. Institution Mining and Metallurgy.

Design for Powder Thawer.

TO THE EDITOR:—From time to time you have published in the MINING AND SCIENTIFIC PRESS descriptions of powder thawers, while almost invariably the statement is made that no dry heat should be used in thawing dynamite. Nearly all those described call for lighted candles as the source of heat.

Not only with the idea of eliminating the candles, but also to get a thawer that would thaw, as safe as possible to make it, and made from such supplies as are at the hand of every miner, the following idea was worked out, and proved a success during work exteuding through the winter, in El Dorado county, Cal., at an altitude of about 4000 feet:

A box was built of inch lumber, 2 feet square by 15 inches (inside depth), aud in it were built two shelves, one abont 5 inches above the bottom, 5½ inches wide,



Powder Thawer.

with a raised rim ½ inch thick and 1 inch high; this shelf was built all around the box, leaving in the middle a hole 10 inches square. Six inches above this shelf was placed a rack, 6 inches wide, all aromnd the box as before, leaving the 10-inch hole in the ceuter; this rack was bored with sixty-four holes, 1½ inch in diameter, spaced 2 inches apart.

To thaw a lot of powder, one stick can be stored in each hole—sixty-four in all; if more is required, they can be laid in between and aromnd the sides. An empty five-gallon coal oil can, top cut out and wooden handles nailed in, is filled with water and heated on the forge, or wherever convenient, until nicely warm—not hot—placed in the magazine box and air-tight cover placed over all.

The heat radiating from the warm water, and held in the box by the non-conducting walls, will slowly thaw out the powder, and in the course of two or three hours it will be soft and ready to use. It is surprising how loug a can of water will remain warm when euclosed in a woodeu box. We would put a can of warm water in when leaving in the eveuing and find our powder still soft in the morning.

The size of the standard five-gallon coal oil can is 9¾ inches square by 13½ inches deep; hence the above dimensions. I see no reason why the box could not be made cousiderably larger, so as to have three or four rows of sticks of powder, if desired.

If the box were made double, with a layer of sawdust between, it would undoubtedly be an improvement. I believe this is as safe a plan as any for thawing powder, and it works very satisfactorily in cold weather. CLIFTON H. WILDMAN.

Mt. Hope mine, El Dorado county, Cal., Nov. 18.

The Alsek Placer District, Yukon Territory.

Written for the MINING AND SCIENTIFIC PRESS by W. M. BREWER.

During the summer of 1902 discoveries of placer gold were made by Dawson Charley, an Indian, and his associates on a creek about 12 to 14 miles long, situated near the headwaters of the main tributary of the Kaskawulsh river, itself a tributary of the Alaska river which flows through that portion of the Yukon Territory across a strip of British Columbia and into the ocean in United States territory westerly from Lynn Canal.

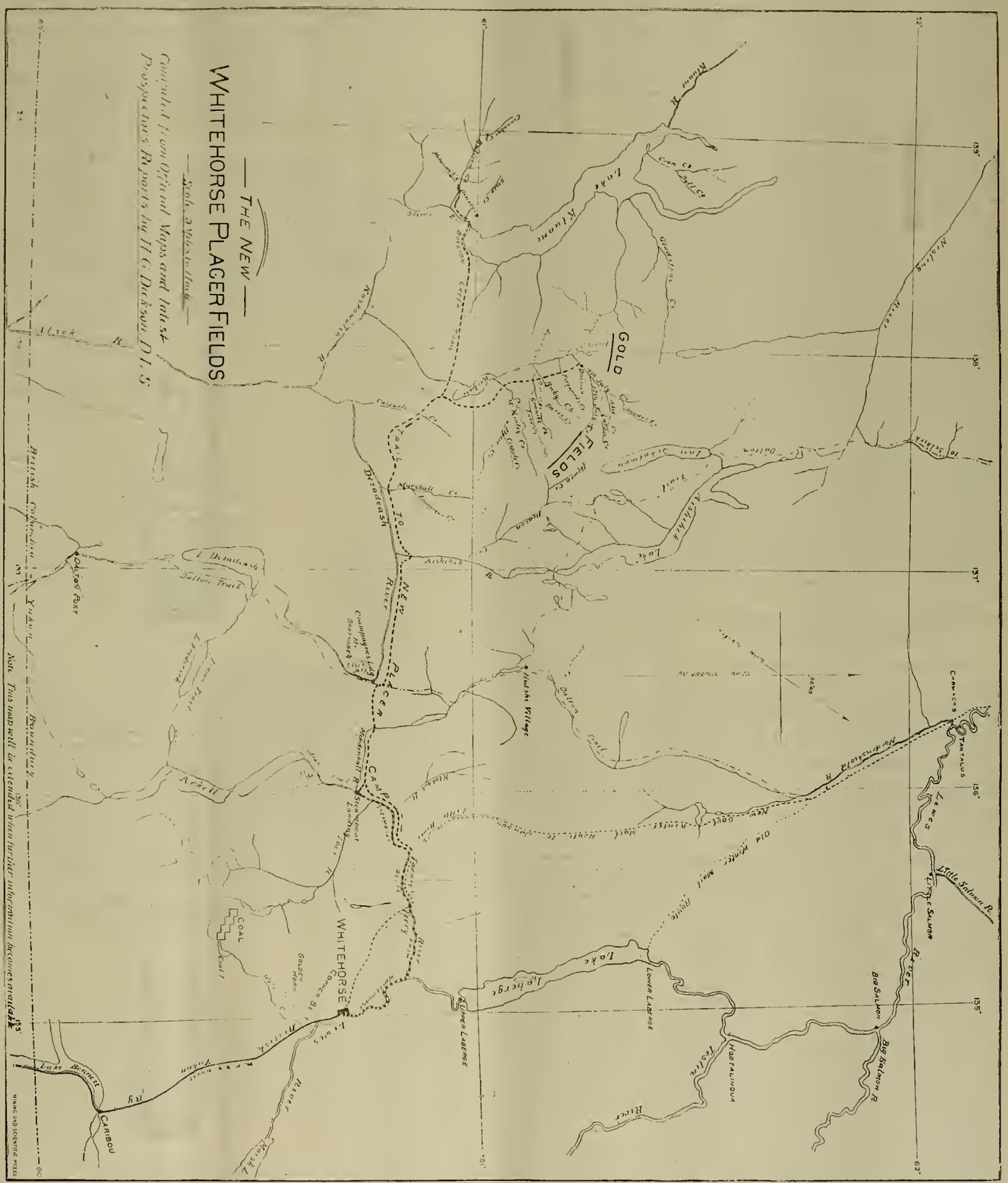
The location of the new discoveries is about 130 miles northwesterly from the terminus of the White Pass railway at White Horse, which is the outfitting point.

As the first staking was done on the 4th of July by the Indians they named the creek on which the discovery was made "Fourth of July" creek.

Their arrival at White Horse for the purpose of recording was the signal for general stampede and in a few days the town was almost depopulated.

Following the discoveries on Fourth of July came others on Ruby, Alie, Twelfth of July, McKinley, Dixie, Marshal and Lamoreux creeks, which resulted in the recording of about one thousand claims, principally by White Horse residents. A few men started at once to prospect their claims by sinking to bedrock. Whipsawing lumber for sluice boxes, these men washed some of the gravel, which yielded fair prospects, but only one man—Bert Fowler—reached bedrock on "34 above Discovery" on Ruby creek. In a few days he took out about $300 in gold dust. The other claims prospected fairly well from the surface gravel down, but bedrock was too deep and water interfered so much with sinking that the owners returned to White Horse in October last, and some of them ordered machinery for thawing the grave and pumping. This machinery, some of which ha already arrived at White Horse, will be hauled out to the creeks during the coming winter, and next spring and summer there will be a pretty active camp.

Later in the season than the discovery of the creeks mentioned William Armstrong and party from White Horse crossed the divide into the Kluane Lake district to the west of Fourth of July and other creeks. They discovered placer gold on a river which empties



nto Kluane lake on the east shore, and still later, on the 24th of October, a party of prospectors arrived in White Horse bringing forty ounces of very coarse gold dust and small nnggets which they had recovered by sluicing on Bullion creek, a tribntary of Shins river, which empties into Kluane lake at the southwest limit. Conseqnently another stampede took place, participated in by abont 200 men, some of whom came from Skagway, and others from Atlin.

On "Discovery" claim on Bullion creek from which the gold dust was taken, the discoverers report that bedrock averages from 3 to 9 feet below the snrface. While the stampeders, many of whom have already returned to White Horse, not only confirm this statement, bnt assert that all along that creek, as well as on other tribntaries of Shins river, the bed rock is apparently shallow.

The accompanying map illnstrates the location of the several creeks which comprise the Alsek placer diggings. The topography of the conntry in the vicinity of Rnby, Fourth of Jnly and other creeks east of the divide, is comparatively level, and no high mountain ranges are sitnated in the near vicinity, but that portion contiguous to Kluane lake is described as mountainons, rngged, bare of timber and generally inhospitable. This is to be expected though, becanse while the more easterly camps are located at an average altitnde of about 8000 feet, and situated in the foothills and plateaus of the coast range of mountains, the westerly camps are situated in that range bnt east of the summit.

Large hay meadows are fouud along Rnby and some of the other creeks included in the earlier discoveries, as well as an abundance of fair sized timber, principally spruce, some of it 10 inches in diameter. But in the Kluane lake section, where the higher altitndes are reached, there is but very little timber.

The trail from White Horse is described as good. The ronte is from White Horse northwesterly to the Takeena river where the Northwest Monnted Police maintain a ferry; thence up the Takeena to the month of the Mendenhall, up that river and across the divide to the Dalton trail; theuce down the Dezadcosh river to Marshal creek, and thence nearly uorth to the other creeks, or westerly to the Klnane lake section. No high monntains have to be crossed, and timber for camping purposes is plentifnl and easy of access. The snmmer range for stock feed is reported as the best in the Yukon, and saddle and pack horses can be used on the trail the year round because road houses are beiug built in the vicinity of good hay meadows which will furnish a supply of winter feed.

The area over which anriferons gravel has beeu discovered covers abont 400 square miles.

Accessibility as a Factor in Mining and Related Business.

Written for the MINING AND SCIENTIFIC PRESS by CHARLES H. FITCH.

It was au old saying that "all roads lead to Rome," and for Europe it was well said, becanse Rome was the mother of road-building; roads meant Rome, and were built to serve Rome's pnrposes. The repntation gained by Julius Cæsar as a general who struck his blows before his opponents were ready to parry them was due in no small degree to the provision of roads reaching out like veins wherever the body of Roman power exteuded its growth.

In figuring on the profit (or loss) obtainable in getting values from a mine, cost of transportatiou ought to have its reasonable consideration. If the miue is 40 milcs from Sodaville, and "20 miles from any place," and the ore has to be packed over a trail, it has got to be worth much money to the ton to pay for itself, let alone making fortunes for the mine owner. It goes without saying that this is well understood by practical people, but people who bny stock on the strength of gold-beariug specimens do not in many cases understand it. To their minds $10 or $20 to the ton makes the appeal of so much cash on hand. We do not qnestion the honesty of legitimate promotion, nor the fortunes obtainable in hard actnal mining, bnt there is a saying which makes the mining man or promoter the snperlative of untruthful, even when he confines himself strictly to true statemeuts, telling half the trnth, the auspicious half. But do not merchauts and machinery men do likewise with the merits of what they have to sell, leaving the defects to be discovered after purchase, aud is not the complaint merely a matter of whose ox is gored? There are both deceivers who are trnc to the interests of those whom they entertain, and many more trnth-tellers who deceive, and up to a certain poiut the latter are the more popular class.

Bnt I did not intend to dwell upon inaccessible mines, or mines whose profits are inaccessible. My interests concern machinery, and the long, expensive road between the maker of a good thing and its pnrchaser. I was only yesterday at the shop of a man who has no end of mechanical cleverness, whose devices combine novelty and what we might call good horse seuse in mechanics. He had built and equipped a shop which bore the marks of his ability, being one of the neatest and best arranged shops of small size that I have ever inspected. He complained, however, that he had not enough for this pretty shop to do, which worried him some, as pretty shops eat their heads off the same as some which are less admirable and have fewer conveniences. He was making a device usefnl to all mechanics which could easily be shown to pay for itself in time aud labor-saving within a few months. He fignred out, and his figures could hardly be dispnted, a saving of 200% to 300% on the investment, a showing that could not be bettered by "get-rich-quick" concerns.

This proposition was like rich ore in the mine, and no road to it, bnt as Rome has roads to all Europe, the MINING AND SCIENTIFIC PRESS has subscription roads to all Westeru mines, and the best the manufacturer can do is to plant his works by advertisement on the line of these roads. This, of conrse, costs money, bnt it is as trne that it takes money to get business as it does that it takes a mine to make a mine.

If the device be a small bnt meritorions one it is a good plan to get it published in the catalognes of jobbers and dealers in snpplies. These charge a good commission, but it is contingent. There are no commissions nnless sales are made. With this help sales may be slow, but a rough road is better than none and may be all the bnsiness will bear. If our manufactnring mine in a good article is at all rich, however, it will pay to have a good road to it. A clear, effective picturc of the device shonld be kept pnblished in the jonrnal of the best reach. I came across an engineer recently who wanted a kind of steam trap, but had lost the address of the maker. It had been sold throngh some jobber who had removed the maker's name to block the direct road to him, and now the man did not know where it had come from. He looked in the engineering papers, but conld find no pictnre of it. As a matter of fact the jobber's advertisement was there, offering steam specialties, but the engineer did not know which jobber, and there was no pictnrc of the device. This is a common occnrrence amoug people who want things, aud the man who keeps an open road to his device will build np the trade therein.

But some mines are not rich enough to pay for keeping the road open. There are some devicces iu conuection with mining which are good in themselves, but which are not of snfficiently large demand, or do not carry a sufficient margin of profit to admit of their being exploited commercially. Perhaps they can be inclnded in a catalogne, or worked in connection with larger affairs, so that they will be specified in contracts, and something made ont of them on the side, but as leading propositious they cost more than they "come to."

We might cite ore and tailings samplers and mine signals as coming in this class. When the late H. L. Bridgman brought out his ore sampler, its compactuess and efficiency enabled a smelting conceru (Cia Metalnrgica Mexicana) to strike a large building from its plans. Its cost was saved many times to them. Bnt how did it "pan out" as a commercial proposition. It was sold at a good profit. The inventor offered a bonus of $100 extra to every salesman who should succeed in placing one of these machines. Quite a few were placed, bnt Mr. Bridgman told me that he speut more on foreign patents than his whole profits on the machines, and I thiuk that the manufactnrers spent more thau their profits in advertising it. Bnt it was a credit to them. It took the Scott prize of the Franklin Institute, and did good work.

When the Byrnes tailings sampler was brought out, the mannfacturer made an extravagant pledge of outlay in advertisement. My opinion was asked, and I said that I had seeu a long striug of good samplers, bnt had never seen any money made out of making and selling them. Perhaps the makers of the Scobey sampler or the Lamb sampler may have a different tale to tell, but I doubt it.

I recollect when H. C. Bacorn came East from Montana with his mine signal. It was a good thing, snccessfully installed iu several mines where he had friends and infinence. There it stopped. It was advertised, and "press-noticed," and catalogued, bnt practically none were sold. To sell a device of this kind required at least a visit to the mine, and a snrvey before an estimate conld be properly made, and the contingent expenses were disproportionate to the cost of the device. Introdnctory outlay was more than it wonld stand, and where signals were needed the mine manager was left to devise his own. We do not care to make a serions religions allnsion in an engineering article, but this analogy is too apt to be omitted. A Christian society for the conversiou of Jews had such slow success that the cost of every person of the latter faith converted was extravagantly large. So the cost of every mine manager converted to a system of signalling is likely to be so heavy as to be prohibitive. These things may be all right to be described, and nsed going on the free list, but there are no large fortnues to be made from them, and the margin derivable from proprietary rights in them is small. They are like $12 ore which costs $11 to concentrate and rednce, while there is not enough of it to make the dollar margin vastly profitable. The dollar profit is there as the gold is in the mine, bnt it is not conveniently accessible.

To Determine the Current Flow of an Electrical Circuit.

Written for the MINING AND SCIENTIFIC PRESS by WM. H. KRITZER, E. E.

If the cnrrent is of cousiderable strength, its direction can be ascertained by a compass needle or a small magnet suspended by a fine wire or thread. Place the condnctor (wire) so that its direction is approximately north and sonth., Let the observer face the north, and hold the compass or magnet jnst above the conductor.

If the north-pointing end of the needle or magnet is deflected to the right or east, the current is flowing north or going away from the observer; while if the sonth-pointing end is deflected to the right the currcnt is flowing south or coming toward the observer.

The positive wire of a circuit that has been iu nse for some length of time will have a darker appearance than the uegative, also a heavier deposit of dust upon it.

Cut several slips off a common blne print paper, moisten them iu water, and apply to the couductors of which it is desired to ascertain the polarity. In a few seconds the blue paper placed on the negative terminal will be bleached, the ferro-prnssiate of potash nsed in preparing the paper being decomposed, with the liberation of potash.

Another reliable method is to remove a portiou of the iusulation that covers the wires at ZZ iu Fig. 1,

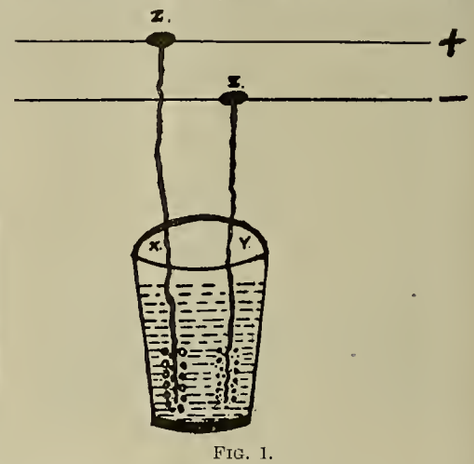


FIG. 1.

and attach pieces of insulated wire, leaving several inches of their free ends bare.

Place some water in a glass vessel, in which has been dissolved some common salt, or add several drops of sulphuric acid, if preferred. Dip the bare end of each wire that has been temporarily attached to the circnit into the water, aud observe which wire gives off bubbles or gas most freely. For example, if the one leading from X is found to do so, this is the positive wire. The gas given off by the + (positive) wire (or cathode) is inflammable, which may be proven by holding a lighted match over the bnbbles as they rise to the snrface. They will ignite with a minnte explosion. The wire is also very quickly corroded and eateu away by the action of the current.

Shonld only one wire of the circnit be accessible, attach two wires, as in Fig. 2, and, if safe to do so,

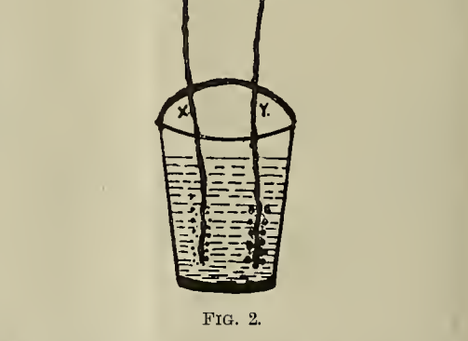


FIG. 2.

cut the circuit at A; bnt if dangerons, take the two wires as a shunt from the main condnctor and place the euds in a glass of acidnlated water, as before, and note which one acts as the + wire. We find that the wire Y does so, and, previonsly knowing the dynamo is located in the direction in which the tail of the arrow is pointiug, we know at once that the cnrrent in the conductor is flowing iu the direction in which the head of the arrow is pointing—away from the dynamo. It is apparent that this wire is the + portion of the circnit.

Underground Hoisting Problems on the Witwatersrand.*

Written by A. W. K. Peirce.

Gold mining on the Witwatersrand consists chiefly of the exploitation of the "main reef series," a bed of gold-bearing conglomerate with an east and west strike, and dipping to the south at a fairly uniform angle in the neighborhood of 30°. For an extent along the strike of 50 miles this reef series has been proved to be gold bearing, and the continuity of the deposit has been proved by actual mining and by bore holes to such a depth on the dip that mining ground is held at a high valuation even where the ultimate depth cannot be less than 8000 feet (vertical) or even more.

The permanence and the uniformity of average dimensions and values of these gold-bearing conglomerates make the mining in this area partake more of the nature of an industrial enterprise than is usual to mining ventures. This justifies the great attention that is paid to the engineering features of the work, and the large sums spent on the necessary mechanical equipment for the rapid and economical mining and reduction of the ore on a large scale.

According to the Transvaal mining laws, only the ore body contained vertically beneath the surface claim area can be mined by any given mining company. In order to exploit the ore contents of a mine situated at a distance from the outcrop, it is the practice, therefore, to sink one or more vertical shafts near the northern boundary of the property, to the intersection of the reef. This is then opened up by horizontal drives in the direction of the strike, and inclines along the dip; the principal inclines, in the most cases, being extensions of the vertical shafts. The ground thus opened up is stoped as required for the reduction plant, the development being kept ahead of these requirements sufficiently to permit of keeping up average values of the output, in spite of local variations in the gold contents of the ore body; and this process is continued until the payable ore body in the claim area is exhausted.

Where these vertical shafts are of moderate depth, the hoisting in both vertical and incline shafts is done by steam winders located on the surface, the vertical shaft being turned through a circular or parabolic curve into the incline. At greater depths, separate winders are used for the two sections (vertical and incline), but both located on the surface, the ropes for the incline hoists being led down the vertical compartments near one side, and suitably guided into the incline, the ore being transferred from one hoist to the other at the intersection of the two shafts.

Further extensions of the "deep levels" involve vertical shafts of 3500 to 5000 feet to the intersection of the reef, with inclines from this point of 3000 to 6000 or more feet in length; and in planning the development and equipment of these new properties, it is evident that present hoisting methods must be modified. A paper by H. C. Behr, entitled "Winding Plants for Great Depths," presented the various features of this hoisting problem, and in this paper and the ensuing discussion will be found a complete treatment of the matter from several points of view.

The concensus of opinion among South African engineers seems to be that these deep levels will be operated on an even larger scale than has obtained previously, the output planned for being 2000 to 3000 tons per mine per day; and that the greatest attention will be given to the economies that may be effected in working costs by the use of machinery, and in economic methods of operating the same. The advantages of electric power distribution are recognized, and this method will be extensively adopted for what may be termed auxiliary power requirements. This is not an inconsiderable amount; it may be from 500 to 1500 K.W. per mine, for surface requirements only.

The underground workings will be arranged with a view to rapid removal of the ore contents, and it is probable that several incline shafts, operated by independent winding engines located underground, will be used to feed each single large vertical shaft, the latter having several pairs of hoisting compartments, and possibly arranged for hoisting in stages. In any case, there will exist within the next few years a demand for hoisting engines of considerable size, to be located underground in a dozen or more of the deep level mines, and with from three to six hoists per mine.

As in several cases a number of these mines in the same neighborhood are controlled by the same financial interests, and will require their equipment at approximately the same period of time, it is feasible to consider the supply to such a group of mines of their electric power requirements from a single central power station; and if these requirements are to include the underground hoists I have mentioned, it is of interest to mention some of the conditions of the problem thus presented, and some of the conclusions that have been drawn therefrom.

The principal power requirements of the mine equipment and the area over which the power is to be distributed (this being several square miles, with an added distance of in the neighborhood of a mile for each transmission to any underground installation) practically determine the use of a polyphase system at a moderately high voltage, especially as the ratio of copper cost to power cost is about twice as great in the Transvaal as in most countries, thus rendering the use of small line losses desirable.

I think it is generally conceded that, for hoisting work on the scale indicated, direct current motors are more desirable than alternating. Their use in this instance, therefore, involves apparatus for converting the polyphase supply into direct current.

In spite of the losses and extra first cost involved in this conversion, it presents many important advantages in connection with the control system and the central station supply.

First, however, as to the nature of the power demand of such hoists as will be required.

The hoists will be of the double drum type, with clutches for each drum, and while they will be operated normally in balance, they must be capable of bringing up a fully loaded skip from the bottom with the other drum unclutched, i. e., without the balancing effect of the empty skip and its rope.

While for each particular installation the size of the hoists must be separately determined to suit varying local requirements with regard to degree of inclination, load to be hoisted, length of haul, etc., the following may be taken as representing the approximate limits, between which particular values will be taken to suit conditions:

Load of ore 5500 to 8000 pounds.
Hoisting speed 2000 to 3000 feet per minute.
Degree of inclination 25° to 45°.

A hoist to suit what may be taken as average conditions would demand 400 K. W. at the end of the acceleration period.

The hoists would be installed for an ultimate hoisting distance of perhaps 3500 feet along the incline (any longer inclines being equipped for hoisting in stages), but would only have 300 feet or so to haul when first installed. As the incline would be continued at the rate of about 100 feet per month, in about two and a half years the hoist would be working at its full capacity, and during most of this time would be operating under maximum conditions of load, the variables being the frequency and the duration of the trips, and possibly maximum speed if the control scheme be suitable.

Considering an individual normal trip, it is evident that the maximum torque required from the hoist motor occurs at the time of starting the loaded skip on its upward journey; for the acceleration is a maximum, the moment and friction of the ascending rope is also a maximum, and the balancing effect of the rope on the descending skip is a minimum. On completion of the acceleration period the effective torque still continues to decrease during the remainder of the trip, by reason of the winding up of the rope on the ascending skip and the corresponding unwinding of the rope on the descending skip.

The design of the hoist should not be such that this torque would become negative before the completion of the trip, as this would require the application of the brakes at this point to overcome all the inertia of the moving masses. It is obvious that this inertia should be utilized as far as possible to complete the last part of the trip, the brakes only being used to effect the final landing of the skip.

While similar in kind, the mechanics of this problem are quite different in degree to those of operating elevated railway trains, the relative value of the kinetic energy of the moving masses and the work done against friction and gravity being quite different in the two cases. Thus, with the limitations to hoisting speed imposed by practice, a considerable part of the trip must be made with power after the acceleration is completed, and the "coasting" period only exists for the few seconds required to bring the moving masses to a standstill.

In considering the demand on the generating plant occasioned by such a trip, the form of the acceleration curve to be adopted is of importance.

Obviously, if the available acceleration moment is fixed, maintaining the moment at a constant (maximum) value throughout the acceleration period gives a minimum duration of that period; but, as pointed out by Mr. Behr in his paper, an acceleration showing a constant decrease from the same maximum value to zero will give the same ultimate velocity in a certain space, and requires only 5% greater time than is needed to cover the same space with the same maximum velocity using an acceleration maintained constant at the maximum value.

The maximum power actually demanded by the hoist motor during a given trip depends upon the form of the acceleration curve, and is materially greater with constant acceleration than with constantly decreasing acceleration. The power demand being proportional to the product of the total torque and the speed at any instant during the period, it is evident that as the constant acceleration maintains the initial maximum torque until the maximum speed is reached, the power demand continually increases during the acceleration period, and at its end is a maximum. With a constantly decreasing acceleration, however, the maximum torque only occurs at minimum speed, and at maximum speed the acceleration torque is zero; therefore the maximum power demand occurs at some instant between these two points, and is but little greater than the power demand at full speed after acceleration ceases, which is that required for overcoming the effects of friction and gravity only. The actual amount of the work done is of course practically the same in either case.

It is evident that the constantly decreasing acceleration is much more favorable to the central station, in that it gives a better load factor, less fluctuation in the power demand, and requires less investment in generating plant, provided the method of control is such that the power demand from the source of power is proportional to the actual power demanded by the hoist motor.

The control system is thus the important factor in attempting to realize these advantages, as the decreasing acceleration is more normal for electric motor operation than the other; and for this purpose I know of no other method of control that is workable than some form of voltage control or Leonard system. Involving as this does some separate dynamo machinery for each motor installation, the advantage in control method previously referred to in connection with the conversion from the assumed polyphase distribution to direct current becomes apparent, in that this converter machinery may be utilized in one of a number of obvious ways to furnish the voltage control of the hoists.

This machinery also helps out the central station in another way, in that the inertia of its moving parts further smooths out the peaks in the demand curve during each trip; this effect may even be increased by the deliberate addition of inertia to the converter set in the form of a flywheel, as has been proposed by several Continental engineers that have investigated this problem.

The voltage control also possesses incidental advantages. The necessary slow speed inspection trips in the shaft may be readily made; during the first year or so of operation, the controller can readily be provided with adjustable stops limiting the maximum speed (consequently the maximum power demand) to whatever amount will give the desired output, and thus again improve the central station load factor; the controller need not handle the very considerable main current of the motors, thus eliminating a source of considerable first cost, and also maintenance cost; given positions of the controller handle result in nearly enough given speeds, irrespective of loads. These characteristics are so well known that it is perhaps superfluous to mention them here; I only wish to indicate that in almost every particular this problem is best met by this control scheme, which favorably affects both the source of the power and its utilization.

* Abstract Trans. Amer. Inst. Elct. Engrs.

A Sulphur Mine in Nevada.

George I. Adams of the United States Geological Survey has recently inspected a sulphur mine in Nevada and made an interesting collection of specimens which show that a good grade of sulphur is produced in this country and that we are not dependent on importations from Sicily to supply the demand. Only a few deposits in the United States are at present mined; but if a tariff were levied on the foreign product much greater development of native deposits might be expected. This is one of the industries that ought to be fostered. The investigations of the Survey were made for the purpose of ascertaining the nature and extent of the Nevada deposits.

The mine visited by Mr. Adams belongs to the Nevada Sulphur Mine Co. It is situated in the Rabbit Hole mining district, just northwest of Rabbit Hole Springs, 35 miles from Humboldt House station on the Southern Pacific Railway, on the edge of the Black Rock desert, a desolate volcanic region in which there is little rest to the eye or cheer to the spirit. The mines are in the form of pits, open cuts and drifts.

This deposit was discovered about thirty-five years ago by an Indian, who sold it for a horse and saddle that he never received. In 1874 the mine was worked by white men.

The Nevada Sulphur Mine Co. began work in 1900. The new company started with only one retort, but have since added another. These retorts are cylindrical iron structures somewhat resembling a blast furnace in general appearance. After the ore is dumped into them they are closed and superheated steam is then turned on. The sulphur melts and runs out of the bottom of the retort into a settling pan, from which it is drawn into molds. The forms in these molds weigh about 250 pounds. After they have cooled, they are crushed to pea size or ground with buhrstones into flour.

The sulphur of pea size is shipped in 100-pound sacks, the flour in 110-pound sacks.

Where the sulphur has taken crystalline form, it looks bright and sparkling, its yellow crystals often beautifully tinted with rosy cinnabar. The richer deposits are the dark, massive ones, which look like solid walls of brimstone.

Mr. Adams will write a report on the mine, to be included in the Survey's yearly volume on "Economic Geology."

Notes on Quartz Milling on the Rand.*

Discussion of paper by FRASER ALEXANDER.

I. Roskelley: With regard to Mr. Edwards' first question in reference to the rate of feeding ore into the mortar, I am nnable to give any definite answer to this question, since the rate of feeding must depend on the rate that the crnshed prodnct passes through the screen. The feed shonld be kept low and the discharge should also be low, say from 2 to 3 inches. The crushed ore bronght to the mill should not be larger than 2-inch cnbes, for on the size of the ore depends, to a great extent, the efficiency of the mill. This is a point to which not nearly enough attention has been given on these gold fields. The crnsher is the proper machine for breaking up big rock, and if the work is not done there the damage done to the mill itself is almost endless—mortar boxes are choked, feeders get broken, and the duty of the mill is lowered. When the ore has been properly brokeu np before being brought to the mill the dnty is increased by about a quarter of a ton per day per stamp. This, in a 200-stamp mill, means an increase of 50 tons per day. Hence, taking the duty per stamp at 5 tons, proper crushiug is eqnivalent to an increase of ten stamps.

Mr. Edwards wants to know what quantity of water shonld be used per stamp per twenty-four hours. This, again, is conditional. It depends on the duty of the stamp, the mesh screen used, and the fall given to the plates. The following are the results obtained in the Robinson Deep mill under varyiug conditions:

Fall of Plate.	Screens, Standard.	Tons Crushed per Stamp per 24 Hrs.	Slimes Collected.	Height of Drops.	Speed Drops per Minute.	Height of Discharge.	Water Used per Ton of Rock Crushed.
Inch per Foot.			%.	Inches.		Inches.	Tons.
1 1-16	600	5.45	25.4	8½	96	2½	6
1 1-16	700	5.28	29.0	8½	96	2½	6
1 1-16	900	5.07	31.8	8½	96	2½	6½
1 1-16	1000	5.06	35.3	7½	100	2½	7
1 1-16	1200	4.95	35.0	7½	100	2½	7½

Referring to the use of lime, should the plates show discoloration a little lime may be used, but not otherwisc. An excess of lime would, I think, affect the efficiency of the plates.

DISCHARGE.—I certainly do advise the general adoption of a low discharge, since I do not believe iu inside amalgamation. I can see no reason why the pulp should not leave the box immediately it is crushed to the reqnisite degree of fineness, and a high discharge is nnfavorable to this, siuce the pulp is splashed about the box instead of against the screen. Did I recommend iuside amalgamation I should favor a high discharge, since this splashing would be what I should aim at getting.

C. H. Pead: I wish to state the fact that all our later experience goes to show that the gold left in the sand residues is, except for a very small portion, due entirely to the condition in which the pulp is received from the mill, for the gold, being enclosed in insnfficiently crushed particles of pyrites, is, to quote Mr. Tavener, "not accessible."

Mr. Crosse has stated that all our gold since reaching the blue ground is associated with the pyrites. Mr. Denuy has shown that if the pyrites be crushed fine enough wonderful extractions may be obtained from them by cyanide treatment, and I fully indorse this statement. This being the case, it is inevitable that this fine crushiug must by some means be done, aud when it has been achieved the residue values, now ranging from 1 dwt. to 1.5 dwt. per tou on the Rand, will, I believe, be brought down to from 0.3 dwt. to 0.5 dwt. per ton.

As to how this fi e crushing is to be done, there seem to be almost as many opinions as there are experts, but I think it will be geuerally admitted that the finer crushing of the pyritic portion of our rock is the point to be aimed at.

From experiments made by Mr. Crosse and myself at the East Rand Proprietary miues—where the milling conditions are as follows: Stamps 1250 pounds, drop 8 inches to 8½ inches, discharge 2 inches, screen 700 mesh, speed 98 drops, water 6 tons per ton of rock, feed light—it has been found that, of the pyrites in the rock, from 40% to 50% of it has been insufficiently crnshed to give np its gold contents to anything like a complete extent, and that further crushing causes this inaccessible gold to be readily dissolved by the ordinary cyanide treatment.

The proposition before us, then, seems to be to crush the pyrites as much finer as we can contrive to do during the first crushing in the mortar boxes without undnly crushing the siliceons portiou of the rock, and without lowering the duty per stamp, to collect mechanically the pyrites which may still remaiu insufficiently crushed, to regrind it to a suitable size and treat by cyanide in the ordinary way.

Mr. Crosse has often told me he would like to make the mortar boxes act as mnch like spitzlntteu as possible, and I think he is right, bnt it is evideut that they will never act thns while the water is led into them at the top, and I believe if it were introduced lower down, even, perhaps, through the bottom, much better results might be obtained. Of course, the discharge would have to be considerably raised and a much coarser screen used, or, perhaps, even none at all. In this connection it wonld be of the first importance that the water supplied to the mill come from a steady head tank through pipes of snfficient size to allow of effective pressure at any part of the mill, and the snpply must not serve as a general main to provide water for other purposes besides milling. The results to be obtained by some such plan wonld, I think, be higher dnty and more gold recovered.

While on the subject of stamp duty, I notice Mr. Alexander gives an instance where with 1000-mesh screen and 6-inch discharge a duty of 5.5 tons per stamp per day is obtained, and J. R. Williams mentions that among the compai ies with which he is connected the mill using the finest screen crushes the most rock. I shonld like to ask if there is any special reason why with so fine a screen such an excellent tonnage is obtained—whether, for instance, the rock is unnsually easy to crush, or whether some special system of milling not usnally adopted on these fields is the cause of this success? I feel sure that either of the gentlemen I have mentioned will gladly assist us to an improvement, and, I think, we must admit that, as a rule, the use of finer screening has resulted in less tonnage being pnt through the mills.

Mr. Alexander also gives us the relation between height of discharge and size of screen, reducing he height as he increases the size of his screen. I cannot in the least understand how he arrives at his figures, for the reverse seems to me to be the natural order of things, unless the mill duty is to go all to pieces. For instance, keeping a nniform size of screeu and raising the chuck block I shall expect the dnty to fall more or less in proportion to the rise in discharge, and with every increase in the size of the screen I should expect the dnty to rise. Therefore, I should have looked for a low chuck with a fine screen and a higher chuck with a coarser screen, whereas Mr. Alexander advocates the reverse.

With regard to amalgamation, Mr. Alexander advocates an unrippled flow from start to finish over the plates. I know snch a condition of things has been established in these fields, chiefly, I believe, for convenience in work. But is an nnrippled flow the best for amalgamation? It has often seemed to me that the pulp traveling over so smooth an inclined plane does not turu over enough, and may easily bear np particles of free gold in such a position that no contact with the plates is possible. We can, many of us, remember the old-fashioned step plates, and these, I am told, are still used in Australia, and that the results obtained with them are excellent. Perhaps bnt for the introduction of the cyanide process we should still be nsing them here.

(TO BE CONTINUED.)

*Abstract Jour. Chem., Met. and Min. Soc., S. A.

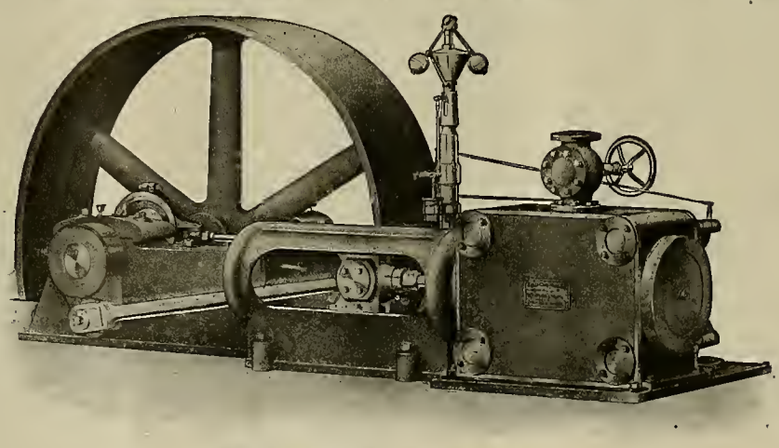
New Standard Reynolds Corliss Engine.

Herewith is illustrated a new Corliss engine which is being bronght out by the Allis-Chalmers Co. from the designs of Irving H. Reynolds. The field of Corliss engine design has been so fully worked over in the past, and the accepted designs have become so simple, that no strikingly novel designs are to be expected. The present machine, however, represeuts the experience of twenty-six years in buildiug of Corliss eugines. Engines of the type illnstrated are being built in seveu sizes, rangiug from 50 to 500 H. P., and are desigued for steam pressure np to 150 pounds. They are bnilt of somewhat shorter strokes than have heretofore been customary in Corliss engines, with the idea of economizing in space and making the construction more rigid. The speeds are also somewhat higher thau usnal, rangiug from 110 to 150 revolutions per minute, although these speeds are not higher than those at which the Reynolds-Corliss engines of older design are frequently operated. The frame is cast in one piece with the slide, the construction being of the box type, resting on its foundation for its entire length. The main bearing shells are bored into the frame, thus insnring a solid bearing and also permitting the easy removal of the shells by rolling them ont around the shaft. The slide is of the barrel type with bored guides. The crosshead is fitted with babbitt faced shoes with wedge adjustment. The piston rod is screwed into the crosshead and held firmly with a steel lock nut. The cylinder is of the round cornered type, is fitted with double ported steam and exhaust valves, lagged with planished steel. The cylinder is set on a cast iron base plate, which extends under the valve gear, serving as a drip pan.

The valve gear is of the nsual Reynolds-Corliss type, the wrist plate beiug of skeleton pattern and fitted with a new type of disconnecting device which, while clamping the hook rod firmly, is easily detached by hand. The dash pots are of differential plunger type without leathers or packing of any kind. The regulator is of the high speed weighted type, designed to control the engine within narrow limits of speed variation. The connecting rod is of steel with solid forged ends, fitted with bronze boxes, babbitt lined on the crank pin ends, the boxes being adjnstable by means of screw actuated wedges. The crank is of plain type, polished on the face, and is protected by a planished steel oil guard (not shown in cnt).

The engines are fitted either with belt flywheels, as shown, or with square rim wheels where used with direct connected electric generators. The crank and crosshead pins and main journals are of a size ordinarily nsed with heavy duty engines.

The manufacturers say that "the engine is strong, simple and compact, and while nothing has been added for oruamentation, nothing contributing to economy or durability has been omitted, and the machine should find a large sale among power users who appreciate quality."



New Standard Reynolds Corliss Engine.

Refining Silver in British Columbia.

A shipment of 85,000 ounces of silver 900 fine was recently made to the United States Mint at San Francisco, says the Mining Record, for shipment to the Philippines, representing the product from the smeltiug of British Columbian lead ores at Trail, refining the resulting bullion by the electrolytic lead process, which has for many months past beeu supplying Eastern Canada with commercial pig lead.

When the electrolytic lead refinery was first operated the "silver slimes" (composed of the precious metals and all the impurities, such as copper, antimony, arsenic, etc.) were sold to United States refineries, where the actual separation of the precious metals from the impurities was made. As there were no plants in operation prepared to economically handle this particnlar product, which differs somewhat from the slimes produced from electrolytic copper refining, it was decided to bnild a special plant at Trail for the purpose of making a complete separation of the precious metals and impurities, which will make, in connection with the electrolytic lead process and the smelting works, a complete works for the treatment of all lead-silver ores and the productiou therefrom of pure lead, fine silver, fine gold, copper sulphate, and probably later, metallic antimony.

The first shipment of abont 300 ounces of gold which was over 995 fine was made to the United States Assay Office at Seattle a few weeks ago, and a second shipment of about 700 ounces of gold was made shortly thereafter to the same place.

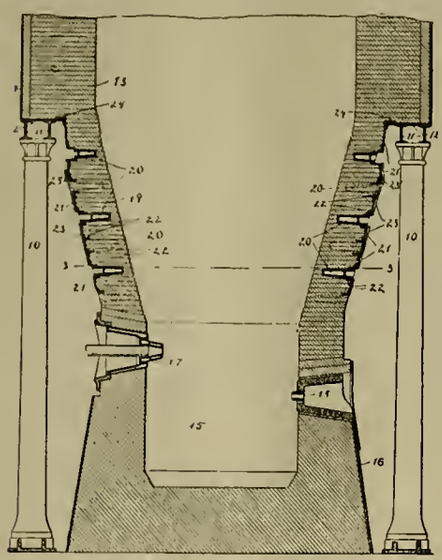
FORMERLY it was the custom to operate machiue drills nnder a pressure of 60 to 70 pounds per square inch, but the pressure has beeu increased to 90 or 100 ponnds, and, although the wear on the drill is greater, the additional work accomplished is more than commensurate.

Mining and Metallurgical Patents.

PATENTS ISSUED NOVEMBER 24, 1903.

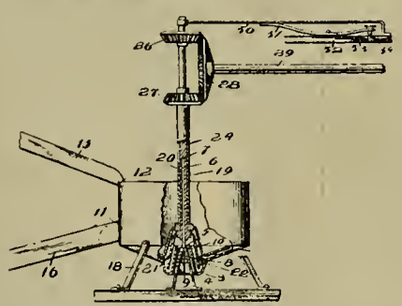
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

SUPPORT FOR COOLING PLATES OR COILS IN BLAST FURNACES.—No. 744,319; A. Farrell, Gladstone, Mich.



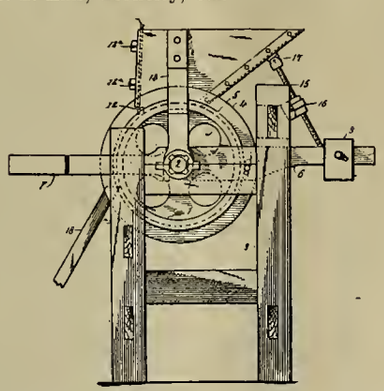
Blast furnace having metal frame encircling its bosh wall and provided with series of cooling plates or coils extending inwardly from frame, and means for securing outer portion of cooling plates or coils to frame in manner permitting plates or coils to be removed without disturbing frame.

AMALGAMATOR AND CONCENTRATOR.—No. 744,687; T. B. Lee, Hesperus, Colo.



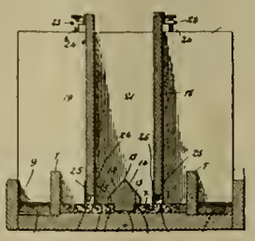
In amalgamator and concentrator vessel having bottom and amalgamating pocket depending therefrom, revolnble stirrers to operate on bottom and in pocket, and vessel carried by stirrer in pocket having means to feed chemical therefrom; revoluble shaft vertically disposed, having stirrer to operate in vessel; tubular shaft on first mentioned shaft having stirrer to operate in vessel; reversely disposed gears on shaft and tnbular shaft; a driving gear engaging gears to simultaneously reversely rotate same.

FEED REGULATOR FOR ORE FEEDERS.—No. 745,169; C. Z. Ellis, Berkeley, Cal.



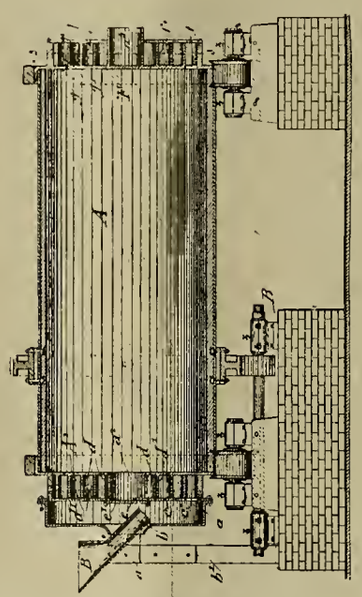
In ore feeder, frame, cylinder mounted to rotate in frame, annular flanges at the ends of cylinder, cylindrical ledges at outer sides of flanges, levers mounted to rock at opposite ends of cylinder, blocks carried by levers and extended across cylindrical ledges, sides of blocks adjacent to ledges being inclined upward and outward, series of bearing balls arranged between blocks and ledges, balls being of varying diameters and hopper arranged above cylinder.

AMALGAMATOR.—No. 745,047; G. Fletcher, C. E. Davis and B. T. Douglass, St. Clair, Nev.



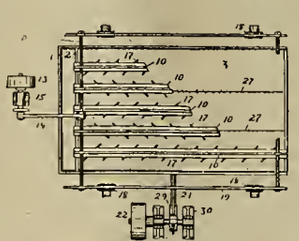
Amalgamator comprising casing having qnicksilver pit and pressure chamber directly over pit, vertical amalgamating plates disposed in pairs at opposite sides of pressnre chamber and each plate extending below qnicksilver level in pit, plates of each pair being disposed in parallel relation and forming intermediate space in which anriferous material is free to distribute itself after passing one plate and before passing remaining plate of pair, and beveled divider extending upwardly from bottom of pressnre chamber and between adjacent members of pairs of plates.

TUBULAR BALL MILL.—No. 744,451; M. F. Abbe, New York, N. Y.



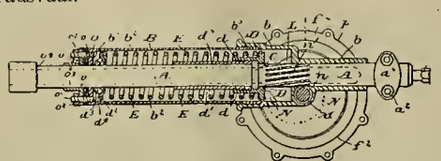
In grinding mill, combination with horizontal cylinder rotatably mounted, of feed chamber at front end thereof, partition wall dividing feed chamber into two compartments and provided with segmental opening at circumference, hopper extending into front compartment, and spiral feedway in other compartment for feeding material passing through segmental opening of partition plate into cylinder.

MACHINE FOR RECOVERING MERCURY AND AMALGAM FROM ORES.—No. 744,759; T. H. Hicks, Fort Wayne, Ind.



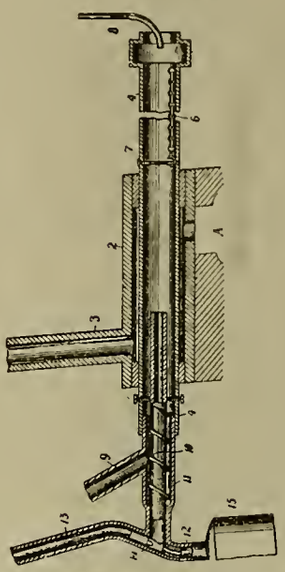
Reciprocating pan having amalgamated lining and adapted to contain ore and water; amalgamated joints in lining for passage of snperfinons mercury, and means to agitate ore.

ELECTRICAL ROCK DRILL OR ROCK DRILLING MACHINE.—No. 744,912; A. H. Gibson, Krugersdorp, Transvaal.



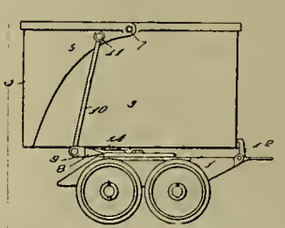
In rock drill, in combination, drill bar A, collar or annular projection C formed thereon, circular tappet or disk D mounted concentrically on bar A and free to rotate thereon and bearing against one side of collar C, boss d of tappet and bearing sleeve d' screwed into boss d to reciprocate drill bar as tappet is moved in path parallel to longitudinal axis of bar while permitting it to revolve freely, spiral spring E arranged concentrically around drill bar and bearing against tappet at one end, and ball-bearing collar interposed between other end of spring and drill case.

ROASTING FURNACE ATTACHMENT.—No. 744,992; D. D. Bailey and J. O. Bailey, Banner, Cal.



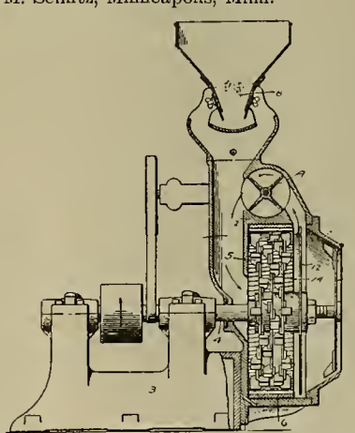
Combination in ore roasting apparatus of furnace having inclined discharge flue, pipe extending substantially central through flue and through furnace, device for feeding ore through pipe, extension of pipe beyond furnace, and amalgamating device carried upon discharge end of pipe.

ORE CAR.—No. 745,113; G. G. Newcomb, Denver, Colo.



In ore car combination with rotatably mounted support of car body pivoted thereto formed with a discharge opening, gate closing opening, webs formed on gate inclosing portion of body pivotally engaging same, and link connecting rotatably mounted support with one of webs.

CORRUGATED LINING FOR PULVERIZERS.—No. 745,075; J. M. Schutz, Minneapolis, Minn.



A pulverizer or grinding mill comprising cylindrical casing in combination with corrugated ring or lining provided therein and having internal inclined corrugations, ring being shorter than casing; shaft, beaters provided thereon, disk 12 carried by shaft and located between end of ring and end of casing; return duct, feed trunk, separator cone 10 and end disk 11 thereof.

PROCESS FOR DESULPHURIZING SULPHUR-BEARING PETROLEUM.—No. 744,720; T. F. Colin, Elizabeth, N. J.

Process of desulphurizing petroleum and its distillates by treating them with aqueous solution of iron sulphate, sodium chloride and copper sulphate.

Mining Summary.

SPECIALLY COMPILED AND REPORTED FOR THE MINING AND SCIENTIFIC PRESS.

The annual report of Director Roberts of the United States Mint Bureau shows that the mints at Philadelphia, New Orleans and San Francisco were in operation during the year and that the output was greater in number of pieces than in any previous year, aggregating 205,872,482. The pressure for small domestic coins and for Philippine coins reduced the aggregate of gold coinage to $45,721,733, and the stock of gold bullion in the mints increased from $124,083,823 to $157,511,571. This bullion is included in all figures of Treasury reserves. The net gains in the gold stock of the country during the year is estimated to have been $57,157,149.

Of the silver bullion bought for dollar coinage under Act of July 14, 1890, 33,218,712 fine ounces were on hand at the beginning of the year and 17,502,938 at the close of the year. This amount will be entirely exhausted during the current fiscal year. No other provision exists for the coinage of dollars or subsidiary silver coin.

The total deposits of gold bullion at the offices of the Mint service during the year were of the value of $127,004,443.——A summary of all earnings and expenditures, including seigniorage on silver and minor coin, shows that the total earnings and gains exceed expenditures by $6,897,323, the total earnings having been $8,698,510 and the expenditures $1,801,187.——It is announced the new coinage mint at Denver, Colo., will be ready for equipment during the coming year.

D. Phillips, U. S. Consul at Cardiff, has forwarded to the State Department at Washington, D. C., statistics relative to the coal industries of the world. Figures are given showing the production of coal in the five principal coal-producing nations in 1902, as compared with 1901, as follows: United Kingdom, 227,095,000 tons; increase 8,048,000 tons; United States, 268,688,000 tons; increase, 6,814,000; Germany, 107,436,000 tons; decrease, 1,103,000 tons; France, 29,574,000 tons; decrease, 2,060,000 tons; Belgium, 22,769,000 tons; increase, 556,000 tons. The total known production of the world is stated to be about 700,000,000 tons.

The excess of exports over imports in 1902 in the three leading coal-producing countries is shown to be as follows: United Kingdom, 60,397,000; Germany, 12,111,000: United States, 2,583,000.

The following figures are given showing the excess of imports of the chief coal-importing countries: France, 13,017,000; Austria-Hungary, 5,388,000; Russia, 3,643,000; Sweden, 2,793,000; Canada, 2,627,000; Spain, 2,151,000.

The following figures are given to show the consumption of coal in 1902 in the countries named: United States, 265,105,000 tons; United Kingdom, 166,698,000; Germany, 95,325,000; France, 42,195,000.

ALASKA.

Judge Wickersham, on the 28th ult., gave his opinion confirming the title of the Alaska Copper Co. to the complete and undisputed ownership of the Bonanza mines in the Copper river section, near Valdez. It is expected the building of the road will result, as the Havemeyers of New York are said to be of the company. The question as to titles of the properties arose through a misunderstanding over grubstake rights.

C. Whitehead of the Alaska Bank & Safe Deposit Co. reports the gold production of the Nome region for the season just closed estimated at $6,000,000. This is an increase of half a million dollars over the production of 1902, and an increase of $1,500,000 over 1901.

The final cleanup of the 300-stamp mill of the Alaska-Treadwell mine, on Douglas island, was made last week, and operations have ceased. It is not expected to start up again before spring, says the Juneau Record-Miner.

ARIZONA.

Cochise County.

The oil-burner smelter at Benson, which has been under construction during the past year, is completed, and is expected to be put in operation this week. The Smelter Co. last week struck artesian water at depth of 250 feet, and it is expected to supply all the water necessary for the operation of the plant.

Developments by the Tombstone Con. M. Co., Ltd., at Tombstone, are progressing. The work of unwatering is going successfully. The ground has been sufficiently drained to permit of sinking winzes on the veins at distances of several hundred feet from the shaft and shipping ore has been struck at points below water level. The ore is found to carry more lead than that from above water. Increasing shipments are being made, the present rate being three cars a day. The amount of water being pumped daily is 2,250,000 gallons, which is sufficient to drain the ground, but not as fast as desirable, and two additional pumps have been set up on the 700-foot level which will permit of doubling the rate of pumping if necessary. An additional boiler of 200 H. P. has also been put in, making a total of 1000 H. P. available at the drainage shaft.

Gila County.

Suit has been brought by G. Elliot of Boston, Mass., in New Jersey courts, to restrain the consolidation of the Old Dominion C. M. & S. Co. at Globe and the United Globe mines, and a temporary injunction granted.

R. Fleming has secured a two years' working bond on the McNelly & Crowley group of copper mines on Middle Pinto creek, near Globe, and will begin development in January. It is intended to develop the property by sinking a shaft several hundred feet and opening up the lead by drifts and crosscuts. The McNelly & Crowley is a group of nine mining claims and a millsite. About 1400 feet of development work has been done. The ores carry copper and gold values.

Graham County.

Work was resumed on the Antietam mine, near Metcalf, last week, and arrangements have been made to ship ore to the Arizona C. Co. for treatment, says P. F. Crowley, manager of the mine. A burro pack train will carry the ore to the railroad at Metcalf.

The Humboldt tunnel, near Morenci, is being widened to receive six-ton cars, as they propose to increase the output of the mine.

At the Sierra de Oro mine, near Clifton, in their tunnel, last week, a 3-foot vein of ore was struck which averages $15 in gold, 9% lead and 2% copper, says the Copper Era. Manager Potter says this lead does not apex on the surface.

Maricopa County.

(Special Correspondence).—A bottling works has been established in Phœnix to supply the trade with mineral water from the springs near Goddard's. A mineral paste which is said to possess medicinal virtue is found near the springs.

La Gloria M. Co. is working sixty men on its property in the White Tank mountains, west of Phœnix.

Mills & Philes, in the Cave Creek district, are taking out high-grade ore. It will be shipped to a smelter.

Phœnix, Nov. 30.

Mohave County.

Arrangements have been made for resuming work on the Elkhart mine by the reorganized company, with J. P. Finegan of Chloride, resident manager, and Tom McGraw superintendent.

It is reported the Infallible and Star Spangled Banner mines, at Stockton Hill, have been sold to W. S. Fletcher of Pinal county. An adit 700 feet in length tapping the vein 250 feet from the apex has been run on the Infallible, while a drift several hundred feet in length has been run on the vein of the Star Spangled Banner. These drifts have been connected by shaft with the apex of the veins, giving them ventilation, says the Mohave Miner. They have produced gold, and silver-lead ores. W. A. Mensch will be resident manager.

The water is being pumped from the C. O. D. mine, near Kingman, and a deal for the mine is said to be pending. The C. O. D. is in Wallapai mining district, and has produced gold-silver ore.

It is reported that the New Comstock M. Co. has bonded its mines and mill, near Kingman, to Swan & Son. A short line of railroad connecting the mine with the mill will be built and a hoisting plant set up on the Katherine mine, says the Mohave County Miner.

The hoisting plant for the De la Fountaine mine at Stockton hill is being set up in the drift and the shaft will be sunk to water level. The shaft is 300 feet from the portal, and through this drift all waste and ore will be discharged until water in sufficient quantity to require a pumping plant is struck, which is expected to be within 200 feet below the level of the drift. The mine shows bodies of lead and zinc ores.

Pinal County.

(Special Correspondence).—The Pinal Paraffine Oil Co. has completed the casing of its well in Hackberry wash, near Kelvin, and has resumed drilling. Indications of oil have been struck. The well is down 1217 feet.

Phœnix, Nov. 30.

Owing to fall in price of molybdenum, the C. H. Udell concentrating plant at Mammoth has been shut down, pending recovery in the market price of the metal, reports Manager Udell, who has been operating this plant in extracting molybdenite from the Mammoth mill tailings.

Yavapai County.

The Prescott-Arizona G. M. Co. is putting in machinery at its mine near Hillside. The power dry washer is expected to be in operation this month. The company has both quartz and placer claims, says President J. T. Pendegast.

In the mines of the Octave camp there are 150 men at work.

At Big Bug the Jessie M. Co. is enlarging the shaft to a double compartment. This shaft is down 657 feet. A hoisting plant with capacity for 2000 feet and a five drill air compressor are on the ground ready to be set up. A mill of 200 tons daily capacity will be built adjoining the shaft house.

At the Henrietta mine, near Big Bug, the Braganza M. Co. has let a contract to drive a tunnel from the level of the tram at the mill through the mountain for a distance of 2800 feet. This tunnel will follow the Henrietta lead at the beginning of the work, and when completed will connect with the shaft on the opposite side of the mountain with shaft No. 2. Direct communication will be had between the mine and the mill, and tramming will be reduced to a minimum, says Superintendent J. T. McLaughlin.

F. E. Biles, vice-president and manager of the Dividend M. Co., operating near Big Bug, says they propose to build a 40-stamp mill in addition to the 5-stamp already in operation. They will establish a power house in Eugenia gulch, 1 mile distant, and from that point electrical power will be furnished for all mining, milling and lighting purposes.——The Merchant's M. Co., in the same section, has its main shaft down 300 feet, and the work is progressing on the First Home claim of the group. At the level at this point a body of milling ore has been struck. It is proposed to build a concentrating plant on the ground.

J. J. Brooks will begin development work on the Bodie Extension group, near Prescott, this week.

The Journal-Miner says preparations are being made to resume work on a larger scale on the Leland group in Chaparral district, near McCabe.

Yuma County.

Quinn & Scales are working their Hercules group, 1 mile north from their 10-stamp mill at Harrisburg. Quinn is also working a claim south and adjoining the Bonanza mine.

CALIFORNIA.

Amador County.

The cleanup made last week at the Fremont Con. mill, near Amador City, is reported to have averaged $5 per ton for the first run. The ore was a mixture of rock from several levels.

At the Argonaut mine at Jackson the shaft repairs have been completed below the 1200-foot level. The mine is expected to be in full operation early in the spring.

Butte County.

The American Dredge Co. is building a dredger on the east side of Feather river 5 miles below Oroville.

The Cherokee mine at Cherokee has been reopened by the hydraulic process. Superintendent Vinton has fifteen men at work and the number will be increased.

Calaveras County.

Last week a number of the mines in and around Angels started up again, as there is plenty of water to keep them in operation. The list includes the Sultana, the Angels, the Oriole, the Gold Cliff and the Madison mill. At the Cross shaft of the Utica G. M. Co. water was turned on instead of steam; repair work is being done at this shaft, while at the Madison shaft the water is being pumped out, preparatory to development work, says the Angels Record. There were 500 men put to work during the week. The outside mines are preparing for work, and the Calaveras mine, on Indian creek, is putting in an engine.——The '49 gravel mine at Douglass Flat has resumed, and the water is being pumped out.——At the Eho mine, 3 miles east of Murphys, water for hydraulicking is being piped from the Utica ditch. During the past year a tunnel 130 feet long was run and two drifts made; powder was put in and exploded, tearing down the side of the hill, so that the hydraulic work can be carried on.

Operations are resuming at the Welsh gold mine, near Copperopolis.

The Angels Record reports that forty additional stamps are to be added to the 60-stamp mill at the Melones mine this winter.

The Salvator mine and mill, near Railroad Flat, is again in full operation. Owing to shortage of water for the past four months, milling could not be carried on. The 8-stamp mill is crushing ore. The property consists of three full claims on the lead, on south bank of Esperanza creek. The mill is on Esperanza creek at mouth of tunnel No. 1, and is run by free water from the creek, which they have eight months of the year. The mine is developed by tunnels on the vein. No. 1 from mill is in 950 feet, showing a milling ore body, with sboots at intervals. On one shoot a raise is up 300 feet to tunnel No 2, which is being extended. Also a winze is being sunk on shoot on floor of tunnel No. 2. H. C. Newman is superintendent.

A union of the miners having been formed at Hodson, a demand was made of the Royal Con. M. Co. last week that the men be given $3 per day, that the union be recognized and that the men be allowed to board and trade where they please. Up to the present time the men have been required to board and trade at the company boarding houses and deal at the company stores. This was refused and the company has closed the mines, throwing 200 men out of employment, 100 being union miners. The company recently started a new shaft near the old 40-stamp mill, but the work has been abandoned, as well as all other work. The 120-stamp mill has been in operation since summer.

El Dorado County.

At the Havilah mine, 8 miles from Plymouth, Amador Co., across the Cosumnes river, Superintendent O. R. Allen says the shaft has been sunk to 800 feet in depth and other developments made. More machinery will be put in at the top workings.

It is reported that Superintendent B. Peters of the Lady Emma mine, near Kelsey, has completed the 2-stamp mill at the mine.

The steam hoist is in operation at the Eureka-Woodside mine, near Georgetown, and Superintendent Everson has two shifts at work. The triple-compartment shaft is down 80 feet.

Fresno County.

The first well of the Pleasant Valley Stock Co., near Coalinga, has been finished, and is flowing at rate of 250 barrels per day of 18° gravity oil. Well No. 2 is over 900 feet deep.

Section Seven Oil Co., well No. 1, at Coalinga, continues production averaging 1200 barrels per day. Since it was tubed and packed, the flow has been steady without any indication of lessening, says the Reporter.

The last well that has been pumped by means of a jack on the west side, at Coalinga, is No. 3 of McClurg & Claypool. It has been changed back to be pumped with the beam. It has been shown by various companies that the production can be increased from ¼ to ½ by pumping a well with the beam instead of jacks.

Inyo County.

Work is reported progressing on the mill and cyanide plant of the Millspaugh M. & M. Co. at Millspaugh.

Kern County.

(Special Correspondence).—The Hamilton mine, 8 miles from Rosamond, is down to the 300-foot level, with free milling ore averaging $5.28 per ton. Manager Staverken will build a 100-ton plant. The ore will be cyanided.

Rosamond, Dec. 1.

F. H. Heald of Los Angeles, part owner of the coal mines near Garlock, says a diamond drill will be used to thoroughly test the mine.

The Karma M. Co., near Mojave, has its 20-stamp mill building up and is putting in the machinery and stamps. Equipment for cyaniding is also being installed.

The hoist at the Sunshine mine, near Randsburg, has been set up and is now in operation.——Superintendent Morrison of the St. Elmo mine reports he has resumed operations with one shift at work.

Nevada County.

Five more stamps are being added to five set up at the Zeibright mill, near the Placer county line, south of Grass Valley, by the Zeibright M. Co. of Nevada City. The work of laying 1500 feet of pipe to connect the South Yuha ditch with the mill is in progress, and when completed will give a head of 400 feet.

Preliminary work is under way at the Osceola mine, near Rough and Ready, bonded by Enzensperger & Waterfield. The mine was formerly worked through a tunnel, but they will sink a shaft.

The Town Talk mine, on Howard Hill, near Grass Valley, will resume operations, says the Tidings. Work has been suspended for the past five months. The tunnel in 900 feet will be continued. The Town Talk is owned by William Shackleton, and is between the Empire and Badger Hill mines, near the Gold Blossom.

At the New Eureka mine of Canada Hill, near Nevada City, the 300-foot drain tunnel is being cleaned out and reopened. The tunnel cuts the shaft at depth of 75 feet and as soon as it is opened to carry off the surface water sinking the shaft will be resumed.

J. M. Meighan of Groveland, of the

Shady Creek mine, near Nevada City, says the centrifugal dredging pump is in operation. The pump has a 10-inch suction and an 8-inch delivery, with a 65 H. P. pressure, and handles 1500 yards of gravel daily. Ten men are at work on the mine.

At the Federal Loan mine in Willow valley, near Nevada City, Superintendent H. Ogden has fourteen men at work and high-grade ore is being taken from the seventh level. The 10-stamp mill is running steadily.

At the Orleans-Potosi mine on Gold Flat, near Nevada City, the hoisting and pumping plant is in operation and shaft No. 2 is under way. W. B. Gillingham is superintendent. The main shaft is being sunk and the drain tunnel is being opened. Ore is coming from No. 1 level and is being crushed at the Gold Tunnel mill.

Machinery for the mill of the New York-Grass Valley mine, near Grass Valley, is on the ground. The foundations have been laid.

The Yuba River Gold Placer Co.'s mine, near Grass Valley, has been closed for the winter, says the Minor.

Placer County.

It is expected the Marguerite mine, near Auburn, will resume operations, says President Gimble of the company. They will sink further in the original shaft.

Work has been stopped at the Crandall mine, between Auburn and Ophir.

Plumas County.

At the Claybank mine at La Porte the gravel channel is reported struck in a raise from the main tunnel.

San Bernardino County.

The consolidation of the Bagdad and Chase mines, near Ludlow, has been completed by incorporation of the Bagdad-Chase G. M. Co. in New York, with C. Depew of New York City, J. N. Beckloy, B. E. Chase and J. H. Stedman of Rochester, N. Y., and E. Van Etten of Boston, Mass., as directors.

San Diego County.

The Elevada mine at Banner was closed down last week, and Superintendent F. D. Jones says operations will resume Jan. 1st, when further development will be done.

Santa Barbara County.

The Santa Maria Oil & Gas Co., near Santa Maria, is down to depth of 2000 feet and reports good indications of oil. The well is a mile from the first hole sunk, says Superintendent Squier.

The Pinal Oil Co., near Santa Maria, has contracted for the delivery to the Standard Oil Co. of 120,000 barrels of oil, delivery to begin as soon as the Standard's tank at Port Harford is completed. Wells No. 1 and 4 are completed and producing. No. 1, while being tested, flowed 250 barrels in two hours. The derrick for No. 5 is completed.

Santa Clara County.

The Teresa Quicksilver M. Co. has completed purchase of its property near Edenvale, south of San Jose. The company has taken deed for 325 acres of land. The mine has been worked under a bond of $25,000 for two years. The price paid is reported at $100,000. The Santa Teresa proposes to inerease work.

Siskiyou County.

The Marsena Mott mining claim above Oak Bar, on the Klamath river, comprising eighty acres of the river channel, has been sold to H. J. Barton for San Francisco men, says Superintendent Mott. Work has begun.

Solano County.

A vein of coal 2 feet thick is reported struck on the Patrick Garrel land, near Vacaville, at a distance of 25 feet from the surface.

Shasta County.

The ledge in the Copper Queen mine, in Pitt River district, near Bear mountain, northeast of Redding, has been opened up, showing 50 feet wide. B. F. Rodgers, who has a bond on the mine for Eastern men, says 375 feet of tunnel have been driven.

Work on the Shasta May Blossom mine near De Lamar has been resumed after a temporary shut-down.

At Deadwood the Lappin mine has closed down. —— At the Three Brothers mine, Zont, Thorne & Carter are getting out ore and are running their arrastra steadily. They have uncovered another ledge showing 2 feet wide.——The Nicholson mine, near the county line, is shipping ore to the smelter.

Trinity County.

Location notices were filed with the County Recorder last week for a total of five lode claims and eight placer claims.

The Drinkwater M. Co. is operating its claims near Hayfork. The dam built in Kingshury gulch last summer stood the test of the recent high water. They have put up a sawmill, run by a gasoline engine, to be used in sawing their flume blocks and timber.

Tuolumne County.

At the Nonpareil mine, near Groveland, grading for the 200-ton mill is completed and the building is going up. In the mine the station at the 250-foot level has been completed, and contract let for crosscut and drifts east and west on the vein.

F. Vassalo has bought the Bon Ton quartz mine, ½ of a mile below Pine Log crossing, on the Stanislaus river, near Columbia.

At the Horseshoe Bend mine on the Stanislaus river, near Columbia, twenty men are at work, and it is expected the number will be increased. The tunnel is in 500 feet, and crosscuts are said to show the vein 105 feet wide. When 600 feet additional are driven the tunnel will be under the shoot cut in the surface shaft. The company proposes to build a 100-stamp mill, with a chlorination or cyanide plant, all to be driven by electricity. An assay office and superintendent's quarters have been built. C. G. Grimm is superintendent and E. Goss manager.

F. Boitano has bought the Dora C. quartz claim, an extension of the Melba, near Sonora, says the Banner; also the Eagle Bluff millsite, No. 1.

Superintendent N. Carmichael of the Confidence mine at Confidence, says the mill will be kept running until Jan. 1, provided the ore holds out, then the Confidence mine will be shut down and operations suspended indefinitely.

Yuba County.

W. H. Hill, H. Gillen, W. E. Nims and A. M. Meintz of St. Louis, Mo., have closed a deal whereby they will operate the New Blue Point gravel mines, near Smartsville. In connection with working the mine they will rebuild the ditch and flumes that carry water to be sold for irrigation purposes. C. H. Hill is superintendent.

COLORADO.

(Special Correspondence). — Sympathy seems to be the main object for striking in different parts of Colorado. In the northern coal fields everything was granted the strikers, and now they refuse to return to work out of sympathy for their fellow workmen in the southern field, who have been unable to get any concessions from the operators. It will undoubtedly be the means of bringing in outside labor to operate the coal mines, the same as the metal mines of Cripple Creek district.

Telluride district has the militia, and the operators will undertake to start the mines. However, with the militia on the ground, it will make some difference with the strikers.

At Cripple Creek a large percentage of the mines are operating, and it is claimed by the operators that they can secure plenty of men. The El Paso, on Beacon Hill, is outputting as large a tonnage as before the strike and employing the same number of men. About 40% of the old men are at work on the El Paso. The Elkton is running the same as before the strike, likewise the Gold Coin and Strong. The Independence has between 450 and 475 men at work. While this mine is not up to the standard, yet it is believed within the next month they will be producing the same number of tons as before.

Following the blowing up of the 600 station of the Vindicator mine, several of the operators of other mines have received notices to leave the district under penalty of death. None of them have left, and do not expect to leave, as they intend to stay and run their mines. It is conceded by the miners that the Western Federation made a mistake, and that they are defeated, as far as the Cripple Creek district is concerned.

Denver, Nov. 29.

(Special Correspondence). — Gov. Peabody has given out the statement that intimidation and lawlessness must cease, and that anyone wishing to work shall receive military protection. The strikers in the Cripple Creek district have lost. The mines are in full operation with non-union men. Telluride is protected by the militia and the mines will again be in operation this month.

The coal strike has caused considerable hardship, but this seems to be at an end. In the northern Colorado fields the strikers have voted to return to work, the operators having granted them everything asked for. In the southern fields the operators will not grant any concessions, but have commenced operations with non-union men.

Violence has been resorted to at the Globe plant of the American S. & R. Co. at Denver.

Denver, Nov. 30.

Boulder County.

The coal miners of Louisville, Lafayette and Superior, and other northern Colorado camps, returned to work on the 30th ult., all of their demands having been conceded by the operators. There were 2000 men put to work, and it is expected this week the full number will again be working, and producing 4000 tons of coal daily. It is thought the settlement of the strike in the northern fields will have some influence in settling the strike in the southern fields.

At the Gold Lodo mine, near Wall Street, men have been put on and the output is being increased. Operations have resumed on the 200-foot level, where there is said to be a body of high-grade silver ore.

The Apex M. & M. Co. will resume work on El Dorado mountain, near Eldora.

Clear Creek County.

(Special Correspondence).—The Consolidated Gem. M. Co., W. E. Renshaw manager, is remodelling the State Oro Sampling Co.'s plant and is putting in stamps.

Idaho Springs, Nov. 29.

The Santiago mine, near Georgetown, has been consolidated with the Hazeltou Con. M. & T. Co., with W. Rogers as manager, who is also manager of the Baltimore tunnel. The Santiago group consists of eleven claims and the Santiago mill site. The property is developed almost entirely by tunnel system, driven on the ore body.

W. P. Clough of Empire, treasurer and manager of the Continental Electric Power & Irrigation Co., says the company proposes building a mill at Empire. This mill will have capacity of 100 tons daily and will have a cyanide annex. It will do custom work exclusively. A number of the mine operators in Empire district are shipping their mill dirt to Idaho Springs for treatment. A pipe line excavation 6000 feet in length has been cut by the company, and work is progressing on the dam which will protect the water supply. The company will furnish power for the mines through Empire district and in Fall River district, as far as Yankee Hill, and will be able to generate a maximum of 3000 H. P.

Manager Boughton says he is arranging to increase work on the Bi-Metallic tunnel and group of claims controlled by the Boughton T. & M. Co., near Silver Plume. The Blue Bell has produced ore of high grade and the Countess lode has yielded ore carrying a value of 100 ounces silver and 20% lead. The Three Nations, another lode, will be cut by the tunnel. The Bi-Metallic tunnel penetrates McClellan mountain.

The Eagle mine at Dumont, being operated by Micheals & Anderson, will resume production. They have men at work unwatering the shaft and clearing the workings. A cable 1 mile in length is being put up, which will carry the ore from the shaft to the Spect mill, which has been bought. The shaft is down 350 feet.

Manager B. F. Kelley of the Kelley tunnel has an option on the Junction, Fred Rogers, Clift, Big and Little Emma Junction and other claims on Democrat mountain, near Georgetown, and proposes to drive the Hansboro tunnel, at the base of the mountain, near the railroad tracks, to cut these claims at 1000 feet below their lowest workings. The work of enlarging and retimbering the tunnel is now under way. When completed wires will be strung from the plant of the United Light & Power Co. to furnish electric power at the terminal.

The Memphis & Idaho Springs G. M. Co. is arranging for a compressor plant, to be used in extending the Tropic tunnel, near Idaho Springs. The company's claims include all the ground between the Gem and Sun & Moon mines.

C. S. Desch of Silver Plume is making regular shipments of ore from the Diamond tunnel, near Silver Plume. He says it is intention of the company to build a mill at the tunnel mouth next spring.

The Shafter mine, near Idaho Springs, will have a mill, says Manager A. H. Roller. The Shafter will be cut by the Central tunnel, and after connection has been made the property is expected to output 100 tons a day.

Custer County.

The Preston G. M. Co., near Rosita, has resumed operations, and is sinking its Bismuth shaft. There is a showing of lead carbonates.

The Humholdt and Pocahontas mines, at Rosita, have been sold to F. Fruend et al., of New York. Operations will begin this month and additional machinery will be put in. The plant at the Humboldt will be overhauled and refitted. These properties were formerly producers of silver ore.

Dolores County.

H. C. Demming, State Geologist of Pennsylvania, reports tin ore found in the shaft of a mine near Rico, which was being worked for gold and silver. Samples are said to have assayed 14% tin. P. S. Rider of Durango is manager of the mine. The ore has been uncovered 18 feet thick.

Gilpin County.

The Jupiter G. M. & M. Co. has been incorporated by J. W. Smith, G. M. Edmonson, et al., of Colorado Springs, to take over and develop a group of mines and mining claims at Central City (Saguache county), Crestone and Bowermau (Gunnison county). The holdings of the Jupiter Co. consist of three claims at Central City, making fifteen acres; five claims at Bowerman, comprising fifty acres, and four claims at Crestone, comprising forty acres.

N. J. Pike & Co., of Idaho Springs, leasing the Wautauga mine near Russell Gulch, have unwatered the mine and will increase development.

Grand County.

C. Wolcott, T. S. Waltenmeyer et al., of Boulder, report locating copper prospects on Arapahoe mountain, in Grand county. The vein is 30 feet wide, and carries 10 feet of copper ore. Should the proposed State wagon road be built by way of Arapahoe pass it will run near these claims. They will begin development in the spring.

Gunnison County.

The Whig mine, near Pitkin, will resume operations this month, says the Pitkin Miner.——Operations will begin this week on the South Hall's Gulch tunnel, which is to cut the Silent Friend ore shoots at depth. The contractors are driving the north tunnel.——The Colorado S. & M. Co. has men at work in the West Mountain tunuel, near Pitkin, preparatory to resuming operations.

After being closed for ten years, owing to low price of silver, the Jimmy Mack mine, near Tin Cup, a former producer, will be again started up this month, say C. J. Carpenter and H. J. Waldron of New Brunswick, N. J. There is a mill on the property, and in the ore bins are several hundred tons of ore, taken out before the mine shut down. There are tunnels, drifts, raises and stopes aggregating 5000 feet of workings. The company will overhaul the mill and add more machinery. A. Lajune of Gunnison is superintendent.

The Tomichi Dome G. M. & M. Co. has been organized to operate at Bowerman, with J. G. Crooks of Denver as manager. It owns eleven claims east of Tomichi dome, which are to be developed by a tunnel.

Hinsdale County.

T. L. Beam and E. W. Wiley have a bond and lease on the Æolus group in Cascade gulch, near Lake City, and have begun work.

Ten stamps are dropping at the Hanna M. Co.'s mill, near Lake City, and the others will resume this week.

Las Animas County.

The coal strike situation at Trinidad shows little change. The injunction case of the United Mine Workers against the Victor Fuel Co. to restrain the latter from interfering with union men visiting any properties of the company, was decided against the unions, as Judge Lindsay dismissed the proceedings on the ground of lack of evidence. It is thought the settlement of the strike in northern Colorado may influence the situation in the southern fields.

Onray County.

The Yale-Brown M. Co. of Red mountain is preparing for the winter by putting up several buildings. Work on two tunnels is progressing.

San Juan County.

Tungsten ore is reported in the Adams claim on Bonita mountain, near Silverton, and in the claims, Dawn of Day, Sunshine, up Dry gulch, and in several claims in Minnesota gulch. The veins run from 3 to 4 feet wide, but the development is yet superficial, consisting of short tunnels and open cuts. The quartz carries hubnerite in small streaks and bunches, and it is thought it can be made to pay by concentration.

The Northern Light M. Co. is developing a group of ten claims on west slope of Bouldor mountain, near Silverton, under management of W. N. Sesson.

A group of Picayune gulch claims, near Silverton, viz., the Golden Eagle. Neglected, Crown Diamond, Scotia Extension, Scotia Extension No. 2 and Atlantic, have been sold to A. A. Brown for $20,000, of which $15,000 has been paid.

Carpenters and machinists are at work on the tailing plant of the Gold King mill, near Silverton. The building will occupy ground space of 73x167 feet, and will contain thirty-six slimes tables, with direct current motors to propel same.

Work will be resumed on the Charter Oak mine tunnel, near Howardsville, owned by T. Trippe and O. Kimball. The 200-foot bore will be continued 250 feet to cut the Charter Oak vein at a vertical depth of 300 feet.

The Mayflower lode and one-third interest in the Slide lode have been sold to Malchus Bros. of Silverton. The Mayflower and Slide are said to be continuations of the North Star vein after it reaches the gold belt of Little Giant mountain.

San Miguel County.

Justice of the Peace Robinson at Telluride has issued a lot of John Doe warrants to Sheriff Rutan to be used as he soes fit, in connectiou with tho striking miners. Thirty-eight men were taken into custody. soldiers accompauying the deputy sheriffs and assisting in making the arrests. Twenty of the prisoners were discharged hy Justice Robinson. Sixteon othors were fined $15 each for vagraucy and two were assessed $35 each ou tbe same charge. One man was fined $5 for contempt of court. The sentences, except in the contempt case, were suspended until 2 P. M., December 2, when they must be paid or iucarceration will follow, unless the men are at work. With 500 soldiers posted at tbe various mines in Telluride district, the success or failure of the attempt at resumption of miniug depends on the ability of the mine managers to find meu who will work in the places of tbe strikers. A majority of the 1200 miners and millmon who went on strike to enforce the demand for an eight-hour day iu the mills, have left for other mining districts. There romain only ahout 300 idle miners and millmen.

Summit County.

T. R. Griffitb has a lease and bond on the Jossie gold mines, 4 miles from Breckenridge, in Gold Run. The property consists of thirty lode claims, a 40-stamp mill and other surface improvemonts. Superiutendent A. Matthiossen will resume development work this week. The mill will not he started up before May 1, and in tbe meantime ore will be hlockod out. In the spring machine drills will be put in.

Teller County.

Three moro companies of the Colorado National Guard, from Lamar, Rocky Ford and Pueblo, were sent to Camp Goldfield last week, and the gaurds at points in the district are being strengthened, particular attention heing given to tbe outposts. It is roported tbe soldiers located and have arrested the owner of the revolver found in tho sixtb level of the Vindicator mine. A numher of other arrests have been made in connection witb the Vindicator explosion.

The Henry Adney shaft, near Cripple Creek, on which M. J. Burke resumed operations last week, will be sunk to 500 feet depth. At that point laterals will be startcd. The Henry Adney adjoins the Buckeye, of the Old Gold Co.

There are ninety-five men working on tbe Vindicator mine at Independence in two sbifts. Tbis is about equal to the former number of men employed, but does not include lessees, which brings the number up to 130. Tbere are being mined and shipped daily forty tons of ore, whicb averages three ounces gold per ton. The ore is being mined in a stope 400 feet north of the shaft at the 800-foot level.——Lessee Smith, operating tbe Ida May claim, is driving a crosscut at depth of 400 feet expecting to cut the Joe Dandy ore shoot. ——The Gold Ore Leasing Co., operating under lease tho Saturday claim on soutbwest slope of Beacon hill, noar Cripple Creok, is sinking the shaft and expects to continue to the 200-foot point before doing lateral work.

The suit of the Stratton Independence Co., Ltd., of London against the Strong G. M. Co. has been dismissed, the litigants having effected an agreement out of court. The Stratton Co. accepted $18,500 in lieu of $1,750,000, for which it sued as full payment for all damages for the extractiou of ore from its territory in Cripple Creek by the Strong Co. A boundary line between the properties has also been agreed upon.

The water flow from the Cripple Creek drainage tunnol was doubled in volume last week by cutting two additional channels in the east heading. The flow amounts to 3000 gallons per minute. Measurements taken sbow the water had receded a total of 11 feet since Sept. 6, the day that tho tunnel was connocted with the El Paso Co.'s shaft, and the fall of 11 feet in the water area of tbe district means that a total of 650,000,000 gallons of water has flowed through the tunnel since the connection was made, says tbe Gazette. As the figures secured during the pumping season showed that it cost practically $10,000 per vertical foot to pump the water, it is seen that the tunnel has already paid for itself, as the tunnel proper cost between $80,000 and $100,000. The breast of the tunnel is nearing the point where the main water course should bo tapped. Tbe breast of the tunnel is up iu the loose phonolite. The effect of tbe tunnel is already felt throughout tbe district, and bas proven that the entire district, with the exception of the east side, is connected by underground water courses, and that the currents flow in every mine in the district. (By the east side is meant the Isabella, Vindicator and Golden Cycle properties.) In the Gold Coin mine, on Battle mountain, the company has a water gauge, and that indicator is showing a decrease of pressure. ——The work of extending tbe east lateral from the El Paso Co.'s main shaft is progressiug. The flow is increasing daily.

Statements made by the railroad officials indicate tho tonnage of ore for the month of November will he 90% of the normal output. A numbor of the properties which prior to the strike worked a gravoyard shift, have dispensed with it and are ouly workiug two shifts. Somo of the properties have only one shift where formerly two, at least, were employed.

IDAHO.

Blaine County.

The new railroad ratos on zinc and other low-grade ores from Wood River district to the smelters has led to the resumption of operations at the Star group of mines in Star gulch, 2 miles southwest of Hailey, says the Wood Rivor Times. Superintendent A. Richardson bas men at work making an air connection from tbe 465-foot level to the shaft, which is down 365 feet. When this connection is made the number of men will be increased to twenty-five. Thore are over 20,000 tons of zinc on the dumps and a concentrating mill on the ground.

Boise County.

H. L. Woodburn has bought the East Hill placer ground, near Idaho City, with water rigbts, ditches and other equipment, from tbe War Eagle Co. The price is reported at $40,000. The water of More creek can be conveyed to Gold Hill, which has a deposit of gravel, averaging 100 feet in deptb and extending ¾ of a milo north along the east side of Elk creek, and east the same distance, says the Idaho World.

Custer County.

The Carbonate Hill M. Co., operating near Galena at Stanley basin, proposes to build an elootric road from Ketchum to Stanley basin, a distance of 60 miles. This will be to haul tbeir ore and supplies to and from the railroad to their mines, and, secondly, for general freight business to offset tbe cost of such hauling.

Idaho County.

G. E. Sanders, president of tbe Angel Con. M. Co. of New York, says the Angel Co. owns a group of twenty-four claims in Warren district, also several claims in Yellow Pine Basin in Thunder Mountain district. Among the properties owned by the company at Warreu are the Goodenough and Rescue, on which considerable work has hoen done. On the Rescue there is a 10-stamp mill. Sanders has arranged to increase operations next spring. The company will make Weiser its headquarters and base of supplies.

Lemhi County.

E. Minert reports tbe discovery of tin ore at Prairie Basin. The ore runs from 1½% to 2% in the metal and contains a little wolframite.

Shoshone County.

The Horst-Powell C. M. Co. has been incorporated by E. L. Powell, M. F. Mendenhall of Spokane, Wash., with E. E. Horst of Kingston. The company owns a group of copper claims on the Little North Fork of the Cœur d'Alene river.

Tbe American Lead-Silver Supply Co. has been incorporated by J. L. Brice, J. A. Bennington, T. B. Dennis, L. Frankell of Burke, L. Feldman of Murray and J. H. Wourms of Wallace.

The Iron King M. Co. has been incorporated, owning a group of claims in Evolution mining district. F. Eppinger, J. Gann, W. J. Bracking and J. L. Columhus of Wallace, with H. N. Freeman of Oshurn are incorporators.

KANSAS.

Cherokee County.

The Marsball mine, on the Galena Lead & Zinc Co.'s ground near Galena, is again working. The present operators are C. N. Crissman of Webb City, M. H. Cavanaugh and T. J. McKnight. Tbey have laid tracks in the upper level and will work two faces of ore. They are unwatering and expect to reacb good ore at the 100-foot level, where the former operators were working when they pulled the pumps.

The Galena Lead & Zinc Co. has unwatered its ground at Galena. Two 10-inch pumps have boen working steadily at the main sbaft. A new shaft has been sunk north of the Cousins shaft to depth of 150 feet. A face of lead and jack has been found from 125 to 150 feet under the old workings and this will be mined. Leases will be made. The company has had a drill in operation. Several new shafts will be sunk after the new ore body.

Neosho County.

The official report on the general Kansas field sbows that on October 1 there were 1014 wells producing, and on October 25, 1158, with 184 wells completed during the month and forty ahandoned.

The Colorado-Kansas Oil & Gas Co., of Colorado Springs, Colo., owning 400 acres of oil lands 7 miles south of Chanute, will sink two more wells on its ground and put up a pumping plant, says C. M. Smith, president. Tho company has one well ostimated to flow fifty barrels a day, tho grade of the product being 34° speoific gravity.

Chanute reports say that New York men will build a 2000barrol independont refinery.

MICHIGAN.

Houghton County.

Repairs at Tamarack No. 5 shaft of the Calumet & Hecla C. Co., near Calumet, have been completed and rock is again being hoisted.

The electrification of the underground tram lines in the Quincy is completed and the system is expected to be in operation this week.

The present production of tbe Franklin mine at Hancock is coming mainly from the Junior mine, which with a single shaft is turning out more rock than was considered possible two years ago, says the News. With the completion of the additional sbaft on the conglomerate lode, the Franklin will be able to operate its 3-stamp mill to full capacity.

The Isle Royale mill, near Hougbton, is operating two heads of stamps and crushing 900 tons of rock daily. The output of refinod copper is showing little change, however, and for month of November amounted to about 160 tons.

Keweenaw County.

Diamond drill work on the south end of the Isle Royale property having been discontinued for the wintor the drill is in operation on the Cliff mino, north of Calumet. In the spring it will be taken back to tbe Isle Royale and the work of locating the Baltic lode resumed.

Menominee County.

A copper deposit has been discovered near Carney, 30 miles north of Menominee, which is said to be similar to the Calumet deposits.

Ontouagon County.

The rock from the Michigan mine, at Rockland, being handled in the Mass mill, is said to bo proving softer than Mass rock, and it has heen shown the single-head can handle 600 tons of rock daily. One run milled 330 tons in 12 hours and 15 minutes. The walls of the Michigan smelter are completed and the structural steel for the roof is arriving on the ground.

MISSOURI.

Barton County.

The drill on the lease of the Golden City Oil & Gas Co., near Golden City, is down 200 feet and they expect to get oil in quantity at less than 1000 feet. At 70 feet the drill, after going tbrough a stratum of bituminous sandstone, went into 7 feet of what is said to be liquid asphalt.

Jasper County.

The Portland M. Co., owning the lease on sixty acres of land a half mile north of Webb City, has tbe shaft 8x16 feet in tbe clear, down 230 feet. It is equipped with cage ways and two cages supplied with safety clutches. The mill has capacity of 300 tons per day. Power is supplied hy an engine of 130 H. P. There are four boilers, 60, 100, 150 and 200 H. P., respectively; and two air compressors which run eight drills. The ore is worked at the 209-foot level, and two pumps, each having a 6-inch discharge capablo of raising 600 gallons per minute, have been placed at the shaft bottom. One of these pumps will handle the water, the other being used in emergency. Two mules are worked under the ground. They are, however, taken down and brought up every day. The company has an electric lighting plant. From the prospect work done, additional shafts will be sunk. M. C. Conkey is president and manager of the company.

The Binghampton mill, macbinery and the fee in twenty acres east of Joplin, were sold at assignee's sale last week, to A. E. Humphrey for $2500.

J. W. Brooks, E. L. Davidson and E. R. Shipley have organized as tbe Brooks M. Co., in Joplin.——J. Luke, J. Brown and B. Ash have organized as the Luke & Brown No. 8 M. Co., at Carthage.

Forristall & O'Donald expect to start up the Florence F. mine, near Joplin, which has shown prospect in a drill hole, and a shaft will be sunk.

Lawrence County.

At Stotts City, at Lucky Jack No. 2 mine on Shipman land work on tbe mill is progressing, and it will be ready for operation this montb.——The drill hole on tbe Bud Smith land is showing up ore.

MONTANA.

The State Legislature met in special session Dec. 1 to consider the "fair trial bill," which will give tbe Supreme Court authority to review facts in cases of equity and change of judgeship. This bill is the outcome of the copper troubles in Montana which resulted in the closing of all the Amalgamated C. Co. mines.

Beaverhead County.

It is reported that the Watseca mine at Rochester will he reopened. The shaft is being unwatored. The mill will start up next week.

Fergus County.

Tho Case-Wilson Cyanide Developmont Co, is increasing developmont work on the Gilt Edgo Charley group, near Gilt Edge, says E. H. Crabtree. The shaft on the Gilt Edge Charley is down 110 feet and they are placing a steam hoist. On the Evergreen claim of the same group the Case-Wilson Co. have opened a body of ore averaging $3 per ton. The Gilt Edge Charley group is south and west of the Gilt Edge mines.

Granite County.

A lease and bond have been taken on the iron mines on Franklin hill near Philipshurg, by S. H. Babcock and D. T. Conkling, and they intend shipping two carloads or more of ore daily to Butte smelters. There is a 5 foot ledge wbich averages 50% iron, and the smelters desire it for fluxing purposes, says the Progress.

Jefferson County.

The Eva May mine in Cataract district, near Basin, has ceased operations for the winter.

The Pittsburg C. M. Co. of Butte has bougbt the iron claims of Jaquemin & Rotbfus, near Elkhorn, and will put the property in operation this month. The ore is an iron sulphide and will be used for fluxing by the company in its smelter near Butte.

Lewis and Clarke County.

The Sacajewea G. & C. M. Co. has been incorporated to operate near Helena by H. Altman of New York, W. J. Anson and A. S. Hovey of Helena, D. B. Sickles and W. T. Lawson of New York. Forty-seven mining claims have been acquired, with an area of 800 acres; also all the available water, 500 miners' inches. Electrio power will be obtained from the Missouri river dam. Considorable development work has already been done, and the ore carries copper and gold values. Work will be resumed this month.

Madison County.

The Monitor & Revenue M. Co., operating the Revenue mine near Norris, will build a 100-ton cyanide plant.

Tbe Kennet M. Co. has reincorporated as tbe Alder M. Co. Some additional property in Alder gulch recently bought has been transferred to the new company, as well as the Kearsarge mine near Virginia City.

The Greon Cambell M. Co. of Butte and Eastern men, who havo a loase and hond on the Green Cambell mine near Silver Star, bas lot a contract to sink a 200-foot shaft to E. W. Merritt. The ore is gold-bearing quartz.

A strike made in the U. S. Grant mine, near Virginia City, in the lowor tunnel at 250 feet from the mouth, sbows values in gold. The mill started up last week with five stamps. It is expected fifteen stamps will be dropping this week. The mill is built for treatment by amalgamation, concentration and cyanide processes. L. D. McCall of Chicago, Ill., is manager.

The Cook G. M. & M. Co. has been incorporated by E. Stevens and F. A. Brown of St. Paul, Minn., and M. A. Goodner of Pierre, S. D., with principal offices at Pierre, S. D. The company is organized to operate the Fortune group of mines on Williams gulch, 5 miles west of Virginia City. A concentrator will be built.

R. C. Knox, manager of tbe Monitor & Revenuo M. Co., operating near Revenue, says tbey will build a 100-ton cyanide plant, work to begin in the spring.

Silver Bow County.

The Goldsmith mine, half a wile west of Walkerville, a former producer of gold and silver, is being operated by C. W. Ellingwood, who has a lease. Ore is being shipped. The workings are down 250 feet.

The Little Eveline mining claim has been leased for eighteen months to W. McGuire of Butte.

The Pypocka M. Co., organized last year by F. A. Heinze et al., at Butte, has taken over the Minnie Healy mine, recently awarded to Heinze by Judge Clancy.

NEVADA.

Esmeralda County.

The Montana Tonopah M. Co. at Tonopah reports shipping a carload of ore on Nov. 22 to the Western Ore Purchasing Co. at Reno, wbich after all shipment and treatment charges were deducted netted $22,226.47.

Lincoln County.

Superintendent Spare at tbe Ione mine, near Searchlight, has suspended operations temporarily while the mine is being equipped with a gasoline hoist and other improvements to increase development.

At Searchlight the Quartette M. Co. is working seventy-five men, the Southern Nevada M. Co. thirty-three men, and forty-five or fifty union men are doing

assessment work on claims for themselves and local parties. The non-union men who are working are kept close to the companies' grounds, the companies having provided their own commissaries for supplying their men.

Development work is in progress on the Hidden Treasure, Bay View and Tiger mines, owned by C. E. Mand, between the Cyrus Noble and Olympia groups, near Searchlight. The lead oponed measures 6 feet.

Storey County.

It is reported C. Butters proposes to double the capacity of his Six-mile canyon cyanide plant, near Virginia City, says the Enterprise.

NEW MEXICO.

Grant County.

The International G. M. & M. Co. at Malone, 20 miles north of Lordsburg, is sinking the main shaft on the Summit mine, which is down 140 feet and shows an ore body from the surface. The ore averages 5 feet in width, with an average value of $15 per ton in gold and silver, says W. H. Stevens, manager. He is arranging to build a 50-ton cyanide plant, which is expected to be in operation by spring. The plant will be 1 mile below the mill, in a canyon, where there is an abundance of flowing water. The company has a lease on this water right for twenty years. A wagon road has been built from the mines to the millsite.

At Stein's Pass the concentrator on the Beck mine is completed and is expected to be in operation this week. The Beck mine is a silver proposition, carrying gold. It is the intention of the management to add a cyanide plant.

The Michigan-New Mexico C. Co. reports development progressing on the Dacotah Pearl mine, one of the company's group of five claims near Shakespeare, south of Lordsburg. The shaft is down 200 feet and has ore all the way, but of low grade. The ore is 8 feet in width and consists of quartz carrying carbonate and sulphides of copper, red and black oxide of copper, $2 gold and 5% copper per ton.

Sierra County.

A gold strike is reported made at Apache canyon, in the Cobolla mountains, east of Hillsboro. A large number of men have gone from Hillsboro to that section.

Taos County.

The Tusas Park M. Co. proposes to build a concentrating plant at Tres Piedras, in Bromide district, say J. W. Murray and F. White of Manistee, Mich., directors in the company.

OREGON.

Baker County.

The Hoad two-thirds interest in the Rainbow group, near Sumpter, has been bought by the Commercial M. Co. of Portland, which owns the California and the Radcliffe groups. W. E. King is manager. The owners of the Rainbow have been hauling their ore to the Golden Gate mill, 2 miles distant, on South Dixie creek, and report that for the past three months they have had returns of $50 per ton. These mines are 1 mile east from the Morning Star group, in Mormon Basin district.

The Alpine G. M. Co., near Sumpter, building a 20-stamp mill, has discontinued construction work for the winter on account of snow. In the meantime development work at the Alpine mine will be continued, says Superintendent Addoms.

Manager F. E. Pearce of the Iron Dyke copper mine at Homestead, on Snake river, 60 miles east of Baker City, says the Iron Dyke mine is in full operation, blocking out ore, and neighboring mines are working double shifts.——At Homestead the Ladd Motals Co. is making progress with building its 100-ton smelter. In another year they expect to have railroad transportation.

The Golconda mine, near Sumptor, last month shipped over 150 tons of concentrates to the smelter, and shipments this month promise to be large.

The North Polo and Columbia and the E. & E. and Taber Fraction are also shipping ore. The first two send concentrates; the latter two are shipping rock from the new workings. The cleanup from the Columbia, taken to Baker City last week, is estimated at $40,000.

The Alamo mill is completed and ready to start up. The flume is almost completed and when connected mill operations will commence. It is expected that within two weeks the stamps will be dropping. There are over 3000 feet of underground work done in the Alamo and large bodies of ore are blocked out for milling.

The Golden Wizard Co., near Sumpter, has contracted for material for construction of the new mill, which will be built as soon as the material can be placed on the ground. The main shaft is down 175 feet; sinking has been suspended. The shaft is now full of water.

Josephine County.

B. Hurst is developing his quicksilver ledge on South Umpqua, near Wolf Creek.

The Wolf Creek M. & Dev. Co., at Wolf Creek, is running full blast and operating two giants, says R. C. Shipley, superintendent.

The Ramsey & Ingram copper claims, on Slate creek, near Grant's Pass, have been bonded by S. Bowden for $25,000. Bowden will put men to work and develop the claims during the winter. The ledge carries values in copper and gold. The vein shows a width of 100 feet on the surface. The claims are within 2 miles of the surveyed route of the proposed railroad from Grant's Pass to the coast.

A. B. Cousin, manager of the Galice Con. M. Co. of Portland, says their hydraulic properties on Galice creek are expected to be ready to begin piping this month. There is now an abundance of water in Galice, and the supply will not diminish till late next summer. The dams and reservoirs built during the summer at the head of the Galice Con. ditches on both forks of the creek are conserving the water.

Jackson County.

The Sborty-Hopo M. & M. Co., near Ashland, is increasing development work. The miners last week cut an ore shoot on the 335-foot tunnel drift carrying values in gold.

Union County.

A discovery of molybdenum is reported in eastern Union county, 12 miles southwest from Cornucopia camp. The owners are arranging to make trial shipments.

SOUTH DAKOTA.

Lawrence County.

The Eliptic M. Co., which bought the holdings of the Arcade M. Co., has bought additional ground and now owns 1000 acres near Maitland. The ground adjoins that of the Penobscot on the north and east. J. G. Leming, manager, says a hoist will be put in and development begun.

The Ivanhoe mine, near Deadwood, is putting in machinery, including a hoist, pump, pipe and fittings, etc., and a boiler and compressor.

F. E. Wade, manager of the Globe G. M. Co., is putting in a cage, additional cars, etc., to be used in drifting and crosscutting on the 500-foot level of the company's mine west of Lead City.

Golden is the name of the new town in Nigger Hill district which has sprung up about the Golden Empire M. Co.'s property. The town is near the head of Potato gulch, near the Ontario claim. The Ontario shows a big vein in slate, which the company will open up. A hoist is to be put in and the shaft continued to 500 feet.

Another discovery was recently made on Mineral hill on the Gold Coin claim, where ore was found showing gold. C. Rock is superintendent.

A strike is reported in the Lucky Strike mine on Box Elder creek, 12 miles south of Deadwood. The pay shoot is said to extend from wall to wall of the vein, 11 feet. This find was made in drifting from the shaft at the 100-foot level.

A gold bar worth $5200, representing three weeks' run of the 50-ton cyanide mill at the head of Two Bit gulch, 4 miles from Deadwood, is the first output of the mill since it was remodeled. The plant was started a little over a month ago, after being shut down and the capacity doubled, five stamps being added to the five first. A number of new slime vats were added to the mill equipment, as in the experiments carried on with the plant early last spring it was found that the capacity of the plant for handling slimes was inadequate. The ore being treated by the Golden Crest makes a high percentage of slimes when crushed under stamps, and the extraction of the gold values has been a matter of experiment.

UTAH.

The Deseret News says that many new mining enterprises which were to have opened up have been advised by the Utah Fuel Co. not to do so as it is at the present time a question with them whether they would be able to fill coal orders of any size. Inquiry at most of the offices brought out the fact that the greatest supply any of them had on hand would not last more than thirty days, and that most of them had not more than a fifteen days' supply on hand. It was stated that the United States M. Co. at Bingham was very short both at mine and smelter. The Beaver Con. has a supply on hand. The Majestic C. Co. at Milford has a good supply on hand, as also has the Cactus at Frisco. The coal situation will hardly affect the Park City mines as the supply from these is remote from the scene of disturbance. It is thought that if the shortage should keep up for thirty days, over half of the mines using coal in the State will have to close down.

Beaver County.

Now that the smelter of the Majestic C. Co. at Milford is in operation development work will be increased on its group of mines. It is intended to resume sinking on the shafts of the Old Hickory, O. K. and Harrington-Hickory mines, and to go below permanent water level. W. A. Farish is general manager of the company.

Carbon County.

President Kramer of the Utah Fuel Co. says they will not deal with the United Mine Workers. He says his company has at all times been willing to submit to the State Board of Arbitration any grievances that may exist between the employer and employe covering such questions as may properly come before the board. W. Price, the United Mine Workers' representative, says the strike would be declared off provided the Utah Fuel Co. would guarantee that no discriminations would be made against the employment of union men in the future. In reply to which President Kramer issued the following statement: "To work union and non-union men in the mines is impossible. Men who refused to join the union would be intimidated, and there would be too much danger of accidents. We are willing to take back in our employ all strikers who have not been agitators, and who have not destroyed property, provided they will give up their union cards."—— The five days notice of eviction served on the striking miners occupying houses on leased company ground expired on the 30th, and guards armed with rifles made a house-to-house call, demanding that the houses be vacated. The service of eviction notices has created an ugly feeling among the Italian strikers at Clear Creek and Scofield. Two companies of infantry are at Clear Creek.

Grand County.

New York men have a bond on the property of the Westwater Asphalt Co., at Westwater, says President Ray. The work of extracting asphalt will start this week. It is said they have contracts for a large amount of the product in the Southern States.

Iron County.

Manager McGrath of Detroit, Mich., of the Sulphides group of claims, near Stateline, says the company proposes building a 10-stamp mill. The Sulphides carries values in silver, with gold. Development consists of a 150-foot shaft and 500 feet of drifts and crosscuts.

Juab County.

At the La Reine mine, near Eureka, an engine and boilers have been put in.

The Eureka Reporter says the Uncle Sam mill, near Eureka, will be completed and in operation this week. The water line to the mill is finished and connections made with the Telluride Power Co.'s line for power.

W. Hatfield of Salt Lake City, manager of the Snowflake mine, gave orders last week to have the mine closed down, due to disagreement among the stockholders.

Piute County.

W. Armstrong of Milford, part owner of a gold property in Gold Mountain district, near Marysvale, says the Surprise G. M. Co. has been organized to develop the group.

Salt Lake County.

Manager Clays of the Peruvian mine at Alta says work was resumed this week.

The Conklin sampler, near Salt Lake City, has been put out of commission for an indefinite period, says the Tribune. The samplor has been in constant operation for thirty-five years.

J. J. Snider has a bond and lease on the Mystic Shrine group and Erie mine, adjoining properties near mouth of Markham gulch, near Bingham. They are to be developed this winter.

Summit County.

A gasoline hoist has been set up at the Silver Bell mine at Park City. It is at the upper end of the inclino tunnel which is being run from the tunnel level, 700 feet below surface.

Manager J. McConghy of the Diamond-Nimrod group at Park City, says the steam hoisting and development plant is in operation. The shaft, down 175 feet, will be sunk to 1000 feet, and it is expected 100 feet per month will be made, as no time will be lost in drifting or crosscutting. They will drive for the contact, which should be reached by August, 1904.

WASHINGTON.

Ferry County.

Five miles of the new wagon road to the Blue Horse mine on Iron mountain, near Republic, has been completed. It starts at the California mine road, a mile east of the San Poil sawmill, and follows O'Brien creek southward. This makes it possible for the Blue Horse mine to send ore to the smelters, and work will be resumed on it this month.

The tunnel on the Red, White and Blue group at Belcher Camp, near Republic, is in 325 feet, and cuts three veins, the first 22, the second 65 and the third 16 feet wide. It has also run past the hanging wall of the third vein 50 feet into the diorite. The claims in the group are the Copper Bottom, the White Stone, the Black Diamond and the Red, White and Blue, midway between the Belcher and the Hawkeye mines, and are owned by R. W. Hunner, G. W. Tripp, W. H. Bingham and R. Brownrigg. A station will be cut at the end of the tunnel and a shaft sunk 200 feet.

The Trade Dollar mine at Republic has closed down for the winter, owing to the steam hoist being inadequate for the work required. The management, being interested in the lease of the Nob Hill mine, will work that until spring, when a heavier heisting and pumping plant will be put in at the Trade Dollar.

Snohomish County.

The shaft at the Wayside mine, near Granite Falls, will be sunk to the 200-foot level. The drift at the 100-foot level is in 60 feet. Manager Habecker says the ore taken out of the tunnel and shaft in developing will pay two-thirds the operating expenses of the mine. No stoping will be done until the mine has been further developed.

Whatcom County.

C. H. Ballard, manager of the Mammoth mine in Slate Creek district, east of Whatcom, near Mt. Baker, says he is arranging to build a chlorination plant capable of handling five tons of concentrates daily, and machinery is being hauled in. The company will put in ten additional stamps in the spring The 10-stamp mill at the mine, during a run of forty days, turned out $18,000 in gold and silver, $11,000 of which was secured on the plates, the remainder being in concentrates. About 2000 feet of development work has been done, and work in the mine will be continued through the winter. The Eureka mine has plans for increase of development work, and the Chancellor will work all wiuter. Ballard says the main drawback to mining in Slate creek is the lack of roads. The natural outlet is on the west side of the mountains, but a road 65 miles long would be needed to reach the Great Northern railroad. Forty-five miles of the road between the mines and Goodell, in Whatcom county, passes through a rough country, but the remaining 20 miles would be comparatively easy to construct.

WYOMING.

Carbon County.

In the lower workings in the Doane-Rambler mine, near Grand Encampment, connection has been made with the old shaft by the drift from the lower tunnel, and the mine is drained. A station has been cut, machinery placed, the shaft enlarged to its present depth below the station, and sinking will be resumed. Superintendent Powell says he is sending out by teams copper ore taken from the shoot cut in the drift from the tunnel which will run 30% copper.

FOREIGN.

AFRICA.

Rhodesia.

The South African Gold Dredging Co., near Bulawayo, reports the electric power plant and dredgers Nos. 1 and 2 in successful operation.

Transvaal.

The Transvaal Chamber of Mines at Johannesburg reports the gold output for month of October of the mines which have so far restarted working as indicated and compared with corresponding months of 1902:

	1903			
	Witwaters-rand. Ozs.*	Outside Districts. Ozs.	Total. Ozs.	1902. Ozs.
January....	192,934	6,345	199,279	70,341
February..	187,977	8,536	196,513	81,405
March.....	208,456	9,009	217,465	104,127
April.....	218,900	8,971	227,871	119,589
May.....	224,409	9,716	234,125	128,602
June.....	228,167	10,153	238,320	142,780
July.....	242,070	9,573	251,643	140,179
August.....	262,569	9,349	271,918	162,750
September	267,513	8,684	276,197	170,802
October....	275,064	8,880	284,544	181,440
November..	.....	....	.....	187,575
December..	.....	....	.....	196,023
Total...	2,308,659	89,016	2,397,875	1,704,413

* Returns are in fine gold.

The Transvaal Chamber of Mines at Johannesburg, Nov. 10th, reports:

Natives distributed to mines during October	
by Native Labor Association	7,208
Time expired and other wastage	6,716
Net gain during October	492
Total number employed, end of October	68,958

An allotment of 588 natives was made to the railways, otherwise there would be a net gain for October of 1080.

AUSTRALIA.

New South Wales.

The exports of minerals from New South Wales during the nine months ending September 30th are reported as fol-

lows: Silver, 814,861 ounces, valued at £82,032; silver-lead, 246,201 tons, valued at £901,363; copper, 7715 tons, valued at £366,544; tin, 1431 tons, valued at £177,400; coal, 2,866,146 tons, valued at £1,336,561; total value of minerals exported £2,863,900, as compared with £2,659,261 during the corresponding period of 1902.

The gold yield of New South Wales in October amounted to 32,319 ounces, valued at £119,246. The gold yield for ten months was 269,373 ounces, valued at £985,707.

Queensland.

The Queensland gold returns for the month of October were:

District.	Tons crushed.	Yield in ounces.
Charters Towers	24,300	43,400
Croydon	6,900	8,200
Gympie	16,700	14,400
Mount Morgan	19,300	9,100
Ravenswood	1,900	3,700
Other fields	5,100	3,900
Alluvial	....	1,700
Total		84,400

The Mount Morgan G. M. Co. at Mount Morgan reports that during October 18,531 tons were chlorinated; gold returned, 8989 ounces.

The Mungana M. Co. at Chillagoe reports for the month of Octoher 1946 tons of ore containing 81 tons of copper, 12,074 ounces silver and 328 tons of lead were shipped to the smelting works.

Western Australia.

The 20-stamp mill at the Kinsella mine, one of the Murchison properties of the Cue G. M. & Exp. Co., near Cue, is in operation.

The scheme for testing the Bayleys mine at Coolgardie at depth provides for boring hy diamond drill from the 1000-foot point by means of five horeholes from Price shaft, about 2750 feet heing proposed.

The Perth hranch of the Royal Mint reports for month of September, 1903, and from Jan. 1, 1903:

Particulars. Receipts.	Month of Sep., 1903. Ounces.	Since Jan. Jan. 1, 1903. Ounces.
Western Australia	129,823.71	1,085,463.17
Other Australian States	.....	19.89
Foreign countries	.....	.....
Unknown origin	28.62	212.56
Worn British gold coin	.....	5.49
Total weight	129,852.33	1,085,701.11
Value of gold contained in the above, calculated at an average of £3 10s. 9d. per gross ounce of material received	£459,353	£3,840,668

The firewood carried by rail for the mines at Kalgoorlie is charged 1d. per mile per ton for a minimum distance of 16 miles, says the Western Australia Journal. The Kurrawang Co., the largest supplier, paid for freight for the two years ending July 31st last, £24,315. The Broad Arrow Co. paid £5619 for a period of seven months. The hulk of the railage for those companies, however, is done on private tram lines which feed the State railroad.

Now that things are settling down in this State to legitimate mining, says the London Mining Journal, the number of unemployed men is on the increase. The reason for this is not very far to seek. When the mines were first opened up, a great influx of all sorts and conditions of men took place; anyono who called himself a miner was sure of work. This class has been gradually weeded out, and since only skilled men are now wanted, they find themselves out of work. A large percentage of these take to a bush life, doing odd jobs at various mines in the Back Country, or else a little prospecting. It is surprising the large quantity of gold that is ohtained hy small parties of men who work a claim for a few months, until, with the appliances they have, they are unable to go deeper. The surface enrichment of reefs and lodes in this State is surprising, it being a common occurrence for parties of men to send parcels of stone to the public hatteries, and which yield as high as 50, 60, or even 100 ounces to the ton. These high values are mostly contained in narrow leaders of a few inches, and which do not continue in depth. This country is highly auriferous, and any day another Kalgoorlie may he discovered in the Black Range.

BRITISH COLUMBIA.

Ore shipments from the Granby mines to the smelter havo heen increased from 1200 to 2000 tons daily. The railroads are making an effort to supply cars and the motivo power to handle the increased tonnage hetwoen the mines and the smelter. There are now six furnaces in blast at the company's smelter at Grand Forks, giving the works the maximum daily capacity of 3100 tons. At tbe smelter the improvements made in the last few months havo been many, so that it now has the capacity to turn out blister copper at the rate of about 1,500,000 pounds monthly. Some increaso will be made in the working forces at hoth mines and smelter, whero 700 mon are omployed.

Boundary District.

The deal for the transfer of the Volcanic group of claims on the north fork of Kettle river, near Phœnix, has been closed hy Marquette, Mich., men for $90,000. W. A. Harkin of Grand Forks is resident agent of the company. A diamond drilling outfit is at work. In addition to this they have bonded the Evening Star group, in Wellington camp, on which work has been started. A wagon road will be huilt to connect with the main road and a test shipment to the smelter will be made. Both the Volcanic and the Evening Star have had some development work done. The Volcanic M. & D. Co. has been formed to develop the Volcanic.

S. Curtis, managing director of the Denoro mines, Ltd., that owns the Oro Denoro group, near Phœnix, says the ore is heing taken out and loaded on the railway dump cars at a cost not exceeding 40 cents per ton. This has been made possihle since putting in the compressor. The output is 150 tons per day, sent to the Montreal & Boston C. Co.'s smelter at Boundary Falls, and runs high in iron, serving as a flux. Work has centered in stripping the ore body exposed when the Phœnix branch of the C. P. R. was graded five years ago. From this point all the ore has been shipped thus far. The main ore body is 80 feet wide. After putting in the air compressor work was started in No. 3 tunnel at 200 feet from the portal to crosscut to reach the ore body, on which work is going on above. After going 80 feet the ore was cut. A raise will be driven to the surface, and connections made with the ore quarries. Surveys have heen run hy the C. P. R. to build a third spur, which will run under the dump from No. 3 tunnel.

Cassiar District.

The Canadian American M. Co. of Whatcom, Wash., has contracted with the Tyee smelter at Ladysmith to handle the output from the Empress group on Grihhell island. The company has been three years opening up these copper properties. The road from the beach to the mine has been completed. Development work has opened up the ore hody on the 300-foot level. The 480-foot tunnel to tap the ledge on the 400-foot level has not yet reached the ore hody, but will do so next month.

East Kootenay District.

Iowa men have formed the Gold River M. & P. Co., with G. E. Henderson of Beloit, Ia., president, and D. S. Guinter, superintendent. The company has a water right for 10,000 inches from Bull river, near Fort Steele, and has also leased several miles of placer ground. Superintendent Guinter is working sixteen, men prospecting and developing. Supplies have heen taken in for the winter. The right of way has been cleared for a flume for a mile, and the company intends to put in a sawmill to get out timber to allow the flume being huilt in the spring.

Rossland District.

The annual report of the Centre Star M. Co., operating at Rossland, issued last week, shows the company netted $265,000 on its mining operations, which, after paying off the company's debts, left a surplus of ahout $70,000 in the treasury. The future development, according to the report of Manager E. B. Kirby, will lie along the line of milling the low-grade ores. Kirby's report shows the ore sales during the year have heen 88,387 tons, averaging $10.58 smelter's gross assay value. The average assay contents were: Gold, 0.50 ounce; silver, 0.40 ounce; copper, 0.99%. The net profit in excess of all expenditures was ahout $265,000. The reserves of smelting ore at present are not large, and are of such shape that their dimensions cannot be accurately estimated. The development work of the year has continued to add to the masses of ore too low in grade for smelting, hut rich enough to afford a profit to successful milling. They occur in hodies 15 to 30 feet in width, and exposed imperfectly hy the mine workings, since these have in the past been directed to exposure of smelting ore hodies only. The values given are hased on the price of 12 cents for copper instead of 16.25 cents, as in previous reports. —— The fourth level, 431 feet in depth measured on the vein) east has heen extended to a point 690 feet from the shaft. At the 500 foot point the ore is 35 feet wide, averagging $5 smelter's gross assay value. The fifth levol (608 feet in depth west, at the 340 foot point, raise No. 595, has heen made on the vein to connect with the fourth level. The fifth level east has been extended to a point 358 feet from the shaft crosscut. From the 187 to the 217 foot point the ore is 8 feet wide, averaging $9.80 smelter's gross assay value.

F. Deitzsch, as consulting engineer, is conducting a series of tests with Giant mine ores of Rossland to ascertain the most economical method of handling the molyhdeuum and cohalt contained in the ores and lost in the ordinary smelting process followed thus far.——The Contact mine, in Burnt Basin section of Rossland camp, has forwarded another consignment of its ores to Swansea, Wales, to be tested for platinum and other metals of the platinum group. A number of tests conducted in England are reported to have shown that platinum exists in the ore in commercial quantities, the results secured indicating an average of a quarter of an ounce of platinum per ton of ore. With the platinum are iridium and osmium. The contact bas a lead of ore running $10 in gold and silver and is a concentrating proposition, irrespective of the presence in the ore of the platinum metals.

Sixth level (778 feet in depth) main east has heen extended to a point 1060 feet from the shaft crosscut. At the 934-foot point an ore hody begins, 20 feet in width and averaging $20, smelter's gross assay value.

Slocan District.

The Wakefield concentrator, near Silverton, is closed down for the winter after a successful run. The concentrator has turned out two products; a lead concentrate running 65% lead, 9% zinc and 125 ounces of silver; and a zinc concentrate running 45% zinc, 2% lead and 70 ounces of silver to the ton. The lead product was shipped as produced and smelted in the local smelters. The zinc product has not yet been shipped, hut there are 200 tons at the wharf that will go to Iola, Kans. There is as much more stored at the mine, which will not be shipped till next year, in hope that better treatment rates will be obtained. During the winter the Wakefield mine will continue development work with fifteen men and block out more ore. —— The Comstock mines are hauling their own ore down. There are four cars of ore sacked at the mine ready for shipment that will run 45% lead and 85 ounces silver.

CANADA.

Alberta.

A. C. Flumerfelt of Grand Forks, president of the International Coal & Coke Co., operating at Coleman, says he is preparing to put in machinery to enable the colliery to prodnce 2000 tons of coal daily. This will also include the huilding of the initial battery of 104 coke ovens. Electricity will be the motive power in and around the mine. Work on construction will be started in January. The grading of the railway switches to the mines and the construction of the first battery of 104 ovens are in progress. By spring they expect to have a payroll of 600 men at Coleman. There are fifteen buildings under construction, and the payroll numhers 200 men at present, with tho output of the mine at 100 tons of coal daily.

CHILE.

United States Consul R. E. Mansfield at Valparaiso writes the production and exportation of nitrate, the world's supply of which comes chiefly from Chile, is regulated and controlled by an association with headquarters in Valparaiso. The association has issued a circular, from which the following figures are taken: For 1902-3, the oxportation quotas amounted to 1,668,486 tons. On March 31, 1903, the stock on the coast was given at 269,923 tons, and that ahroad at 518,136 tons—a total of 788,059 tons. In course of half the year five new works joined the association, making in all twenty-four "officinas," or producing plants, operating under the combination. The twenty-four plants, or officinas, with the production allotted for the year, as as follows:

Officina.	Production. Tons.
Lagunas	35,000
Keryma	9,000
Mapocho	17,500
Mercedes	10,750
Angela	28,350
Esperanza	18,000
Rica Aventura	66,000
Pepita	57,600
Camina	30,000
Sloga	13,800
Sebastopol	9,250
Pan de Azucar	30,000
Grutas	44,000
Empress	66,000
Recuerdo	19,200
Palmira	7,150
San Lorenzo	27,500
Naprled	5,750
California	30,000
Dalmacia	14,500
Slavonia	14,000
Ballena	40,000
Lastinia	52,000
San Enrique	10,000
Total	655,350

To this total there will be added quotas for the following plants or officinas, which are ready to enter the combination: Jaspampa Bajo, Chile, Alemania, Esmeralda, Florencia, and Cota; in addition to which are to he reckoned the output of several intended new works and those which may be opened on the Government nitrate grounds sold in Novemher.——The total exportation for 1903-4 has heen fixed at 1,625,000 tons.

The consumption of nitrate is increasing in the United States. The Argentine Republic, in which are cultivated 6,000,000 hectares (14,826,000 acres) will, in the future, require large quantities of nitrate to maintain the fertility of its farm lands. It has been claimed that the scarcity of labor may affect the output of nitrate. It is estimated that each laborer in the works produces fifty-five tons of nitrate per year. For various reasons the quantity produced by each laborer has decreased 30% since 1880. But there seems little danger of a scarcity of labor in the nitrate fields. In some of the provinces wages are very low, which is an indication that there is small demand for well-paid labor. The hetter class of workmen in the nitrate works receive on an average 6 pesos ($2.19) per day. This fact is sufficient to attract laborers from other sections of Chile and from Peru and Bolivia, where wages are only 60 to 80 cents Chilean currency (22 to 29 cents) per day, when the demand comes for a greater number of workers in the nitrate fields. ——The exportation of nitrate is taxed at $3.38 pesos Chilean gold ($1.19) per metric quintal.

INDIA.

The Burma Ruhy Co. reports during month of October 148,000 loads washed, producing rubies valued at 103,000 rupees ($49,955); royalties, 22,000 rupees ($10,670).

KLONDIKE.

Superintendent Temple, engaged hy the Government, will hegin his Yukon work with diamond drills this month, says Commissioner Congdon. It was intended to begin on the copper properties at White Horse, hut a change is considered, Congdon says, the most logical place at which to begin work with the diamond drill in the Klondike heing where the property already located and held by companies or individuals is the most promising and developed most. Of the quartz properties in the Klondike proper, the Violet group is making favorable showing. A large number of applications for work on quartz properties with the Government drill have heen made to the commissioner. The Government has a diamond drill at White Horse and one at Dawson. It is possible that Superintendent Temple will do some prospecting work for the Government, in time, with placer drills, such as are used in California and elsewhere, and which were introduced in the Klondike this summer hy two companies. Howevor, quartz devolopment is the chief object at which the Government is aiming at present.

MEXICO.

Campeche.

W. J. Fisher, having oxplored the oil lands of Campeche, Tahasco and the isthmus of Tehuantepec, says he has located 250 acres near San Pedro and will begin drilling operations.

Chihuahua.

The mines of Parral, Minas Nuevas and Santa Barbara employ hetween 8000 and 9000 men, says the Enterprise. The Montezuma Land Co. at Sauta Barhara employs 1200, and a numher of others employ several hundred each. These mines are largely owned by American capital.

At the Americano mine at Terrazas work is going on in four breasts of ore of good grade. There were seventy more miners put on this week, so as to increase operations.

A. P. Johnson and T. L. Owings, of Denver, Colo., aro reported to have organized a company and are beginning operations on two properties in Guaynopa section, 60 miles from Nuevas Casas Grandes.

Coahuila.

The Cahrillas mine, owned by Zambrano Bros., on the National Railroad, near the Nuevo Leon State line, has been oquipped with a steam hoisting plant of fifty tons daily capacity. The ores are lead-silver-iron, which are said to he dosired hy the smelters.

Guerrero.

F. A. Heinze of Butte, Mont., is reported to have taken an option on the Ladichs copper mine, owned hy the Mitchell M. & S. Co.

Mexico.

At the Sullivan mine, at El Oro, the two compartment vertical shaft is down 230 feet, and sinking continuos through the andesite capping. The equipment consists of 10x14 steam hoist and one 80 H. P. boiler, and will ho increased hy addition of a pump and a 40 H. P. boiler, says manager H. W. Benton.

Thore are twenty iron furnaces in operation throughout Mexico, hosides the plant at Monterey, with a combined capacity of less than 60,000 tons per annum. The limit to the supply is determined hy the quantity of wood available for charcoal, the product of these furnaces being wholly charcoal iron, says the Mexican Investor. The cost of pro-

ducing pig iron from charcoal furnaces is estimated at from $20 to $25 and bars at $40 to $50 per ton. The chief obstacle at this time is transportation.

Oaxaca.

The Juanita M. Co. has been organized in Mexico City to operate the Juanita mino, in Oaxaca, by G. M. Houstou, J. Lane, G. P. Hupp, M. Blum, E. Murray and W. J. McCammon.

It is reported that C. Frank of Ejutla, for Chicago, Ill., men, has bought the Soledad mine in Ejutla district for $30,000. The property consists of three pertenencias. It is claimed the ore runs 400 ounces silver per ton.

Sonora.

W. C. Olds of Eric, Pa., of the Hays Con. M., M. & L. Co., operating at Camp Hayes in the Pinito mountains, says work is progressing on the 30-stamp mill being built by Manager D. J. Duncan.

The Brady-Levin Co. has bought the La Higuera group of gold mines, 30 milos southeast of Magdalena in Magdalena district. The group comprises six claims, containing eighty pertenencias of ground. The Higuera is an antigua property on which 1500 feet of workings have been made. There is a 5-stamp mill in operation on the property.

Manager Tennant of the Sonora River Placer M. Co. says work was started last week on their holdings near Cananea, says the Cananea Herald. The company has put in an extensive equipment for water service.

Vera Cruz.

The Oil Fields of Mexico Co. has been organized under laws of Delaware to develop oil lands 40 miles inland from Tuxpan, on the Gulf of Mexico.

Zacatecas.

The San Luis del Oro mine, 2 kilometers south from Zacatecas, in Zacatecas district, is being developed through four vertical shafts, one being 220 feet deep, one 130 feet in depth, and the other two are each 150 feet deep. They are equipped with a 20-stamp mill, two steam hoists, one pump, two engines, four boilers, and a 50-ton cyanide plant. The reduction plant is not in operation, but development work is in progress, and the company expects to start up the mill in the spring. E. Savilla is manager.

SIAM.

Rubies and sapphires were exported from Siam during 1902 to the value of £3701, being £14,490 below the value of this item in 1901, says British Vice-Consul Lyle at Bangkok. The fall is said to be due to low prices prevailing in the London markets. The returns for 1903 are expected to show a recovery.

Obituary.

WILLIAM STEVENS, a pioneer miner of Grass Valley, Cal., died on the 26th ult., after an extended illness. He is survived by a wife and six children.

J. W. VIRTUE, a pioneer miner of the Pacific coast, who formerly owned the Virtue mine, near Baker City, Or., died at Portland, Or., on the 27th ult. of liver complaint.

WILLIAM JUREY, a pioneer miner of Nevada, died at Galena, Nev., Nov. 17th, from heart trouble. Deceased was born in England, aged 62 years, and leaves a wife, two sons and a daughter.

J. P. COCHRAN, a pioneer miner of California, and from 1864 till 1868 receiver of the United States Mint in San Francisco, died Nov. 26th, aged 76 years. Deceased was a native of Pennsylvania and went to California in 1850.

Books Received.

"Irrigation Engineering," by Herbert M. Wilson, C. E., is the title of the fourth edition of the work on this subject. It treats of the precipitation, runoff and stream flow of water; evaporation, absorption and seepage, drainage and sedimentation; flow and measurement of water in open channels, etc., canals and canal works; application of water and irrigation; storage reservoirs, dams and their construction, pumping, etc. It also contains numerous valuable tables; profusely illustrated; 573 + XVII pages; $4. John Wiley & Sons, New York; Chapman & Hall, Ltd., London.

Dividends.

Bunker Hill & Sullivan M. & C. Co., Idaho, $30,000, payable Dec. 4th.

Personal.

G. DUNCAN has returned to Deadwood, S. D., from Denver, Colo.

G. MCCARTY, interested in Mexican mines, is in San Francisco, Cal.

H. GATES is in San Francisco, Cal., from a trip to Mexico on mining business.

J. H. MACKENZIE of San Francisco, Cal., has gone to Alaska on mining business.

J. HISLOP of Fort Steele, B. C., is mining recorder for the Fort Steele mining division.

T. J. EVANS of Cananea, Sonora, Mexico, is in San Francisco, Cal., on mining business.

HOMER WILSON of San Francisco, Cal., has gone to New York City on mining business.

R. F. PEARCE of Denver, Colo., interested in Colorado mines, is in San Francisco, Cal.

M. F. GRAUPNER of Douglas, Ariz., has returned there from a trip to San Francisco, Cal.

C. S. KINC is now assayer at C. A. Luckhardt & Co.'s, 73 Stevenson street, San Francisco, Cal.

F. DIETZSCH of London, England, is consulting engineer for the Giant mine near Rossland, B. C.

J. D. HARDIN, president of the Branch Mint Co. of Galena, Lawrence county, S. D., is in the East.

P. CLARK, of Spokane, Wash., interested in Oregon and Washington mines, is in San Francisco, Cal.

J. E. KING of Mokelumne Hill, Calaveras county, Cal., is in San Francisco, Cal., on mining business.

JOHN ROSS, JR., has returned to Sutter Creek, Cal., from an examination of mines at Grant's Pass, Or.

MANAGER HOOPER of the Echo M. Co. made a short trip to Randsburg, Cal., last week from Los Angeles, Cal.

J. M. BLYTHE, secretary of the F. M. Davis Iron Works Co., has returned to Denver, Colo., from California.

A. LAJUNE of Gunnison, Colo., is superintendent of the Jimmy Mack mine, near Tin Cup, Gunnison county, Colo.

F. JARDINE has resigned as superintendent of the Martha Washington mine, near Eureka, Juab county, Utah.

I. J. COLE, manager and superintendent of the Pine Hill mine, near Auhurn, Cal., has gone East on company business.

E. C. ENGLEHARDT, M. E., has gone from Denver, Colo., to Cave Creek, Ariz., on a three months' professional visit.

D. E. BUCHANAN is superintendent of the I X L mill in the Greenhorn mountains, near Greenhorn, Baker Co., Or.

V. H. BEHNE of Portland, Or., has been appointed manager of a group of coal properties in Muhlenhurg county, Ky.

W. O. MORRISON of the Deadwood Standard M. Co., near Lead City, S. D., returned last week from Denver, Colo.

J. SCHMIDT, formerly engineer at the California mine, Lake City, Colo., is now with the Detroit Copper Co., Morenci, Ariz.

JOHN B. FARISH, E. M., of Denver, Colo., has returned from an Eastern trip and has gone to Mexico, via San Francisco, Cal.

W. L. BOWRON of Los Angeles, Cal., is mill superintendent of the Millspaugh mill and cyanide plant at Millspaugh, Inyo county, Cal.

E. W. NOAKES of Chicago, Ill., treasurer of the Tinton Tin Co., has returned from visiting their mines at Nigger Hill, Tinton, S. D.

F. E. WADE, general manager of the Globe G. M. Co. of Lead City, S. D., made a trip last week to Denver, Colo., on company business.

W. C. OLDS of Erie, Pa., of the Hay's Con. M., M. & L. Co., operating in Sonora, Mexico, has returned from a trip to their mines.

SAMUEL NEWHOUSE of Salt Lake City, Utah, has gone to London, England, to attend a stockholders' meeting of the Boston Con. M. Co.

J. M. SHERRARD, manager of the Taylor Iron & Steel Co., Highbridge, N. J., who has been sojourning in California, has returned home.

PRESIDENT E. L. WHITE of the Bingham Con. M. Co. returned last week to Boston, Mass., from Salt Lake City and Bingham, Utah.

T. MALTMAN returned to Angels, Cal., last week from Nome, Alaska, where he went to superintend the work of the Anvil Sunrise M. Co.

A. MATTHIESSEN, of Keystone, South Dakota, has gone to Breckenridge, Summit county, Colo., as superintendent of the Jessie mines and mill.

H. F. WELLS, treasurer, and E. F. Woodworth, manager of the Lexington Hill M. Co., have returned to Lead, S. D., from a business trip to Denver, Colo.

SUPERINTENDENT T. A. VARDEN of the Ohio Copper Co. of Bingham, Utah, has returned from Salt Lake City, after conferring with Manager Q. A. Tibbetts.

G. E. LADD of Rolla, Mo., is superintendent of the Missouri mines and metallurgy exhibit for the St. Louis Exposition, vice H. H. Gregg of Joplin, resigned.

W. B. MUCKLOW of Hartford, Conn., has resigned as president of the Majestic C. Co., operating at Milford, Utah, and is succeeded by A. H. Loomis of New York.

E. E. REYNOLDS of Wilkesharre, Pa., has been appointed general superintendent of the International Coal & Coke Co., operating at Coloman, Alberta, Canada, the duties of which he will assume Jan. 1.

RICHARD HAMILTON of Kalgoorlie, Western Australia, and J. Edwards of London, Eng., general manager and secretary, respectively, of the Great Boulder Proprietary mine, near Kalgoorlie, are investigating mining operations in Colorado.

Commercial Paragraphs.

THE San Francisco, Cal., office of the General Electric Co. is now in the Crossley Building.

THE Redfield Drill Co. of Denver, Colo., has shipped three of their hand power rock drills to Keller, Wash., one each to Burke, Idaho, and Black Hawk, Colo.

THE Victor Engine & Motor Carriage Co., Mr. Prescott Scott manager, has factory facilities at 252 Spear street, San Francisco, Cal., where offices and headquarters are now established.

C. M. FUELLER, 1752 California St., Denver, Colo., has a telegram from Dover, Frank & Co., Grover, N. C., instructing him to draw plans and specifications for a 50-ton concentration and cyanide mill for erection at that point.

J. W. RICHARDS, assayer and chemist, has moved into his new quarters at 1732 Champa street, Denver, Colo., his increasing business necessitating more commodious rooms. Mr. Richards was for a number of years assayer in Aspen, Colo.

THE Union Iron Works of San Francisco, Cal., reports the usual successful trial of another fine new vessel for the United States, this time it being the official trial trip of the cruiser Tacoma in Santa Barhara channel, where on the 30th ult. she exceeded the requirements of the Government for a developed speed of 16.5 knots, attaining a speed of 16.62 knots. The four hours' run was in every way a success.

THE J. G. Leyner Engineering Works Co. kept open house to their friends and patrons in the afternoon and evening of Nov. 25th at their new offices and salesroom, 501 Seventeenth street, corner Glenarm, Denver, Colo. Refreshments were served to a large company of friends, patrons and competitors. The growth of their business during the past four years has necessitated larger and more commodious quarters, and their space requirements for office and salesroom is three times as great as that occupied by their entire factory four years ago. In future they will be in a position to furnish complete mining and milling plants. Heretofore they have only carried the Leyner compressors and rock drills.

THE G. W. Price Pump Co., San Francisco, Cal., reports the following recent installations of its centrifugal pumps: Union Sugar Co. of California, three pumps with 10-inch discharge (one to raise 3500 gallons per minute 85 feet, with 100 H. P. steam, oil-burning plant; one for 3000 gallons, 75 feet, with 75 H. P. gasoline engine; one for 3000 gallons, 30 feet, 30 H. P. gasoline); F. J. Bowne, Oregon, 12-inch pump, to raise 5000 gallons per minute 20 feet with 50 H. P.; an 8-inch discharge, direct-connected electric motor, to raise 1500 gallons per minute 140 feet; W. H. McCain, California, 155 gallons 90 feet with 7½ H. P. motor. Also, the Price Co. has in preparation for W. E. Dargee, California, for irrigating, one 10-inch pump, to raise 3500 gallons per minute 117 feet with 125 H. P.; for Norcross, one 360-gallon and one 250-gallon capacity per minute, each to raise 40 feet; and for Chicago, Ill., parties a 6-inch pump, direct-connected to 40 H. P. induction motor, to raise 1000 gallons per minute 100 feet.

Catalogues Received.

The Kingsford Foundry & Machine Works, Oswego, N. Y., forward a carefully compiled catalogue of their centrifugal pumping machinery, with illustrated explanation in detail.

The catalogue of the Woodward Governor Co., 658 Race street, Rockford, Ill., shows in detail the compensating type for electric light, power and railway service, and the standard type for mill and factory use, minutely describing the mechanism.

Armstrong Bros. Tool Co., 617-621 Austin Ave., Chicago, Ill., send a handsome pamphlet, catalogue No. 10, showing how time, money, labor and worry can be saved by using the Armstrong tool holders, obviating danger of steel being burned or worked badly, and effecting economy in tool use throughout.

Catalogue No. 52 from the Jeffrey Manufacturing Co., Columbus, Ohio, is a fine compendium of information on coal washing machinery, in which the Jeffrey Co. have deserved prominence. They also therein direct attention to their elevating, conveying, power transmission, screening, crushing, coal cutting, drilling and hauling machinery. Frank R. Field, Equitable building, Denver, is their Colorado representative.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific Coast inventors:

FOR WEEK ENDING NOVEMBER 24, 1903.

744,992.—ROASTING FURNACE—D. D. & J. O. Bailey, Banner, Cal.
744,991.—PLASTIC COMPOUND—Rosa H. Boyd, Seattle, Wash.
745,035.—HARVESTER — J. H. Brammer, Hunters, Wash.
745,150.—GLOVE—F. H. Busby, S. F.
745,037. — GAS GENERATOR — C. A. Butler, Port Townsend, Wash.
744,907.—TRUCK—P. Dahle, Eureka, Cal.
745,043. — STEAM BOILER — W. Dobler, Sumner, Wash.
745,169.—ORE FEEDER—C. Z. Ellis, Berkeley, Cal.
745,047.—AMALGAMATOR—Fletcher, Davis & Douglass, St. Clair, Nev.
744,750.—PRESERVING EGGS — J. W. Green, Portland, Or.
745,185.—BICYCLE—C. G. Hightower, San Mateo, Cal.
744,767. — ELEVATOR — J. W. King, Waitsburg, Wash.
745,021.—VIBRATOR—J. J. Lewin, Palo Alto, Cal.
744,925.—DRILLING TOOL—D. L. Luddington, Grass Valley, Cal.
744,774.—VEGETABLE GRATER—H. H. Lyon, Riverside, Cal.
744,783. — CAMERA — W. E. Mulhollan, Juneau, Alaska.
745,233.—WATER WHEEL—L. Oliver, Ontario, Or.
744,877.—CARBURETOR—E. D. Parrott, Portland, Or.
745,077.—RHEOSTAT—W. A. Sherlock, S. F.
745,126.—PLASTERING TOOL—W. A. Warsoo, Seattle, Wash.
745,128. — ELECTRIC TREATMENT — L. Williams. Seattle, Wash.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

MOVEMENT CURE APPARATUS.—No. 745,021. Nov. 24, 1903. J. J. Lewin, Palo Alto, Cal. The object of this invention is to provide a vibrating arm and a means for regulating or stopping the stroke and the intensity of the vibration. It consists in the novel arrangement of an electro magnet, an armature, a peculiarly constructed contact making and breaking spring upon which the armature is carried, and a curved arm having a rounded knob or point upon the end carried by the armature, and in conjunction with this of a regulating arm and stop. The device is especially applicable to apparatus for the treatment of the skin by the action of the vibrating arm.

ROASTING FURNACE ATTACHMENT.—No. 744,992. Nov. 24, 1903. D. D. Bailey and J. O. Bailey, Banner, Cal. The object of this invention is to provide an apparatus in which the ore is fed to a roasting furnace through a conducting pipe, which is inclosed by a flue carrying the heated products of combustion from the furnace, so that the ore is gradually raised in temperature as it approaches the furnace, while it is roasted, and is continued through the pipe to an amalgamating device carried with the pipe and provided with a scrubbing or polishing device. The upper end of the ore conveyor is connected with a feed apparatus and beyond this with devices by which a sufficient vacuum is produced to withdraw any fumes produced by the roasting and convey them to a condenser.

FISH CUTTING MACHINE.—No. 743,742. Nov. 10, 1903. Wm. Munn, San Francisco, Cal. This apparatus is designed for cutting and slicing fish, particularly salmon, preparatory to canning. The object of the invention is to provide a simple practicable cutting machine of the type employing a series of rotary cutters. It is directed particularly toward providing a means for supporting the fish in relation to the cutters, so that the difficulty heretofore experienced in holding the soft fish up to the knives will be obviated.

Latest Market Reports.

SAN FRANCISCO, December 4, 1903.

METALS.

SILVER.—Per oz., Troy: London, 27¼d (standard ounce, 925 fine); New York, bar silver, 56¾c, refined (1000 fine); San Francisco, 56¾c; Mexican dollars, 46@47½c San Francisco, 43½c New York.

The London price for silver remains unchanged from last week's quotations, while New York and San Francisco prices are nearly 1 cent lower. No considerable rise in price can now be expected before the Government again enters the market as a large buyer.

COPPER.—New York: Standard, $12.50; Lake, 1 to 3 casks, $12.50; Electrolytic, 1 to 3 casks, $12.50: Casting, 1 to 3 casks, $12.50; San Francisco: $15.00. Mill copper plates, $17.00; bars, 18@24c. London: £55 spot per ton.

The copper market remains weak and practically unchanged. It is predicted in Eastern markets that the price will not go below 12 cents, while no immediate rise above 13 cents is looked for. The halt in industrial activity, due largely to the unsettled attitude of labor to capital, has caused a marked falling off in construction, and with it the demand for copper, mostly in the form of wire for electrical use. If the large producers attempt to find a market for their metal by offering lower than open market prices, a heavy slump may be looked for, and there is some anxiety on this score in copper circles.

LEAD.—New York, $4.25; Salt Lake City, $3.50; St. Louis, $4.00; San Francisco, $4.50, carload lots; 4¾c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5¾c; pig, $4.75. London: £11 1s 6d ℔ long ton.

SPELTER.—New York, $5.25; St. Louis, $5.10; London, £20 10s ℔ ton; San Francisco, ton lots, 6¾c; 100-lb. lots, 7c.

TIN.—New York, pig, $25.80 @ 26.00; San Francisco, ton lots, 27c; 500 lbs., 28c; 200 lbs., 28c; less, 28½c; bar tin, ℔ lb., 30@32c. London, £119.

PLATINUM. — San Francisco, crude, $18.00 ℔ oz.; New York, ingot, $19.00 ℔ Troy oz. Platinum ware, 75 @ 80c ℔ gram.

QUICKSILVER. — New York, $46.00@47.00, large lots; London, £8 7s 6d; San Francisco, local, $43.50@44 ℔ flask of 76½ lbs.; Denver, $49.50. Export, $42.50@43.00.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

SOLDER. — Half-and-half, 100-lb. lots, 18.00c; San Francisco, Plumbers', 100-lb. lots, 15.25c.

ZINC.—Metallic, chemically pure, ℔ lb., 50c; dust, ℔ lb., 10c; sulphate, ℔ lb., .04c.

NICKEL.—New York, 50@60c ℔ lb.; ton lots, 40@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30@34c.

ANTIMONY. — New York, Cookson's, 7½c; Hallett's, 6¾c; San Francisco, 1000-lb. lots, 8c; 300@500-lbs., 8½c; 100-lb. lots, 10½c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, $15.35 @15.85; gray forge, $13.35; San Francisco, bar, 3c ℔ lb., 3½c in small quantities.

STEEL. — Bessemor billets, Pittsburg, $23.00@23.00; open hearth billets, $23.00 @23.00; San Francisco, bar, 7c to 12c ℔ lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer	$15 50@16 00
Foundry Northern 1	15 00@15 50
Northern 2	14 50@15 00
Northern 3	14 00@14 50
Southern 1	13 60@——
Southern 2	13 10@——
Southern 3	12 60@——
Forge	11 85@——
Charcoal	16 50@17 00
Billets, Bessemer	24 00@——
Bars, iron	1 35@——
Bars, steel	1 46½@——
Rails, standard	28 00@30 00
Rails, light	28 00@32 00
Plates, boiler	1 90@ 2 00
Tank	1 75@ 1 80
Sheets, 27 store	2 90@ 3 00
Angles	1 75@——
Beams	1 75@——
Tees	1 80@——
Zees	1 75@——
Channels	1 75@——
Steel melting scrap	11 00@12 00
Relaying rails	23 00@24 00
Dealers forge	9 00@ 9 50
No. 1 railroad wrought	11 00@12 00
No. 1 cast, not ton	11 50@12 00
Iron rails	15 50@16 00
Car wheels	15 00@16 00
Cast borings	3 75@ 4 50
Turnings	7 50@ 9 00

LUMBER. — (Retail): Pine, ordinary sizes, $24.00@25.00; extra sizes higher; redwood, $28.00@30.00; lath, 4 feet, $4.50 @5.00; pickets, $21.00; shingles, $2.50 for No. 1 and $2.25 for No. 2; shakes, $13.50 for split and $15.00 for sawed; rustic, $28.00 @35.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, $3.35; Cut, $3.55; 10d to 16d, Wire, $3.45; Cut, $3.35; 8d Wire, $3.50; Cut, $3.50; 6d and 7d, Wire, $3.60; Cut, $3.60; 4 and 5d, Wire, $3.70; Cut, $3.70; 3d, Wire, $3.85; Cut, $3.85; 2d, Wire, $4.10; Cut, $4.10. Special rates for carload lots.

LIME.—Santa Cruz, $1.60 country, $1.75 city ℔ bbl.

CEMENT.—Imported, $2.50@2.75 ℔ bbl.; California carload lots, $2.25 f. o. b. at works; small lots, $2.50 ℔ bbl. in sacks, 4 sacks to bbl.

GENERAL SUPPLIES.

OILS.—Linseed, boiled, bbl., 45c; cs., 50c; raw, bbl., 43c; cs., 48c; Lucol oil boiled, bbl., 44c; cs., 49c; raw, bbl., 42c; cs., 47c. Kerosene—Pearl, per gal., 22c; Astral, 22c; Star, 22c; Extra Star, 26c; Eocene, 25c; Elaine, 28c; Water White, in bulk, 15½c; Mineral Seal, iron bbls., 19c; wooden bbls., 21½c; cs., 25c; Mineral Sperm, cs., 26½c.; Deodorized Stove Gasoline, bulk, 17c; do., cs., 23½c; 86° Gasoline, bulk, 21c; do., cs., 27½c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19½c; Lard Oil, E W. S., bbl., 85c; cs., 90c; Neats-foot Oil, pure, bbl., 75c; cs., 80c; Sperm, crude, 50@55c; Natural White, 70c; Bleached, do., 75c; Whale Oil, cs., 50@55c.

COAL. — San Francisco, coast, yard prices: Wellington, $8.00; Seattle, $6.50; Coos Bay, $5.50; Southfield, $8.00. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8.00; Cumberland, $13.00; Cannel, $8.50; Welsh Anthracite, $13.00; Rock Springs, $11.50, long ton; Colorado Anthracite, $14.00. Coke, $10.50 per ton in bulk, $13.00 in sacks; Sunnyside, $11.50, long ton.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2.00 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE. —Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c ℔ set; 14 oz., 40s., 10c.

CHEMICALS. — Cyanide of potassium, 98%-99%, jobbing, 23@24c ℔ lb.; carloads, 23@23½c; in tins, 30c; soda ash, $2.00 ℔ 100 lbs.; hyposulphite of soda, 3@3½c per lb.; caustic soda, in drums, 3@3¾c ℔ lb.; Cal. s. soda, bbls., $1.20@1.40 ℔ 100 lbs.; sks., $1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb. tins; roll sulphur, 2½@2½c; powdered sulphur, 2@3c; flour sulphur, French, 3½@3½c; alum, $2.00@2.25; California refined, 1¾@2c; sulphide of iron, 8c ℔ lb.; copper sulphate, 5½@5¾c; chloride of lime, spot, $2.50@2.75; sulphuric acid, in carboys, 66° B, 1¾@2c ℔ lb.; nitric acid, carboys, 8c ℔ lb.

BONE ASH.—Extra No. 1, 5@6c ℔ lb. No. 1, 4@5c.

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6¾c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails, ¼c ℔ lb. above keg price; in 1 and 5-lb tin cans, 100 lbs. per case, ½c. per lb. above keg price. Dry Lead—In bbls., 1 ton and over, 6½c; do. in kegs, 7c.

RED LEAD.—500 lbs. and over at one purchase, ℔ lb., 6¼c; less than 500 lbs., 7c.

LITHARGE.—Pure, in 25-lb. bags, 8@9c ℔ lb.

BORAX.—Concentrated, 6@7c ℔ lb; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

MANGANESE.—Pure, ℔ lb., 60c.

SODIUM.—Metal, ℔ lb., $1.00.

BISMUTH.—Subnitrate, ℔ lb., $1.75.

MERCURY.—Bichloride, ℔ lb., 90c.

MOLYBDENUM.—$2.00 ℔ lb.

CHROMIUM.—90% and over, ℔ lb., $1.00.

PHOSPHORUS.—American, ℔ lb., 75c.

SILVER.—Chloride, ℔ oz., 90c@$1.00; nitrate, 55c.

ALUMINUM.—No. 1., 99%, small lots, 37c ℔ lb.; 100 lbs., 35c; 1000 lbs, 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

URANIUM.—Oxide, ℔ lb., $3.50.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

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1—1-ton Rock Car.
800 ft. Pipe, 1 in. to 4 in.; 200 ft. Rail.
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16x7x16 Knowles Single.
12x7x10 Worthington Duplex.
10x5x12 Fairbanks-Morse Duplex.
10x5x12 Blake Duplex.
6x8½x6 Worthington Duplex.
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MINING AND SCIENTIFIC PRESS.

Whole No. 2264.—VOLUME LXXXVII. Number 24. SAN FRANCISCO, CAL., SATURDAY, DECEMBER 12, 1903. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Duty of a Stamp Mill.

An important consideration with a mine manager is the duty of the stamp mill. After years of experience it is found that this duty varies greatly, even in the same district. With some managers the chief object appears to be high capacity—this is particularly noticeable on the Rand, South Africa, where the average duty of a gravity stamp is rather over than under five tons per twenty-four hours. California has made some record runs in the way of large capacity, as high as seven tons per stamp having been recorded, but this was on soft, decomposed amphibolite schist, with just enough free quartz to cut the fine, soft material, and as the gold was comparatively coarse and a 400-mesh screen—twenty holes to the linear inch—was used with abundance of water, the amount put through per stamp was large. This was at a mine near Angels, in Calaveras county.

From four to five tons per stamp is not an uncommon stamp duty in California mills, and about the same amount is run through in some of the Homestake mills of South Dakota, also those of Alaska. In fact, nearly all of the large low-grade mines must crush a large tonnage per stamp in order to reduce the cost of milling. If a 40-stamp mill crushes four tons per stamp through a 40 screen at a cost of 80 cents per ton of ore crushed, and by substituting a 30 screen for the 40, the capacity is increased one ton per stamp per twenty-four hours, the cost of running the mill will remain practically the same, but the cost per ton of ore crushed will be reduced to 64 cents. The question then arises, have the tailings increased in value to an amount equal to the decrease in cost of milling per ton? If not, then the change is advisable and the mortars should all be supplied with the coarser screen. If on the other hand the loss in tailings rises to about the same figure as the saving in cost it is not advisable to make the change, while if the values in the tailings rise above the difference in cost of milling it certainly would be a bad change. A higher capacity may then possibly be secured in some other manner, while the values in the tailings may still be kept down to about the same figure as before. One method of accomplishing this is by crushing the rock finer in the breakers. The smaller the maximum of size as the ore comes from the breaker, the greater the capacity of the stamps within certain limitations. As a rule the rock breakers do not do as much work as should be required of them. In some mills the breakers are only run a few hours each day, and the maximum size of pieces of ore going to the batteries are often so large as to be unable to pass the lip of the feed slot at the back of the mortar. If the crusher be set to crush finer the capacity of the mill will at once be increased. If the ore coming to the mill gains upon the breaker man, then a different arrangement must be provided. Breakers set tandem will increase capacity largely.

Where all the ore from the mine, after being run through a large breaker, which crushes it to pass, say a 3-inch ring, falls on a grizzly which sizes it roughly to 2 inches, the coarse product going to a smaller breaker for finer crushing, it will be found to accomplish a wonderful saving by increased capacity of the stamps. This is a feature of mill practice which many mill men seem slow to recognize. In a 40-stamp mill, where rock of uniform grade was fed to the stamps, several experiments were tried with screens of varying size and different heights of discharge. It was found that a 30-mesh screen, with a 6½-inch discharge, crushed four and one-quarter tons per twenty-four hours. An adjoining mortar, with a 40-screen and 3-inch discharge, crushed as nearly as could be estimated the same amount of ore, but the tailings were about 10 to 15 cents lower than on the higher discharge battery. This indicated that the ore required the finer crushing to release the gold bound up in the quartz and pyrite. In a case like that cited it is wisdom to adopt the finer screen and low discharge, but in another mill on different ore similar experiments may not produce the same results. Experience has shown that a quartz mill is a poor place to apply the "rule of thumb." Each case should be given the advantage of experiment. The simple fact that each stamp in a mill is crushing four tons per twenty-four hours, and that 92% of the values are being saved, does not prove that by altering the running arrangements of the mill it will be impossible to secure better results by still finer crushing and at the same time keep up or increase capacity. An increase in mill capacity without increase in value of tailings means a lowering cost of milling.

Often the ore of a mine is of such character that large tonnage per stamp is impossible without heavy losses in the tailings. Some mills do not crush over 1½ to 2 tons per stamp. This is because the rock, while requiring fine crushing, is very hard and flinty and difficult to amalgamate. In such cases it is, doubtless, economy to reduce the capacity per stamp and save as high a percentage of values as possible. Increase in mill capacity may always be obtained by increasing the number of stamps. It is safe to say that in a large mill ore may be treated at lower cost per ton than in a small one, for the reason that the ratio of expense per ton is less in a large mill than in a small one. The crew required to run a 5-stamp mill may also run one of ten stamps, and the crew of a 40-stamp mill may usually operate one of sixty stamps. Power generally costs less per unit; fewer men are required per unit; and the original capital expense per unit is less—the unit being either the stamp or the ton of ore crushed. In addition to the above considerations, there are other important factors which influence the duty of the stamp mill. These are quantity of water fed in the battery; inclination of the battery screen; the superficial area of screen surface; the height of drop and number of drops of stamp per minute. The weight of stamp varies somewhat with the wearing down of the shoe, but this is in a measure equalized by the increasingly higher drop which results as the shoe wears away. Careful millmen keep the drop as nearly uniform as possible by adjusting tappets.

One thing which is an essential in the stamp mill practice is uniform water feed. This can best be supplied by providing a pressure box outside the mill which is fed with an unfailing stream of water. This box should constantly be furnished with an amount of water somewhat in excess of that used in the mill, having an overflow near the top. The waste water may flow into a separate adjoining tank, this water being conducted by separate pipe to the hose in front of the battery, to be used in washing off the outside plates, etc. This arrangement affords a uniform pressure at the battery. It is also a good idea to provide the battery water feed with two stop cocks, one of which is adjusted to the maximum flow, set by the mill foreman, the other to be manipulated by the battery men at will. This admits of shutting off all water, but does not permit more than in the foreman's judgment is necessary for the best work.



Upper Mill Greenback Mine, Greenback Camp, Southern Oregon. (See Page 391.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market Street, San Francisco, Cal.
Telephone, Davis 771.

ANNUAL SUBSCRIPTION.

United States, Mexico and Canada.....$3 00
All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

BRANCH OFFICES:

NEW YORK CITY, 720 Park Row Bldg. BOSTON, 27 School St.
CHICAGO, 1115 Monadnock Block. DENVER, 606 Mack Block.

J. F. HALLORAN.....Publisher

SAN FRANCISCO, DECEMBER 12, 1903.

TABLE OF CONTENTS.

ILLUSTRATIONS: Page.

Upper Mill Greenback Mine, Greenhack Camp, Southern Oregon.381
Transmission of Power by Ropes.....384
McClelland Mountain, East Argentine District, Colorado.....385
Electrically Driven Power Pumps.....387
Sectroidal Relay Governor.....387
Mining and Metallurgical Patents.....388
Colorado Building at the St. Louis World's Fair.....389
Montana Building at the St. Louis World's Fair.....389
Escape Doors in Cyanide Tanks.....390
Mine Telephone System.....391

EDITORIAL:

The Duty of a Stamp Mill.....381
Increase of South African Mineral Resources.....383
The Copper Market.....382
March of Progress in British Columbia.....382
A Tempest in a Teapot.....382
The Fair Trial Bill.....382
Geology in Mining.....382
The Labor Situation.....382

MINING SUMMARY.....393-394-395-396-397

LATEST MARKET REPORTS.....399

MISCELLANEOUS:

Concentrates.....383
Transmission of Power by Ropes.....384
Sinking a Steel Lined Shaft in South Africa.....384
In Clear Creek County, Colorado.....385
Gold in Igneous Rocks.....385
The Needs of the Miner.....385
Notes on Quartz Milling on the Rand.....386
Iron Mountain, Durango, Mexico.....386
A New Zinc Field.....386
Electrically Driven Power Pumps.....387
Sectroidal Relay Governor.....387
Drilling in Raises.....387
Mining and Metallurgical Patents.....388
Thunder Mountain District, Idaho.....389
Colorado and Montana Buildings at St. Louis.....389
The Strength of American Timbers.....389
Notes on Classification.....390
Mine Telephone System.....391
That Number Scheme Again.....391
Quartz Veins and Mines of Southern Oregon.....391
Treatment of Telluride Ores at Kalgoorlie, Western Australia.....392
The Silverton District, Colorado.....392
$25, Not $35.....392
Books Received.....398
Personal.....398
Obituary.....398
Catalogues Received.....398
Commercial Paragraphs.....398
New Patents.....398
Notices of Recent Patents.....398

THE increasing development of the mineral resources of South Africa is calling for more extensive application of electrical machinery, and American manufacturers are in the field and expect to make large installations in that region during 1904. The gold output is growing larger with each month, though it has not reached the magnitude it had assumed prior to the Boer war.

THE copper market shows signs of weakness, the anticipated rise in price not having materialized. The output for the year has been large, and the consumption has practically been equal to it; but still the market has slowly declined, and it is now at 12½ to 13 cents, with indications for a still lower price. The disturbed industrial condition of the country and lack of confidence on the part of investors is responsible to a great extent for the present condition of the copper market. Numerous anticipated electric installations and extensions have not been made, because of uncertainty of labor conditions, and copper has not been in as great demand as was expected a few months ago.

AS indicating the march of progress in British Columbia, the statement is made that rock which some time since was dumped in the workings of the Lenora mine of the Mount Sicker Copper Co. for filling, is now being drawn out and treated in the smelter for the gold it contains. When the ore was mined from the stopes of the Lenora, it was assumed that it was copper ore, and that, believed to be too low in copper to be profitably treated, was sorted out and used to support the walls of the stope. Presumably in testing the ores for copper, the volumetric assay was employed, and this gives no indication of the presence of gold. Recently it was found that this waste rock carried gold in considerable amount. This illustrates in a marked manner the necessity for careful tests for other metals than copper in so-called copper ores.

A Tempest in a Teapot.

The United States Land Office at Washington has made a ruling that a patented claim shall refer its lines to the lines established by the Government land surveys in the several Western States, and the ruling has been and still is the cause of much unnecessary anxiety on the part of those owning patented mining claims.

All who are familiar with the methods of Government land surveys and their results are aware that many of these lines are not true North-south or East-west courses, and that many other discrepancies exist; but this fact and the ruling of the land department need cause no serious uneasiness on the part of those owning patented claims. In Colorado, particularly, a great deal is being said about the matter, and the opinion is expressed that the land department is about to involve the entire mining region of the West in interminable litigation, by shifting the claims about into new positions, in the effort to make the descriptions of the claims conform to the land survey lines.

Nothing of the sort is contemplated, and, if it were, the land department has no authority to float mining claims from one position to another at will. When the land department has issued a patent to a mineral claim, that claim passes beyond its jurisdiction. The stakes or monuments are necessarily prima facie evidence of the limitations and boundaries of the claim. Concerning this "Lindley on Mines" says:* "It may be announced as a general rule that a patent is conclusive evidence as to the limits of a location, and that it can not be assailed by showing that its actual boundaries were different from those described in the patent. Nor are the proceedings upon which its issuance was based admissible in evidence to impeach it. This rule is, of course, subject to the qualifications that where there is a variance between the calls of the patent for courses and distance and the monuments specified therein, the monuments control, where the monuments are clearly ascertained."

Since the land office has no jurisdiction after issuance of patent, in the event of a controversy the case must be passed upon by the courts. The land department has no power to summon witnesses, take testimony or to perform any of the other functions for which courts are constituted, and therefore it has no jurisdiction. Wherever a conflict arises over this new order of the land office, the courts will determine what land was transferred by the Government to the patentee by taking testimony as to the monuments on the ground. If it be found that the bearings and distances from certain mineral claim corners to lines of the land survey do not conform to the calls in the patent, then those bearings and distances should be ignored, and the monuments outlining the location will define the position of the claim in question. The whole matter only emphasizes the necessity for care when staking a mineral location—to carefully set each post or monument, and to refer these posts or monuments to natural and indestructible objects as far as possible. Trees are very often used for this purpose; but in time a tree, being destructible, may disappear or its identity be lost. Prominent rock outcrops are preferable, and where the lines of the land survey are accessible, they also should be used as reference.

*Sec. 778, second edition, page 1389.

THE Montana State Legislature has passed at the extra session called by Governor Toole, the so-called Fair Trial Bill, the chief provisions of which are that no judge may try a case when either party to the suit files an affidavit that he has reason to believe that he cannot have a fair and impartial hearing before such judge by reason of bias or prejudice of such judge. It permits a judge from another district to sit and try any case, and no more than two judges from the district other than the one in which the action is pending may be disqualified to sit upon such case. The bill was aimed at the Heintze interests, he having won in most of the cases which have heretofore been tried at Butte. What effect this new legislation may have on the litigation between Heintze and the Amalgamated Copper Company remains to be seen. The new law is calculated to secure fair treatment for both sides of any controversy.

Geology in Mining.

That a knowledge of geology in practical mining is not only beneficial, but positively necessary, has been oft times proved. Millions of dollars have been fruitlessly expended in a search for valuable minerals where none existed, and where a knowledge of geology would have saved the unnecessary expense of the work of development. There are many instances where expensive shafts have been sunk in search of a certain ore-bearing horizon, when the collar of the shaft was below that horizon, with no possible hope for encountering it, while in altitude above the sea the platform at the mouth of the shaft was considerably higher than the ore-bearing zone in the same district. This peculiar fact was due to faulting of the strata, resulting in lower beds being raised to a higher elevation than later strata of the same series. The saying "once mineral-bearing, always mineral-bearing," is a good one from a geological standpoint, but not always so when viewed commercially. If a certain area of Archæan rocks is found to be mineral-bearing, it usually follows that any later rocks in the same area, overlying the older crystalline rocks, are also mineral-bearing; but this is not to be assumed as indicating that the entire concession of later rocks laid down upon the submerged Archæan will prove profitable, for such rarely, if ever, proves to be the case. An exemplification of this theory is found in the Black Hills of South Dakota, where the Archæan or Algonkian rocks are notably mineral-bearing, and the overlying sandstones (quartzites), shales and limestones of the Silurian and Carboniferous formations are also ore-bearing in part. Each stratum is not ore-bearing, but there are several horizons already proven to carry gold and silver, and sometimes lead ores in commercial quantities, and in some of the districts of that region there are no less than five separate ore-bearing horizons, while the whole number of strata or separate horizons in which minerals are found in the Black Hills in commercially valuable quantities is not less than nine, and there may be others, as yet undetermined, and this does not take into consideration the occurrence of ore deposits in the massive eruptive rocks of the region. A somewhat analogous condition is found at Leadville, Colo., and in other mineral regions in which sedimentary beds predominate.

Deep wells have been sunk for water and oil in crystalline rocks where a novice in the science of geology could have predicted failure with assurance. Instances are not few where considerable work has been done on strata of black, lustrous, slaty rock, in the belief that it was anthracite coal; beds of obsidian have also been located as coal, and black basaltic rocks have been believed to be tin ore. These are but a few of the numerous mistakes made by those unfamiliar with the simplest principles of geology and mineralogy.

The Labor Situation.

The labor troubles in Colorado and Utah continue to attract the attention of the Governors of those States. Troops have been sent into the Sunnyside coal region of Utah, and the indications are that the State militia of Colorado will have to be sent into the Trinidad district. There are still 500 troops at Cripple Creek, which district has been placed under martial law, and a considerable number at Telluride, though no new disturbances are reported from either of those sections. The Colorado coal strike remains practically unchanged. In California, in Tuolumne county, the Black Oak M. Co. are unwatering their property after an idleness of several weeks, due to the demand of union men who were not employed at the mine that Chinese ore sorters be discharged. No opposition to the reopening of the mine has yet been reported. In Calaveras county it is reported that a large number of striking miners from the Royal Consolidated mines at Hodson are at the village of Miltou, the terminus of the railroad, where they ambushed a party of non-union miners and commanded them to leave the country, which mandate the latter obeyed without argument.

In British Columbia the Provincial Court has imposed fines aggregating $2000 upon James Dunsmuir, being the result of seventy-five cases tried for the employment of Chinese in the coal mines of Vancouver Island. The cases will be appealed.

CONCENTRATES.

"FELDENITE," as an ore, mineral or rock, is unknown to "Concentrates." Possibly the name may have been misspelled.

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HUBNERITE is a tungstate of manganese, similar to wolframite, except that it contains no iron. Hubnerite contains 20% to 25% MnO; is usually in bladed forms; color brownish red to hair-brown to nearly black; streak yellowish brown, greenish gray; often translucent. Wolframite contains 9.5% to 18.9% FeO, and 4.7% to 14.0% MnO.

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BLACK OXIDE OF MANGANESE, though frequently accompanying veins and deposits of silver ore, is not an indication of the presence of silver in ores containing the manganese. There are many manganese deposits with barely a trace of silver. In some silver mines the manganese is barren, and with its accompanying minerals constitutes the gangue of the vein.

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CONCENTRATING MACHINES as arresters of amalgam escaping from plates prove the ability of that class of machinery to accomplish the work for which they are designed—the separation of particles of high specific gravity from those of relatively low gravity—but the amalgam should not be allowed to leave the plates. This is the cause of much loss in gold mills.

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WHEN a large amount of sand accompanies the water flowing into a flume, a great amount of it may be eliminated by constructing a box beneath the flume, into which the sand will settle, and from which it may be removed, daily or as often as necessary. To accomplish this a side flume can be built through which the water flows while the sand box is being cleaned.

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ALL copper deposits do not have heavy iron gossan, though such characteristic is not unusual. In many large copper deposits little or no copper appeared in the surface croppings, and in some instances now noted copper mines were originally worked for gold or silver. Among these are the copper mines of Butte, Mont., the United Verde of Arizona and the Mountain copper mine of California.

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REPLYING to inquiry from Reef, Cochise county, Ariz.: The change in the statement makes no difference. The time of location of a mining claim is a matter of fact, and an error in the date or an intentional misstatement on the location notice does not take precedence over the time when the claim was actually located. If this can be proven then the disagreement of the notice with the fact is not a material consideration.

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SULPHURETS containing gold are successfully treated by the cyanide process by fine grinding of the sulphides, and then treating with cyanide by agitation, the solutions being decanted, the remaining sludge being retreated with weak solution and reagitated, the solution being decanted as before. Coarse sulphides do not yield their gold readily to cyanide solutions, even after a contact extending over a period of several months.

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SOAP is a poor dressing for belts. It may answer for a short time, but will ultimately damage them. Rosin is little better than soap. These substances harden belts and make them brittle. The coefficient of friction between a belt and pulley may be increased by covering the pulley with leather. Experiments with leather covered pulleys has shown that the coefficient for leather belts over leather covered pulleys is much greater than leather belts over cast iron pulleys.

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THE static pressure on the gate of a pipe line 12 inches in diameter, under 400 feet head, would be 19,679.40 pounds, or nearly ten tons. The pressure is 174 pounds per square inch, and this pressure is exerted equally in every direction, upon the pipe as well as upon the gate. The weight of water in a pipe line may greatly exceed the pressure at lowest point in the line, as the vertical height of the column of water in the pipe determines the pressure. A pipe line upon which the vertical pressure at its lowest point is 400 feet may be a mile or more in length.

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WHERE the dropping of water down the timbers of a vertical shaft becomes troublesome, it may be diverted by tacking small laths along the inner upper edge of the plates, the laths projecting ½ inch above the top of the plate. This causes the water to collect on top of each plate, which will preserve them, while the surplus water will run down on the side nearest the walls of the shaft. By providing this simple arrangement a wet and disagreeable shaft may be made comparatively dry. The water may be caught up at desired levels and run to tanks to be pumped or raised by skips to the surface.

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THE terms "dry" ore and "wet" ore are to indicate the character of a particular ore. A "wet" ore is one containing sufficient lead or copper to make it a desirable smelting ore. A "dry" ore is one which is better suited to milling. It is a commercial designation purely, and depends largely upon environment. An ore which in one district would be smelted in another would perhaps be milled for the reason that to smelt it would require a greater expense than to mill it, owing possibly to absence of flux, such as limestone, iron ore, etc. A typical wet ore is one containing practically all the elements to render its treatment by smelting both a technical and commercial success. In large custom smelters the "wet" ores are mixed with purely "dry" ores and the mixed charge smelted, but this does not entitle the "dry" ore to be classed as a wet ore. Owing to improvement in blast furnace practice, and in the furnaces themselves, some "dry" ores of several years ago have become the "wet" ores of to-day.

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WITH the knowledge which comes with years of experience and experiment there should not be any great trouble in treating gold-bearing ores. An ore which after amalgamation, concentration and cyanide treatment still contains appreciable values must either have been improperly treated, or is not amenable to the ordinary milling process as outlined. To secure high extraction by amalgamation and cyaniding, fine crushing is generally necessary, but fine crushing renders concentration more difficult. The economic problem is more important than securing high extraction, for the latter may entail a cost greater than the amount extracted.

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IN some instances blue prints which have been overexposed may be restored to normal condition by immersion in weak solution of ammonia—two teaspoonfuls of ammonia to a half pint of water. When immersed in the bath the print will turn purple and gradually become lighter, passing through various shades of violet to pink, and will eventually become white if not removed from the bath. When the color has reached the pink stage the print should be rinsed in water and dipped in a bath of water one-half pint and muriatic acid one teaspoonful. This causes the blue color to reappear. The print should be washed in several changes of clean water before drying.

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THE statistics of the production of garnet in the United States have been gathered since 1894. These statistics show a great deal of variation in the quality of the mineral from various localities and consequently a variation in price, ranging from $20 to $60 per ton when the mineral has been concentrated and prepared for market. Since the introduction of carborundum, the artificial abrasive manufactured at Niagara Falls, the demand for garnet and other natural abrasives has fallen off. In 1900 the production of garnet was reported to have been 3185 tons, valued at $123,475, and 4444 tons in 1901, valued at $158,000. This fell in 1902 to 3350 tons, valued at $132,829.

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AN electric accumulator is a storage device which is capable of storing electrical energy and discharging it when required. When an electric cell is coupled to an outside source of pressure, so as to send a current through it, it is said to be in the process of charging. On cutting off the current the evolution of gas ceases, and if the poles of the cell be connected by a wire a current is obtained, the direction of which is opposite to that of the charging current, and the cell is referred to a discharging. At pleasure it may again be charged by recoupling to the outside pressure supply. An apparatus employed in this way is called an accumulator. This is the underlying principle of the so-called storage battery.

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THE specimens of rock from Tonopah, Nev., are: No. 1, blue limestone; No. 2, limestone with iron oxide; No. 3, quartz breccia, cemented by iron oxide and earthy minerals. The metallic mineral in No. 3 is lead sulphide (galena). It is a portion of what was probably at one time a solid vein of quartz, which has been fractured by the pressure and movement of the walls of the vein or deposit. It is impossible to tell the age of the limestones in the absence of fossils. No. 1 resembles somewhat the blue limestone of Leadville, Colo., but is rather lighter in color than the latter. The Leadville limestone is also generally coarser in grain than the rock from Tonopah. Either of the limestones represented by the samples might become ore bearing under proper geological conditions.

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THE ball stamp is a stamp lifted and forced down by steam pressure, the stem of the stamp passing upward through a steam cylinder, and having a piston attached. These stamps are in use chiefly at the Lake Superior copper mines. Each stamp head has a separate mortar. There are separate types of this kind of stamp, all operated on essentially similar principles. The foundations for these stamps are made of concrete or timber and concrete combined and the foundation rests on concrete or on solid bedrock. These stamps crush from 300 to 600 tons of copper rock per twenty-four hours, depending on the size of screen and amount of water used in mortar. The screens vary from $\frac{3}{16}$ round punched to $\frac{3}{8}$x$\frac{3}{8}$ slot. The rapidity of drop and size of steam cylinder, as well as steam pressure, has a direct effect on capacity of stamps.

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NO satisfactory microscopic study of rocks can be made without the employment of a microscope especially designed for this kind of work. It has two nicol prisms, one between the eye and object glasses, the second beneath the stage of the instrument. This stage should be adjustable to variable position by means of racks and pinions, and is known as a "mechanical stage." The stage must also be arranged to revolve. There are numerous other accessory attachments to the petrographical microscope, all of which are useful or necessary in the determination of rocks and minerals by a study of their thin sections. This study involves a considerable knowledge of the theory of light, the crystallographic structure of minerals, their refractive and absorbent properties as related to light, etc. It is an intricate study in which only those who make it a specialty may hope to succeed.

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THE issuance of the receipt of the receiver of the land office for money received for land for which patent has been applied for is equivalent to patent, and necessity to perform annual labor ceases at once. If the receiver's certificate issues on Dec. 31, and the assessment has not been performed for that year, but $500 worth of work had previously been done, there is no necessity for further assessment work. The law requires that the receiver of the land office issue a receipt immediately upon accepting the money in payment for patent. Upon the filing of an adverse claim it is the duty of the register of the land office where the patent proceedings are pending to notify both parties of the fact, and pending decision all patent proceedings are suspended and assessment work must be done as though no patent had been applied for. Applications to make entry for patent cannot be made at any place than the proper land office and within the proper hours—between 9 A. M. and 4 P. M.

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"CARBONATE ORE" is a term employed usually to denote "lead carbonate," although there are numerous other carbonate ores, such as malachite (green copper carbonate), azurite (blue copper carbonate), smithsonite (zinc carbonate). This latter is often called "dry bone" by the miners. There is no carbonate of silver in nature. "Siderite" is carbonate of iron. The name "carbonate" became popular upon the discovery of the large lead carbonate deposits at Leadville, Colo. In that district the several ores were called carbonate, sand carbonate and hard carbonate, also liver-colored rock, the latter a dark-colored iron oxide, usually siliceous, with patches and streaks of lead carbonate and often considerable visible horn silver (silver chloride). The common carbonate was a firm, though not hard ore, consisting largely of grayish lead carbonate, often stained in spots by red and brown iron oxides. Sand carbonate contained a large percentage of lead carbonate, which was found in the form of loose grains, like sand. Often this ore, when broken into, would cause "runs" of ore, sometimes difficult to timber. The hard carbonate was lead carbonate mixed with silica and brown iron ore (limonite).

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WHERE a valid existing mining claim is included in a townsite, the owner of the mining location can not be deprived of any of his rights by those who settle upon his claim for the purpose of forming a town. Concerning this the Supreme Court of the United States has declared: "To such claims, though within the limits of what may be termed the site of the settlement or new town, the miner acquires as good a right as though his discovery was in a wilderness." Where the mineral character of land is known, the taking out of a townsite patent by the proper persons for the benefit of those living within the townsite, does not deprive mineral locators of their rights to take up and to work mineral claims within the townsite. In the case of Deffebach vs. Hawke, 115 U. S., 392, 405, 6 Sup. Ct. Rep., 95, the Supreme Court of the United States said: "In the present case there is no dispute as to the mineral character of the land claimed by plaintiff. It is upon the alleged prior occupation of it for trade and business, the same being within the settlement or townsite of Deadwood, that defendant relies, as giving him a better right to the property. But the title to the land being in the United States, its occupancy for trade or business did not, and could not, initiate any right to it, the same being mineral land, nor delay proceedings for the acquisition of title under the laws providing for the sale of lands of that character."

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BY "rawhiding" ore in British Columbia is meant the method employed in transporting ore in the winter time from the mines to the railroad or other point. The mountains are generally steep and covered to a depth of several feet with snow. The ore is sacked at the mine and a trail made along the mountain side leading from the mine to the shipping point. A large rawhide is selected and through the thick, tough portion of the neck two holes are made and into these are secured the traces or chains from the "singletree." The sacks of ore are placed upon the hide and a lasso or rope is laced back and forth through holes cut at intervals in the flanks of the hide. These are drawn up as tightly as possible, enclosing the sacks of ore, the number varying from twelve to twenty each weighing 100 pounds or over, according to the character of the ore. On a good trail from 1800 to 2000 pounds can be easily hauled by a single horse. In many steep places on the trail the horse has to hold back the load of ore, and the process is often dangerous. The transportation of ore by this method is inexpensive as it requires only a narrow trail which may be built on grades not permissible on a wagon road. There are usually several horses, each with his pack of ore, forming a train, sometimes several hundred yards long. One driver can care for three or four horses.

Transmission of Power by Ropes.

Written for the MINING AND SCIENTIFIC PRESS.

Running ropes, made of various kinds of material, have been used as a means for transmitting power for many years. There are two systems in general use—one wherein several ropes, each independent of the others, pass over two wheels, having a series of parallel grooves, a separate rope for each groove. This is known as the English system. The other is by means of au endless rope which passes several times over each of two-grooved wheels, the ends being carried over a third wheel, situated either betweeu the main pulleys or behind one of them. This third wheel is of the sheave type, having a single groove. It is usually affixed to a traveling carriage, and being adjustable is employed as a tightener. The tightener may be "fixed" after adjustment, or it may be made to operate automatically by means of a counter weight, which, while constantly holding the ropes tight, admits of a certain amount of flexibility.

The principal factors which favor rope transmission are a lower first cost, and lower cost of maintenance, provided the installation is properly made; the greater distance over which power may be trausmitted. The amount of power that may thus be transmitted is only limited by the amount of power primarily available. Generally a rope drive ruus more smoothly than auy other, owing to the greater flexibility of the rope, and consequent adaptability to varying load. They are also practically noiseless, which is presumed to be due to a great extent to the cushion of air in the bottom of the grooves, beneath the rope. One valuable feature of rope drives not obtaining with any other system of transmission of power, except electricity, lies in the fact that power may be transmitted at auy augle by the proper arrangement of the "third wheel," or tension sheave. The life of a good rope when employed under proper conditions as to construction and use is stated to be from three to six years, and in a few instances longer. The factors which make driving ropes short lived are: Defective design of construction; improperly turned grooves in the pulleys; too great a strain upon the rope; unsuitable size of sheaves; too small a rope for the amount of power required and running at too high a speed.

As between the two systems, English and American, the former is not adapted to vertical drives, nor in any place where the distance between the pulleys is not sufficiently great to cause the weight of the rope to form its own tension. This system cannot be operated to advantage where the inclinatiou of the rope between the pulleys exceeds 55° to 60° from the horizon. It is stated that a 2-inch rope running 2500 feet per minute will transmit by the Euglish system of individual ropes about 33 H. P. This was increased to about 50 H. P. when the speed of the rope was increased to 5500 feet per minute, but when run at 7500 feet per minute or over the amount of power transmitted did not exceed that transmitted at a speed of 2500 feet per minute. This is due to the fact that when in motion the tendency of each atom of a running rope is to move in a straight line. Any giveu point ou a running rope, when it reaches the sheave, has a tendency to continue to move in a directiou tangent to the circumference of the wheel. At high speed this teudency is greatly increased until the rope ceases to cling tightly to the grooves, and slips somewhat on the pulleys with a consequent great loss in its ability to transmit power.

The American system of single rope with tension sheave is adaptable to any angle, and a given amount of power may be transmitted with a smaller rope than by the multiple rope system employing the same number of grooves. The tension carriage always adjusts itself to the power and speed, and by this system a higher rate of speed may be employed without the loss of power incident to the English system running at the same speed.

When deciding upou the question of small vs. large ropes, the preference should go to large ropes with larger sheaves, rather than to a greater number of grooves on smaller sheaves with smaller ropes. The first cost of large sheaves will be greater, but eventually the economy of larger ropes aud larger sheaves will be demonstrated. Too great a weight ou the tension carriage is not advisable, for while it increases the adhesion of the rope, with a consequent higher percentage of power transmitted, the rope uuder these couditions will be comparatively short lived. Ropes must not be run either too tight nor too slack. With changes in the humidity of the atmosphere the rope will stretch or shrink. On damp days the ropes will shorten and create abnormal friction, ofteu causiug heated bearings, while during dry weather the ropes will stretch to such an extent that under high speed they are likely to leave the grooves. These conditions apply particularly to the multiple rope system, the single rope American system being always adjusted automatically by the tighteuer.

In the designing of rope drives there are numerous coufliciting factors. The manufacturing concern bidding for the work may lesseu the number of grooves and the size of sheaves to an extent rendering the factor for safety a very small one in order to be able to quote a low price. By a formula they can demonstrate that with a given size of rope, diameter of sheaves and speed of driving a stated amount of horse power may be transmitted. The rope manufacturer, from his standpoint, figures the conditions given by an entirely different, but also accepted, formula, aud arrives at a much lower result. He knows that small sheaves and few turns about them with high speed means short lived ropes, and his chances for selling a second rope to the same person under these improper conditions are slender. The aim should be in estimating transmission of power by ropes, not the greatest possible amount of power a rope may be made to transmit, but to ascertain the highest economy that is possible to derive from its use.

There are numerous formulæ for estimating power transmitted by ropes, but owing to the difficulty in arriving at some of them there is usually more or less variation in the calculations made ou any particular installation. The most important factor is the

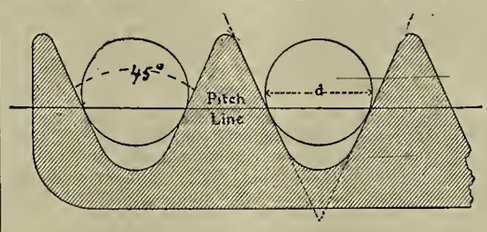


FIG. 1.

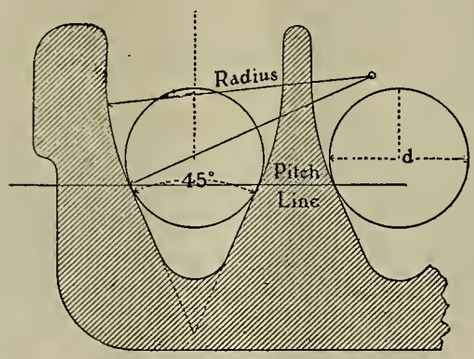


FIG. 2.

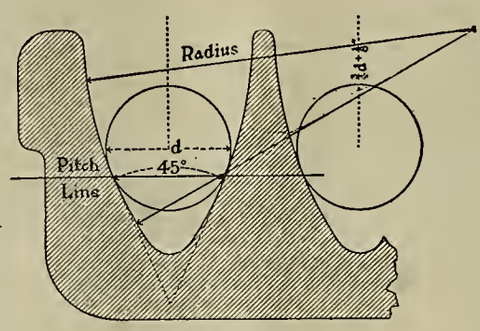


FIG. 3.

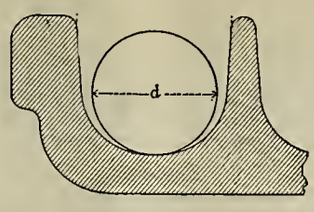


FIG. 4.

working tension which the rope must sustain. This is usually estimated at 200 pounds for a rope 1 inch in diameter. The following table is from Kent's Mechanical Engineers' Pocket Book:

Diameter of Ropes.	SPEED OF ROPE IN FEET PER MINUTE.											Smallest Diameter of Pulley in Inches.
	1500	2000	2500	3000	3500	4000	4500	5000	6000	7000	8000	
½	1.45	1.9	2.3	2.7	3.0	3.2	3.4	3.4	3.1	2.2	0	20
5/8	2.3	3.2	3.6	4.2	4.6	5.0	5.3	5.3	4.9	3.4	0	24
¾	3 3	4.3	5.2	5.8	6.7	7.2	7.7	7.7	7.1	4.9	0	30
⅞	4.5	5.7	7.0	8.2	9.1	9.8	10.8	10.8	9.3	6.9	0	36
1	5.8	7.7	9.2	10.7	11.9	12.8	13.6	13.7	12.5	8.8	0	42
1¼	9.2	12.1	14.3	16.8	18.6	20.0	21.2	21.4	19.5	13.8	0	54
1½	13.1	17.4	20.7	23.1	26.8	28.8	30.6	30.8	28.2	19.8	0	60
1¾	18.0	23.7	28.2	32.8	36.4	39.2	41 5	41.8	37 4	27.6	0	72
2	23.2	30.8	36.8	42.8	47.6	51.2	54.4	54.8	50.0	35.2	0	84

In the case of temporary installation the work may be largely increased—to nearly double that given in the table.

Another factor in the transmission of power by ropes is the sag of the rope between the pulleys.

The wear on the rope is the same whether the distance between the pulleys be great or small. Where both the driving and driven pulley are the same size the grooves should have the same angle of pitch, but where one pulley is smaller, that pulley should have 45° grooves and the larger pulley may have a 60° angle.

The following table, also from Kent, gives the diameter of pulleys and weight of rope best suited to accomplish given results:

DIAMETER OF PULLEYS AND WEIGHT OF ROPE.

Diameter of rope in inches.	Smallest diameter of pulley in inches.	Length of rope to allow for splicing in feet.	Approximate weight in pounds per foot of rope.
½	20	6	.12
5/8	24	6	.18
¾	30	7	.24
⅞	36	8	.32
1	42	9	.49
1¼	54	10	.60
1½	60	12	.83
1¾	72	13	1.10
2	84	14	1.40

With a given velocity of the driving rope, the weight of the rope required for transmitting a given horse power is the same, no matter what size of rope is adopted. The smaller rope will require more parts, but the weight will be the same.

The size and shape of grooves is important. In the early history of rope driving many different kinds of grooves were tried as an experiment, and of these there are two forms of recognized merit, the "V" shaped groove with straight sides and the "V" shaped groove with curved sides. Besides these there are other forms slightly modified from them. The "U" shaped groove is used for idler pulleys and sometimes for the multiple rope system. The relation of groove to size of rope must be such that the rope shall never touch the bottom of the groove. Eugineers differ somewhat as to the best angle to give grooves, both 45° and 60° having their adherents, but 45° is generally recognized as giving satisfactory results.

The accompanying sketches show four forms of grooves. Fig. 1 shows the straight "V" shaped groove. Fig. 2 the "V" groove with curved upper portion and straight lower portion. Fig. 3 shows the "V" groove curving from top to bottom of the groove. Fig. 4 shows the "U" shaped groove used in the idle pulleys.

Sinking a Steel-Lined Shaft in South Africa.

In the course of his paper, presented to a recent meeting of the South African Association of Engineers, says the Johannesburg Star, E. Williams said he was consulted as to the best method of sinking a shaft on the property of the Free State Colliery Co., Ltd., on the Taaibosch Spruit, near Viljoen's Drift, in the Orange River Colony. Several attempts had been made to sink shafts through the sand which covered practically the whole of the farm, but owing to the volume of water met with every effort had been unsuccessful, and it was found impossible to get down by ordinary means. Wooden caissous were tried, but proved unsuitable owing to the masses of clay occurring in the sand. It was difficult and costly to get a plant suitable. The cheapest and quickest method appeared to be to sink steel cylinders, and this was adopted. T. Begbie & Co. undertook the construction. The cutting edge on the first or bottom section was machined before the plates were bent to sweep, and the construction of the sections was as simple as possible. A simple flanged joint with an ordinary gasket wrapped with tarred flannel was adopted, and ½-inch bolts and 8-inch ceuters were used. The chief difficulty anticipated was the layers and masses of clay occurring in the sand, which would certainly impede the travel of the cylinders, and owing to the irregular occurreuce of the clay it was realized that special provision had to be made to ensure the cylinder going down vertically. To guard against any difficulty in that respect a strong frame was erected over the shaft. The sections were brought under the frame, and bolted to the top already in position. Then the runners were suspended by turn buckles, with long screws, to the top of the frame. Following this the hydraulic jacks were started, the thrust being taken by the weighted top beams, and the weight of about 150 tons of old rails, was found sufficient to take the pressure necessary for forcing down the cylinder. Often a small segment of the cutting edge would meet the clay, and then the jack immediately above got more pressure than others. The pumping of water and winding of sand would soon liberate the clay, and then that side of the cylinder was liable to run ahead. This was guarded against by keepiug the hanging screws just on the slack when the jacks were exerting pressure. It took about sixteeu weeks to sink the cylinder and complete the work to the shale bed. When that was reached the cylinder was pressed into the shale by the full weight of the loading. The shaft was kept fairly clear of water, and then boys picked a chase in the shale to allow the cylinder to

travel. This was continued for a distance of 36 inches, when a tarred flannel bed was made, and the cylinder pressed hard on it. The work was carried on by the manager, W. Blake, in an expeditious manner, and he had many difficulties to overcome in this bit of pioneer mining.

In Clear Creek County, Colorado.

The East Argentine district of Clear Creek county, Colo., is one of the most interesting in that State. In this district the Vidler tunnel is projected to cut through the range of mountains beneath Argentine pass, which is at an altitude of 13,000 feet above the sea. The accompanying illustration is that of McClelland mountain, which well illustrates the rugged topography of the country in that district. The canyon is known as Leavenworth gulch. The Colorado Central mine, which has a record of $10,000,000, appears in the central portion of the engraving. Clear Creek county is one of the first producers of the State, the first placer mine located in Colorado having been taken up in that county. The geological formation of the county is described as consisting principally of granite, gneiss and schist, traversed by eruptive dikes of various kinds. The veins are mostly clean cut fissures, with definite walls, and seem for most part to have been formed subsequent to the intrusion of the dikes, often being found in contact with a dike. Although the veins are generally clearly defined, pay ore is often found in the wall rocks adjacent to the veins in the form of local shoots, due to impregnation of the wall rock with gold and silver-bearing base metal sulphides. The vein material itself is altered country rock, which has been fractured and ground up between the moving planes of the walls, the mineral solutions subsequently depositing the sulphides with the gold and silver in the interstitial spaces, besides depositing large quantities of quartz and other minerals by replacement of the pulverized country rock of the vein.



McClelland Mountain, East Argentine District, Clear Creek County, Colorado.

Glassy volcanic rocks like obsidian, vitrophyre, pearlite and pumice are not gold bearing, as far as known. Gold is found in a great number of igneous rocks, but has never been recognized as an original constituent of such rocks. It is generally believed that the gold found in igneous rocks has been deposited from waters carrying gold in solution.

The Needs of the Miner.

To the Editor:—In your issue of Nov. 28th you note the fact that bills are pending in Congress to establish "mining experiment stations," etc. You say: "While the idea of experiment stations is one worthy of consideration and may prove of decided benefit to the mining industry, the plan outlined in the bill is clearly an invasion of the field now occupied by the numerous assayers and chemists throughout the country, and would result in driving some of them out of their profession."

What you say is true to a certain extent, but our Government is for the greatest good to the greatest number, and not for the benefit of the few. Apply your reasoning to the fish hatcheries and farming experiment stations. Could not private individuals carry on these enterprises, and with profit to themselves? Look at the distinction made between the farmer and miner in getting Government land. The Government, at its own expense, surveys the land for the homesteader, and gives him 160 acres of land for the sum of $26.50, local land office fees. Then the Government spends millions each year to find out the cure for chicken pip, hog cholera, mouth and foot disease of cattle and horses, selecting and experimenting with seeds for the farmer, sheep scab, etc., all of which goes to the farmer for asking. Millions are spent in improving the rivers and harbors so that the farm products may reach the markets cheaply. How does the miner fare? He has to go to the wilds, delve in the mountains and hillsides. If he finds indications of mineral, he has to, at his own expense, stake out and set up his boundary lines and corners. For $26.50 and five years' residence the farmer secures 160 acres. The miner himself has to work out, or hire it done, $500 for from 10 to 20 acres, according to the law of the State in which he is, to get a right to apply for a patent for his claim. During this time he has, perhaps, paid out to an incompetent assayer (?) from $50 to $100, and then does not know for a certainty whether he has correct assays or not. I know of a case where a miner spent four years on a claim that he thought was a copper mine. He had for four years been getting assays showing 11% to 12% copper. At last he met a man who was a first class chemist and assayer. He had him make some assays, and he got one-twelfth of 1% copper. The miner could not believe him. He then took five samples of the pulp and sent them to five leading assayers in the United States, and the returns from each and every one of them showed one-twelfth of 1%. The miner then said: "I wish I had met you sooner. I have put in four years' work on this claim, have spent over $100 for assays, and now I find out that the assayer (?) was giving me false assays." Had there been such plants as the bills in Congress call for, for a small sum this miner would have found out at once that he had no copper mine. Again, there was a man running a team who took up a claim. He found rock that carried gold. He took samples from time to time to an assayer (?), who reported $44 to $46 per ton. He sold his team, hired men to get out a carload of ore for the smelter. When the ore arrived the smelter found that it ran about $4.50 per ton and called on him to pay smelter charges before they would treat it. The miner, having lost his all, went insane and was taken to the insane asylum, and there he died. The assayer who gave the big assays is strongly opposed to these bills in Congress, as it will put him out of business. It was from a knowledge of these facts that I prepared the bill now under discussion. Then, again, the rocks here and elsewhere contain by-products that are worth as much or more than gold or silver. Ordinarily the assayers that are scattered throughout mining districts can only assay for gold and silver. With these stations established, a miner would know all the minerals in his ore, gravel or cement. It was for this purpose, and with no thought of private assayers, that the bill was prepared.

I will now go back to the miner after he has done his assessment work and is ready to apply for patent. He has to look up a deputy United States mineral surveyor and make a contract with him to do the surveying. He then has to send $30 to the Surveyor-General. He gets his order for survey, and has the survey made at a cost of from $75 to $150. Then, he is out from $10 to $30 getting his abstract, certified copy of certificate—one certificate from the United States court and one from the State court—that no suits are pending; then $10 to the railroad for their fees; then from $35 to $50 for advertising, and finally $5 per acre and the same for the thousandth part of an acre. Then add attorney's fee of from $40 to $75, and there you are. Say his claim is 20 acres—the limit—and with his preliminary and assessment work he is out at least $550. Add the minimum charges above, and he is out $800, or $40

per acre if it is a 20-acre claim, and $80 per acre if it is a 10-acre claim. How does this compare with the farmer's 160-acre claim for $26.50, and who gets a profit each year from his farm? The miner gets no income in the time he is working—his is all outgo.

I make this statement to you because your paper, I think, does more for the miner than any paper I know of. The information in each of your issues is worth far more than the price of the paper per annum. Seeing that you take such an interest in the miners is my apology for writing this to you, so that you may know the cause for the bill now in Congress.

Trusting that you will receive this in the same spirit that actuates the writer in writing to you, I submit the same for your candid consideration.

Deadwood, S. D., Dec. 4. JAS. A. GEORGE.

Notes on Quartz Milling on the Rand.*

NUMBER II—CONCLUDED.

Discussion of paper by FRASER ALEXANDER.

Mr. Wilkes advocates removing the amalgamating tables to the cyanide works and I fully agree with him, though not only for the reasons he gives, that they should be removed from the mill wherever they may be located. In the first place, the mill is essentially a crushing machine, and should be regarded as such only; in the second place, the greatest improvement in amalgamation, an improvement that may have the most astonishing results, will occur when classification of the pulp takes place previous to amalgamation, and when the tables are specially adapted in size, grade and form to deal in the most efficient manner with the varying products produced. I do not propose to go into the details of the advantages of such a scheme on this occasion, but, to give an instance, the excess water that is necessary to obtain a high stamp duty would no longer be a source of danger to amalgamation, and the duty and recovery would be simultaneously increased.

Mr. Durant quotes figures given in a paper of Edward Chester's, where he says that crushing through a 100 mesh screen only 13.7% of the total product remained on a 900 (30 linear) mesh screen. On the East Rand Proprietary Mines we have found that crushing through a 1000 mesh screen with a 2-inch discharge the following results were obtained:

Remained on 40 screen	34.20%
Remained on 60 screen	27.00%
Remained on 90 screen	7.70%
Passed 90 screen	31.10%

These figures do not at all agree with those quoted by Mr. Durant.

In conclusion, I again desire to confirm what has already been stated, that the high values in the residues are the direct result of the mill work. Many experiments after treatment have shown that all the accessible gold has been dissolved and that only a more complete crushing will enable a better recovery to be obtained. I have heard it stated more than once that of the gold the mill loses, only 85%, may be expected to be recovered in the cyanide works, and millmen have been urged in consequence to catch all they can on the plates. This is, I think, misleading, as any gold that is in a state possible to be caught by amalgamated plates is also in a state to be easily and completely dissolved by the cyanide treatment. Naturally, the exception to this is very coarse gold, but since touching our deeper slopes coarse gold seems to have practically disappeared, and, in any case, it is not the material liable to be lost from the mill through careless amalgamation, and I maintain that any such indifferent amalgamation will not affect our residues to anything like the same extent as imperfect crushing. By imperfect crushing I mean the imperfect crushing of the gold-bearing portion of the rock.

Mr. Alexander: In replying to the many admirable contributions sent in criticising my paper published in the Journal, I must say that I am disappointed in not having had a fuller discussion on some of the more vital points, such as inside versus outside amalgamation, fine versus coarse crushing, etc., from men who have tried both.

I agree with Mr. Roskelley's remarks about the construction of a modern mill, tending rather to follow in the ruts of the ancient stamp mill, and I believe our mechanical engineers only require such intelligible explanation of faulty construction as contained in Mr. Roskelley's remarks to speedily remedy this.

Speaking of the relative merits of crushing with a 700 and 1000 screen, I fully agree that more should be crushed through a 700 screen. Strange to say, this theory is not always borne out in actual practice, hence my remarks that the screen alone is by no means a final factor regulating fast crushing.

It is seen from experiments that the ratio of water to ore crushed plays an important part in fast crushing. My recommendation of 6 inch discharge through 1000 screens with six to one water is found in actual practice to yield the most efficient results, the discharge being lowered where coarser screens are used.

The sliming of ore need trouble millmen very little, in fact, it does not cause anything like the annoyance or bad extraction resulting from the bursting of a screen for instance or partially crushed material, so commonly the bugbear in concentrates.

Mr. Roskelley's views re inside amalgamation are doubtless perfectly correct, but how many millmen on these fields persistently follow an antiquated practice simply because it was done twenty years ago, regardless of the waste of both gold and mercury, resulting from this most unreasonable practice of trying to catch gold—(1) at the cost of all accurate record, (2) the loss of at least 50% of the mercury used in the mill, and many other disadvantages.

There is little doubt that the rock breakers are not always made to do their fair share of the preparatory work, and this defect is often traced to the inaccessible position which they occupy in the crusher station.

I am of the opinion that the contamination of gold with mercury tends to encase the gold particles, and certainly does retard extraction by cyanide. That a very considerable quantity of partially amalgamated gold escapes from the battery is sufficiently proved by means of side shaking tables, which catch about 300 ounces of gold from a 30-stamp mill per month. I presume, were it not for these extraordinary tables, this amount would have gone to the treatment tanks, and a recovery of about 30% only obtained, which bad recovery would be debited to the faulty work of the cyanide process, whereas in reality the mill is at fault. It is not too much to say that where inside amalgamation is practiced a loss of mercury equalling 2000 ounces per month will result from 100 stamps if this mercury carries only 2% in gold. By the time it reaches the treatment tanks it would mean 40 ounces, from which only 12 ounces, or 30%, can be recovered at best.

In answer to Mr. Pead's question of duty per stamp through a 1000 mesh screen which I mentioned in my paper, I was not at the time aware that this duty was at all exceptional. My figures were taken from the actual results obtained at the Ferreira Deep, Ltd., over six consecutive months' run. I might mention that special light screens were used which from later experiments appear to account for an increased duty equal to .2 ton per stamp per day over the ordinary light gauge.

I do not think there is any difference in the rock on this mine from that of any other deep level, nor can I define any special system of milling.

In reducing the height of discharge to suit the screen, or vice versa, the specific gravity of the crushed material must play a most important part. As we crush in water, I think it will be easily seen that where the screen is fine the maximum splash would give most beneficial results, the specific gravity allowing the rise of the fine material in water. We can only obtain this heavier splash with sufficient water in the mortar box and 6 inches appears from actual work to meet the case.

Where coarse screening is used it would retard fast crushing, as the heavier particles will not so readily rise to the face of the screen in this large amount of water.

I believe that the present position of the amalgamating tables is wrong.

1. The vibration caused from the constant falling of the stamps is likely to cause the quicksilver gradually to work off the plate.

2. When the plates are being cleaned the stamps must be stopped, causing a delay of thirty minutes per twenty-four hours for each table of five stamps, which means a complete stoppage of the mill for fifteen hours in each month, whereas the pulp might easily be divided over nineteen tables when one is being dressed or scraped.

3. A similar platform to that now used to walk on at the foot of the plates might with considerable advantage be employed close up to the mortar boxes, from which the millmen could easily change screens and generally work their boxes.

4. Amalgamation would become a more scientific process in its relation to the technical requirements of modern gold mining.

*Abstract Jour. Chem., Met. and Min. Soc., S. A.

Iron Mountain, Durango, Mexico.

There is a solid mass of iron ore close to the International railroad depot at Durango, known as Iron mountain, which has been known ever since the Spaniards and the Mexicans from the south first reclaimed this region from savages over 300 years ago. In 1803 Baron Humboldt, who did not reach Durango in his explorations, but who had seen samples from this mass of iron, said of it that it was an "enormous mass of malleable iron and nickel, whose composition is identical with that of the aerolite which fell near Agran in Hungary in 1751. It is asserted that this mass at Durango weighs nearly 1900 myriagrams, or 400 times as much as the aerolite discovered by M. Rubin de Celis in Olumpa, Tucuman." Humboldt evidently thought that this might be the world's greatest aerolite. Geologically, examination shows it to be a dike, emerging from a rocky plain at the elevation of 6300 feet, rising from 400 to 650 feet in height itself and forming a mass of iron ore 1 mile long and one-third of a mile wide. It has been calculated to contain 500,000,000 to 660,000,000 gross tons above the surface, with no notion of what may be below. The ore is a hard specular hematite, carrying on an average 60% of metallic iron, much of it going higher and some even to 67%. It is said to be suitable for practically all processes of iron and steel making.

The Mexican National Iron & Steel Co., an American concern, claims about one-half the mountain, but has never until lately been a paying concern. Charcoal can be obtained near here, made from the timber on the Sierras to the westward, but its production has always been limited and relatively expensive. Coke was formerly brought from the United States and at such prices that the marketing of the company's iron products in Mexico, except at near-by points, was, when the high freight rates were added, very commonly at a loss, or no gain, in competition with American iron products. Mexican coke is now obtained and at considerably lower prices, and facilities are being added for an increased output. The steel plant has not yet been added to the plant.

A New Zinc Field.

That southwestern Wisconsin is likely to have considerable economic importance as a center of the zinc industry is a fact that is not generally realized. It will be news to many to learn that twenty-one concentration mills have been erected in that district in the last two years, and that seventeen of them were in active operation during the last summer. Deposits of lead have long been noted in southwestern Wisconsin, northern Illinois and northeastern Iowa, and some work has been done toward their development, but owing to the discovery of extensive zinc beds below the lead formations, the district has recently become doubly interesting. The ore is not so clean as that found at Joplin, Mo., as it carries a considerable quantity of iron, and for this reason it received at first no particular attention. Improved metallurgical processes have, however, shown that this district contains a large reserve supply of zinc ore. This fact gives especial significance to the co-operative studies of the district that were made during the last summer by the United States Geological Survey and the Wisconsin Geological and Natural History Survey. The first organization was represented by H. F. Bain, and the second by U. S. Grant of the Northwestern University at Evanston, Ill.

The particular feature of the State Survey's work was that of making topographic and geologic maps on a large scale. Years ago, before the discovery of the underlying zinc beds, the State Survey did some geologic work in the district with special reference to the lead deposits. The maps resulting from that survey were drawn on a scale of a half inch to a mile. The field sheets of those made during the last summer were on a scale of 8 inches to a mile, and the printed sheets 4 inches to a mile, thus offering increased opportunity for elaborate detail and finish.

Mr. Bain's special work was the study of the ore deposits of the district. The results of his investigations will probably be published by the United States Geological Survey in a report that will be merely part of a more comprehensive work on the lead and zinc deposits of the Mississippi valley.

Three processes of separating the zinc from the iron ore are at present in use in southwestern Wisconsin. The Mineral Point Works of Mineral Point, Wis., the property of the New Jersey Zinc Co., is one of the few plants in the country where what is known as the "contact process" of manufacturing sulphuric acid is employed. This process minimizes the cost of the acid and allows the use of mixed ore. The fumes were formerly confined in lead-lined rooms, about 20 cubic feet of space being required per pound of sulphur burned per hour. By the new process these chambers are discarded, and other improvements have been made. The result is that the Mineral Point Works are now able to treat a grade of ore that they formerly refused to buy.

The roasting process, which is the second means of separation in use, is one that has lately been widely applied in Colorado. It consists of roasting the ore until the iron becomes magnetic and then picking it out with magnets.

The third process, which was likewise developed in Colorado, is an application of the principles of static electricity to the concentration of ores. The direct effect is the opposite of that produced by the magnets in the roasting process, for the electricity repels the zinc instead of magnetizing the iron, but the process results, in both cases, in the separation of the minerals in the ore. The electrical method is simpler and cheaper. The expense of roasting the ore, which amounts to about $1 per ton, is saved. In addition to the zinc blende, an iron sulphide is also obtained, which is sold to the manufacturers of sulphuric acid, so that the process thus affords a valuable by-product.

The zinc industry in southwestern Wisconsin would seem to have passed the experimental stage. Some of the mines have paid well. The mineralized area extends into northern Illinois and Iowa. In Illinois four or five mines are being developed and a little ore has been sold. In Iowa all the zinc properties are still in the development stage.

Electrically Driven Power Pumps.

The Aldrich horizontal quintuplex pump, built by the Allentown Rolling Mills, is illustrated in the accompanyiug engraving, Fig. 1. By reason of the large number of cylinders it delivers its discharge in a uniform stream at a velocity not exceeding 3 feet per second. The pump has five single-acting plungers operated from one crank shaft, the cranks being set 72° apart angularly. The working load being divided among five plungers, the liability of breaking bottom chambers, gears, cranks, etc., it is claimed, is much less than if the work were done with two or three plungers, and that the working barrels and valve chambers subjected to the working pressure are similar and relatively smaller than would be the ease with fewer cylinders. The motor is set in the center of a massive base, bolted to the bottom housings, and the shafts are extended on each side and back of piuions and outboard bearings. The power is transmitted to the crank shaft by two gear pinions, each of which is said to be stroug enough to do the eutire work. The crank shaft is made from open-hearth cast steel claimed to have a tensile strength of 60,000 pounds per square inch, and of such size as to give a total strength of fifteen times the maximum load. The conneetiug rods are fitted with bronze adjustable bearings at each end, and the length of the rod is four times the length of the stroke, whieh reduces the angularity and consequently the pressure upon the guides below that usually obtained. The main journal box is made in three parts, giving side and top adjustments. The plungers are east on end and ground perfectly straight and eylindrical. The working barrels are separate castings and contain the bronze valve seats whieh are readily aecessible through covers held in position by hinge bolts. The valves are leather faced with a bronze baeking and the water area is said to be sueh as to reduce the veloeity of flow to less than 3 feet per second. In order to make the pump as nearly automatic as possible the housings are cast with an oil case, and this is partly filled with oil, into whieh the conneeting rods dip at eaeh revolution. There is also attaehed a small radial oil pump which forees the oil from the oil case to eaeh of the bearings, whenee it turns back, thus keepiug up a continuous oiling process.

Fig. 2 shows the Aldrich vertieal quiutuplex pump, which is built to a great extent upon the same lines as the horizontal quiutuplex, and is calculated for working lifts from 500 to 1400 feet.

Fig. 3 illustrates the arrangement of the Aldrich triplex pump for operation with two direct-eurrent motors and is said to be especially suitable for eouditions where it is desired to have a variable capacity pump. When the electric eurrent passes through the motors in series the speed and eapacity of the pump will be half its normal flow, while if the eurreut is passed through the motors in parallel they will run at full speed and give its maximum capaeity. The motors ean be supplied with field rheostats, eontroller, switehes, etc., so that it would be possible to pump one-quarter, one-half, three-fourths or full capaeity without reducing the effieieney of the motor. One of the great objections heretofore raised to electrically driven pumps has been that the operator could get but one speed and there would therefore be no surplus of capacity, but this objection is said by the makers to have been overcome in the construction of the pump shown in Fig. 3.

Messrs. Harrou, Rickard & McCone, of San Fraucisco, Cal., represent the Alleutown Rolling Mills on the Pacific coast, aud have during the past six months installed several of them in large pumping plants throughout California. Two 6x12 horizontal quintuplex and one 9x12 vertical triplex are now in operation at the Brunswiek Consolidated mine at Grass Valley. One 9x10 vertical triplex is used by the North Shore Railroad in their works at Sausalito, Cal., and one 4x12 horizontal quintuplex is now ready in the East to be installed at the Oneida mine, near Jaekson, Amador county, Cal.

Messrs. Harron, Riekard & McCone will furnish any information which those iuterested may desire, upon reeeipt of inquiry.

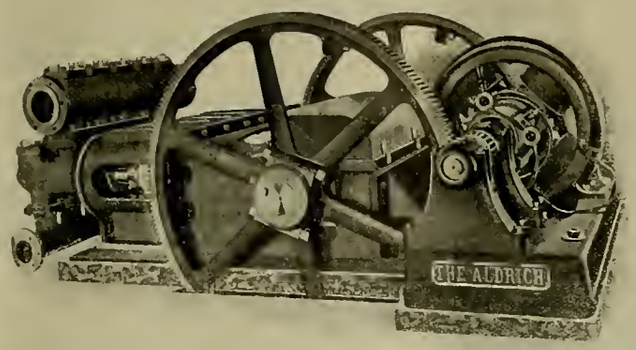


Fig. 1.

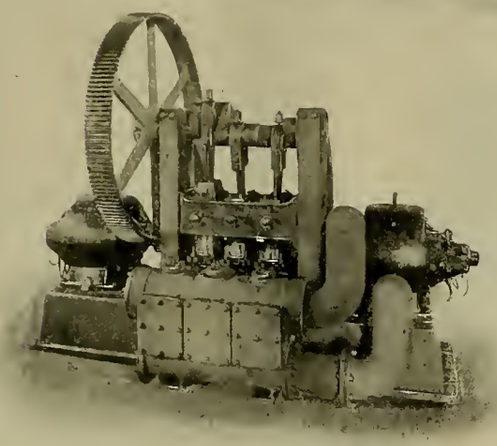


Fig. 2.

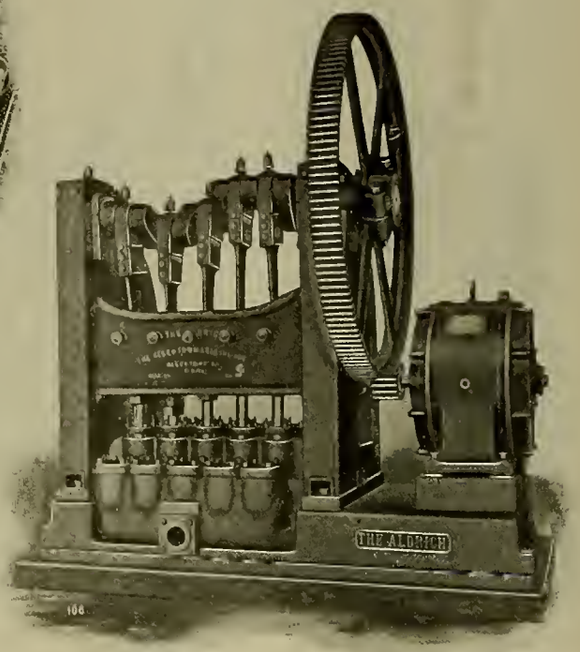


Fig. 3.

Sectroidal Relay Governor.

The sectroidal governor, mauufactured by the Replogle Governor Works, Akron, Ohio, is designed espeeially for impulse water wheels where the gate rigging is nieely balanced or does not operate too elumsily. It can operate defleeting nozzles, hood uozzles, throttle valves and butterfly gates.

It embraces the relay principle, that is, it works by installmeuts, eutting itself out automatically every time it operates, to prevent hunting or raeing, it being held that water wheel regulation of a reliable eharacter ean be provided by the use of this relay priuciple in the governor. With a wheel and governor given, the regulation or government depends entirely on three conditions.

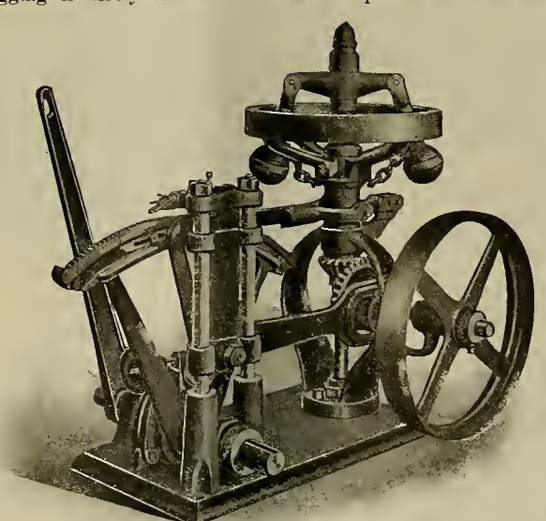
First—The limits of time that governor may have to move gates. This time is solely determined by the conditions under which the wheel must operate, that is, the pressure and volume of water in the pipe. Changes in flow must not be made too rapidly, or the pipe line will be endangered by the vacuum or the water ram that occurs when the water starts too suddenly or stops too suddeuly. Great care and good judgment must be exercised regarding the time of permitting the governor to open the gates.

Second—The relative changes iu load are a great factor in governing. It often occurs that the owner of a water wheel wishes to change his power or load faster than he dare ehange the water supply from his pipe. Small ehanges of load, that gravity ean compensate for readily, are not very difficult to govern, but when comparatively large changes must be made in load, theu the third and last of these eouditions must have special attentiou, as it alone makes such goverument possible.

Third—(Momentum or power storage of the revolving maehinery). As it requires power to give motion to the revolving maehinery, it requires additional power to increase its motion, and when the speed is deereased power is given out. The heavier the machinery the more power it will absorb in an iucrease of speed, or give out in a deerease of speed.

The relay works in eonjunction with the momentum or power storage in government. The relay deviee causes the governor to automatieally slow up the maehinery when the load is inereased or the gate opened. There should be suffieient power given out in this slowing proeess to earry the increased load until the effects of the inereased flow of water ean be added to that already at work, eonsequently when greal ehanges of load must be imposed on a water wheel there must often be added sufficient weight of flywheel to store the power neeessary to g overn for such changes in load. The weight in machinery that gives out power in adding a load will absorb power when the load is cut off, until the governor has elosed the gate or shifted the nozzle.

The governor pulley must ruu 120 revolutions when the water wheel runs at its proper speed. Further information will be given by the manufacturers upon erquest.



Sectroidal Relay Governor.

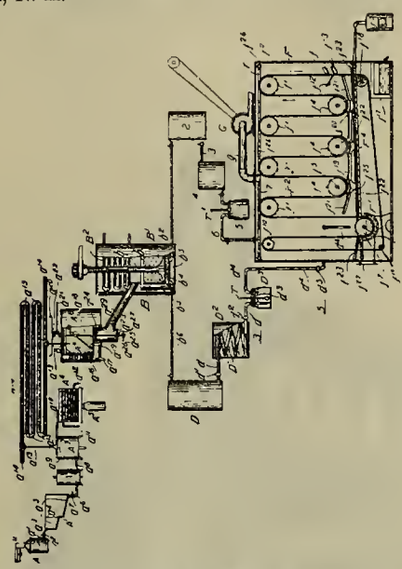
Drilling in raises should be less expensive than in shafts or winzes, unless there be too mueh time lost in taking machines up into the raise or lowering it on completion of a round of holes. By eonstrueting a strong platform under the back of the raise, and beneath it arranging a second platform for the drill and other tools when through drilling, mueh time may be saved in handling the maehine. Blocks should also be used in handling timbers if they are too heavy to be handled easily. The saving of time by providing the proper means for handling materials and tools will greatly reduee expenses in mining.

Mining and Metallurgical Patents.

PATENTS ISSUED DECEMBER 1, 1903.

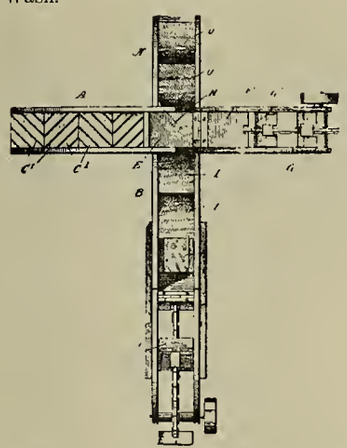
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

CONCENTRATING APPARATUS.—No. 744,823; G. R. Tucker, Boston, Mass., and G. W. Goddard, Concord, N. H.



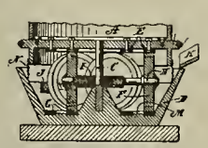
In concentrating apparatus, combination of closed casing, gas inlet port and gas outlet port with receptacle within casing for liquid material to be concentrated; device for continuously removing from receptacle into chamber of casing sheet-like portions of liquid material; means for creating and maintaining a current of gas through casing; means for removiug concentrated material from removing device; meaus for flushing side walls of casing, and means for returning flushing material into receptacle.

GOLD SEPARATOR.—No. 745,949; M. C. Wright, Sultan, Wash.



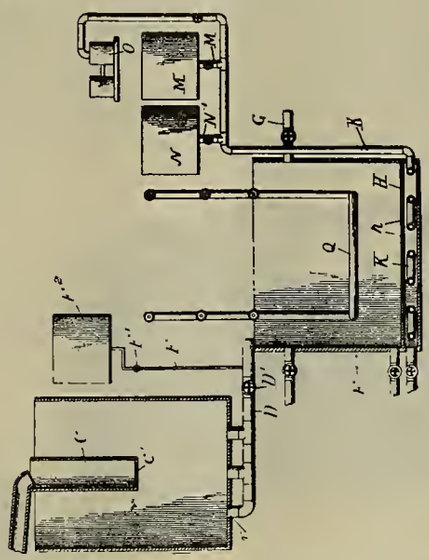
Gold separator, comprising flume for connection with discharge end of sluice box, inclined slatted bottom in upper portion of flume, steeply inclined bottom leading from lower end of slatted bottom, chamber below slatted bottom having inclined solid bottom; second flume at right angles to first flume into which inclined solid bottom of chamber discharges, second flume being set in an inclined position, reversible angular portion set in second flume at discharge of first flume to deflect gold-bearing sand in downward direction in lower portion of second flume, and gold-collecting boxes set in second flume having tops formed of fabric material.

ORE CRUSHING MACHINE.—No. 745,710; H. Yarnell, Pasadena, Cal.



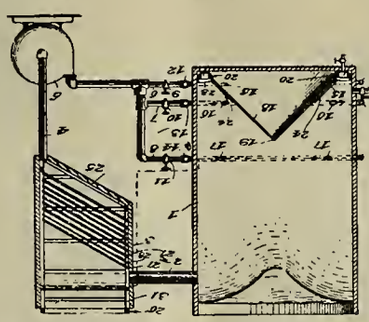
In ore crushing machine, two sets of revolving circular traveling crushing rolls, traveling on treads of different diameter, one set traveling intermediate to the other set, treads for rolls, amalgamating trough intermediate of treads, and means to impart motion to rolls.

PROCESS OF EXTRACTING PRECIOUS METALS.—No. 745,490; T. J. Grier, Lead, S. D.



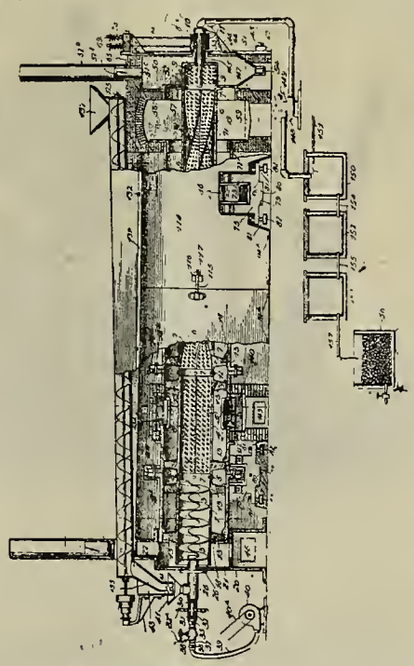
Process of extracting precious metals from slimes, consisting in subjecting slimes to action of cyanide solutiou, whereby watery portions of slimes may be displaced by cyanide solution, latter being of greater density than water of slimes, then treating charge with compressed air and afterward displacing cyanide solution with salt solution of greater density than cyanide solution.

APPARATUS FOR TREATING ORES.—No. 745,472; W. H. Adams, Jr., Los Augeles, Cal.



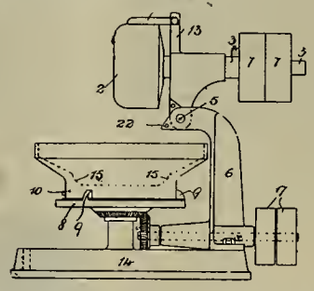
Combination of tank, box, pipe at top of tank connecting same with box, pump connected with box, aud nozzles connected with pump and arranged to discharge liquid into tank at intervals tangentially in approximately horizontal plane.

ORE ROASTING FURNACE.—No. 745,765; A. M. Beam, Denver, Colo.



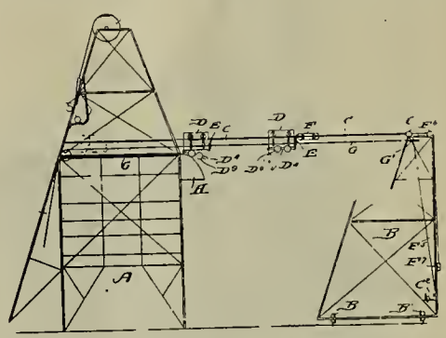
In ore treating furnace, combination of combustion chamber, stack chamber, and revoluble roasting cylinder comprising ore cylinder and flue cylinder surrounding ore cylinder, flue cylinder communicating with combustion chamber and stack chamber and ore cylinder extendiug through combustion chamber.

MORTAR AND MULLER FOR GRINDING, CRUSHING AND MIXING ORES, CHEMICALS, ETC.—No. 745,416; T. Breakell, Wirksworth, England.



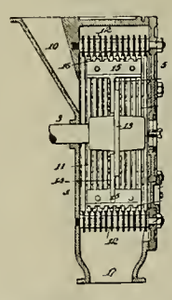
Grinding machiue comprising rotary pan or mortar having flat bottom surface surrounded by upwardly projecting curved rim and conical extension or outer rim, rotary muller eccentrically mounted in pan and provided with flat bottom surface and curved lower edge adapted to correspoud with curved rim in pan and means for positively rotating pau.

ORE CONVEYOR.—No. 745,368; A. McCain and T. C. Grierson, Evcleth, Minn.



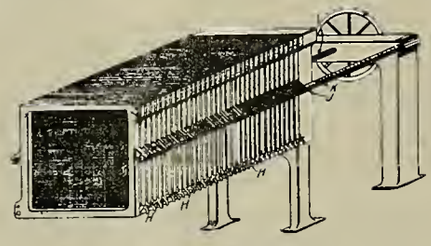
Device comprising inclined track, buffer, rollers carried on each side of buffer and traveling on track, rollers arrauged below first mentioned rollers and engaging under side of track, pulley arrauged in rear of buffer, cable passing over pulley and connected at one end to buffer, weight attached to lower end of cable, stop, and lug on cable engaging stop and limiting movemeut of buffer in one direction.

PULVERIZER.—No. 745,705; W. M. Wheildon, Boston, Mass.



In pulverizer, combination of inclosed casing, series of rings or diaphragms mounted in casing side by side to form pulverizing chamber having peripheral slots, each ring being formed with outwardly flaring inner face, whereby minimum space between rings is coincident with inner faces, shaft extending into pulverizing chamber, and plurality of pulverizing paddles mounted on shaft.

PROCESS OF EXTRACTING METALS FROM ORES.—No. 745,828; E. B. Hack, Denver, Colo.



Process of treating ores, consisting in forming pulp into cakes and subjecting cakes to leaching action of suitable solution in presence of compressed air which is introduced simultaneously with solution and contiuued during leaching operation.

Thunder Mountain District, Idaho.

Written for the MINING AND SCIENTIFIC PRESS by A. E. BORTHWICK.

The Thunder Mountain mining district in central Idaho comprises abont 5000 square miles of high rugged mountain territory, draining northward into the Salmon river. Roosevelt is the ceuter of the most numerous and active mining operations, and is the only postoffice in the district. Mail delivery is three times a week. Under the wiuter schedule, in force since Nov. 1st, six days are allowed each way from Idaho City, 130 miles south. To Warren the nearest established wagon road is 70 miles northwest, to Custer is 85 miles southwest, and to Salmou City is 115 miles east. The State wagon road, now uuder construction to this place, is used to within about 55 miles of there, where transfer is made to pack animals. Packers have been getting 10 cents a pound for bringing goods in from the transfer point. Few of the stores here arc sufficiently stocked for the winter, and there is liable to be a shortage in provisions before the trails are open in the spring. Suow has alrcady commenced to fall, and thero is from 4 to 8 iuches on the passes. One day's storm will close them probably for the winter. It is not safe to count on using the trails for horse travel earlier than the middle of May, owing to the deep snows on the summits, some of them being at au altitude of 8000 feet.

Over these trails for 100 miles or more have come the supplies and machinery used in developing some of the mines that are included in this great zone of porphyry and quartz that borders both sides of Monumental creek from its head, 6 miles above, to Taylor's cabiu, 12 miles below Roosevelt. Within this area there arc great belts or intrusious of granite, diorite, phonolite, etc., but it is in the great porphyry deposit, in colors white, yellow, red and blue, that the quartz and gold-bearing veins occur.

In the rush of 1901–02 thousands of claims were staked and recorded, many of them iu country rock, with no showing of quartz or ore. Capital bas demoustrated that, while there are barren areas in the porphyry, there are also great deposits within it of quartz porphyry that give from $2 to $8 per ton in gold, and often higher, up to $20 and $30 per ton. As tbe ores are nearly all free milling, and usually very cheaply mined and treated, even $2 ore in the quantities that prevail may be made profitable when properly equipped and worked.

The Dewey Co. has had a 10-stamp mill running all the season. It does not save its tailings or concentrates, nor use tables, and the amalgam plates are on a steep grade. The quicksilver on the plates seems to catcb all the gold, to the satisfaction of the management. The mine is developed by numerous tunnels. The company employs about thirty men. A 100-stamp mill was purcbased over a year ago in anticipation of the earlier completion of the State wagon road, aud it is now awaiting that event.

The Sunnyside Co. has prosecuted work of development this year with twenty-five men, and has exposed a deposit of quartz porphyry 80 feet wide that is reported to assay $10 and upwards per ton. This company, after paying $125,000 for its property, met with much discouragement in the development work, but, after contiuued work for over a year, bas now a property with a large amount of ore in sight, the cost of developing which has been less than $40,000. The company has a 40-stamp mill ordered and ready to come in on completion of the wagon road. It has commodious buildings and improvements, and everything about the mine denotes systematic management.

The Fairview Co. purchased three claims for $100,000, situated on the lower slope of Rainbow mountain, opposite the Dewey. After testing the ore deposits and their probable extent and value, the management commenced a working tunnel 500 feet above the town to crosscut the ore body lying beyond. The tunnel is in diorite, and is now in 500 feet, with 800 feet more to drive. Two eight-hour shifts of miners are employed. Jennings Bros. of Pittsburg, Pa., and associates are the owners.

The H. Y. group of eleven claims, bought in September, 1903, for reported price of $100,000, is located on the western slope of Thunder mountain. It has nine tunnels of from 45 to 90 feet in length, and two shafts 30 and 45 feet deep. In one tunnel on the Mollie claim 30 feet of ore assays an average of $4 per ton in gold. No drifting has been done to determine the width of the deposit. The company works a winter force of ten men.

The Climax property adjoins the H. Y., and consists of thirty-seven acres. It has one tunnel of 152 feet and another of 57 feet. The managemeut has contracted to run 100 feet more this winter. A steam hoist, now at the end of the wagon road, will be installed the coming year to test the ore body in depth.

The Rio Grande group of six claims is located on Sugar creek, on the west side of Rainbow. Two veins of quartz porphyry were opeued up this season; one of them is 70 feet wide and the other over 50 feet. Assays show an average above $3 per ton gold. A tunnel was run on the 70-foot vein for over 170 feet. Dean, Duncan & Co. of Colorado have a coutract to continue the tunnel 300 feet farther. The company has a 20-stamp mill ready to send in as soou as the road is ready.

The foregoing are a few of the properties in the porphyry belt. There are many others in various stages of development.

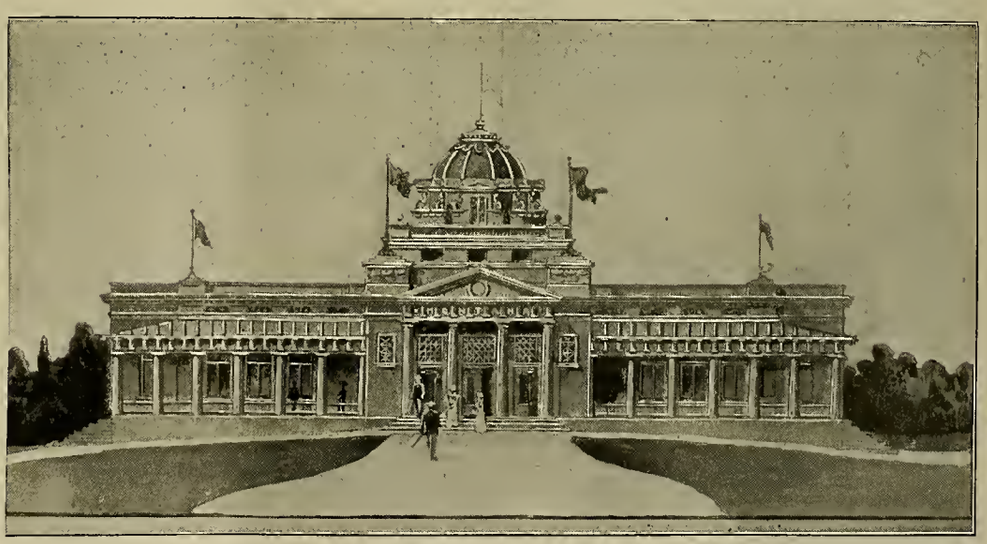
Colorado and Montana Buildings at St. Louis.

Two of the most attractive State buildings at the World's Fair at St. Louis, Mo., will be those of Colorado and Montana.

The design of the Colorado building, now in course of erection, is in Spanish reuaissance. The first floor shows in the center a rotunda, from which ample staircases lead to the second floor. The rotunda has almost the entire height of the dome inside. The ceiling of the dome will be vaulted with intersecting arches, and in the center of the ceiling will be a stained glass light. The remainder of the building is divided into apartments for the executive staff.



Colorado Building at the St. Louis World's Fair.



Montana Building at the St. Louis World's Fair.

Montana's building will be of modified Doric architecture, exemplifying the strength and grandeur of the State. The building has four large and spacious entrances, the main entrance in front being made the feature of the design. The entry at the front, over a wide flight of stairs, opens into a vestibule, which will be decorated by means of columns, pilasters and ornamental frieze. On each side of this vestibule there are closets and check rooms. From here one enters the reception hall and rotunda, extending the full length of the building and divided by ornamental columns, pilasters and beams, all richly decorated. The reception hall is roofed with a dome which extends on the inside to the height of 36 feet above the floor. On the sides are windows. On each side in frout are located parlors or receptiou rooms. Iu front and on two sides are porches. The windows and doors may be so arranged that the entire building can be thrown open, thus furnishing an excellent draught on warm days.

The Strength of American Timbers.

Timber tests which shall determine the strength of the principal American timbers used for construction purposes are now in progress at Washington, D. C., at Yale University, New Haven, Conn., at Purdue University, Lafayette, Ind., and at the University of California, Berkeley, Cal. These tests are made under the direction of the Bureau of Forestry, and are for the benefit of lumbermen, construction engineers and scientific men who are interested in the strength of different wood fibers. The Bureau of Forestry plans from the result of its tests to make tables of the strength of different American woods to which the engineer may refer when he wishes to know what timbers to use for certain purposes. The tests will be in cross beuding and breaking, compression with and against the grain, aud shearing.

No complete and satisfactory series of tests on large sticks of timber has ever been made in this country.

The chief timbers now being tested are the Southern pines and the red fir of the Pacific coast. In the laboratories at Washington tests are now in progress on loblolly pine sticks 17 feet long and 8 by 14, 8 by 8 and 8 by 4 inches. Special attention is given to the effects of moisture on the strength of the wood. In the case of loblolly pine which has grown rapidly, the strength was found to decrease 50% to 60% after the dry wood had been soaked several days in water. The fact, however, is not yet established and will have to be proved by further experiments. The tim-

bers tested are of the usual grades purchased in the market and are not selected pieces.

At the laboratory of the Yale Forest School in New Haven small selected pieces of longleaf pine, without knots or other defects, are being tested so as to learn what is the ultimate strength of the fibers. At Berkeley, Cal., tests are being made on red fir.

These tests of timbers will also be of use and benefit to mining men in the selection of material for surface construction and underground support.

Notes on Classification.*

Written by T. LANE CARTER.

The question of classificatiou is one of importance in the cyanide process. We have been told that we are not up to Australia in many points in the cyanide process, but we believe that many of our Australian friends have gleaned a good deal from the Witwatersrand gold fields and from the pioneers in the cyanide process. It was not so long ago that 25% of our mill pulp was considered untreatable and the slimes assayed between 4 and 6 dwts. In consequence of improvements in classification in the sands tanks aud the use of lime in the mills the value of slimes has come down a great deal, so that the average value of the slimes on one of the large groups, namely, the Rand mines, averaged under 2.1 dwts. for the last six months.

In Rand practice the mill pulp, after treatment by amalgamation, is usually classified into three products for cyanide treatment, namely:

(a) Concentrates and coarse sands.
(b) Sands.
(c) Slimes.

This classification is not really well defined at any point. For instance, where vanners are not used that part which is called conceutrates is really a small portion of concentrates mixed with a large part of coarse sand. The second product, sands, contains an amount of settled slime and sulphurets not caught by the spitzlutte. In the slimes plant we find a very rich float of fine sulphurets, also a very fine sand. When a large portion of main reef, which is generally highly pyritic, is sent through the mill it is difficult to prevent the fine sand and slimy sulphurets from reaching the slimes tanks.

Though one grade blends into another it is, nevertheless, convenient to make the above-mentioned classifications in discussing the question of cyanide treatment. The object of this classification is to grade each portion according to its value and amenability for treatment, so that the richer and less leachable portions might have longer treatment than the poorer and easily leachable portions.

Under the present methods of working, the aim appears to be to mix concentrates with sufficient coarse sands to render the product leachable and to procure sands with as little sulphurets or slimes as possible. This product, which equals only about 10% of the total tonnage, is allowed to receive a very long treatment, an important factor in treating this material.

It will be most convenient to deal with this important question of classification under the headings already mentioned, and we will commence with the first, namely, concentrates:

CONCENTRATES.—A product made up of pure concentrates is of little use for cyaniding in the present state of the cyanide process. In the first place, it is practically unleachable. Even if it were leachable the extraction from this product would be very low. No matter with how much coarse sand the concentrates are mixed to get a leachable product, we must remember that the actual extraction from concentrates by our present methods is unsatisfactory, and that a large percentage of the gold in this class of the pulp is throwu out on the tailings heap. Most of you, no doubt, have verified this statement by dividing a residue sample into the different classes and assaying them separately, when you found that, in the majority of cases, the coarse, heavy sulphurets and coarsest of sand showed highest in gold. Therefore, our present extraction of gold from concentrates, and in some cases from the coarse sands, is unsatisfactory.

This question of concentrates is one that has worried most of us, I am sure. The usual method employed at preseut is to get a product containing 86% coarse sand and 14% sulphurets (the total beiug about 8% to 9% of the mill product) which is given an extra long treatment of about thirty days.

There is one way, of course, of obtaining a high extraction from concentrates and that is by using the chlorination process. But the heavy cost of the process makes it an impossibility for most mines on the Rand. To say when it pays to sell concentrates to reduction works, or to take the much lower but cheaper extraction by the cyanide process, requires careful calculation.

At the New Goch Gold Mining Company we observe that concentrates of nearly five ounces in value are treated by the chlorination process, at a cost of 24.7% of the gross value. It would seem that few mines on the Rand are as fortunate as the New Goch regarding the value of concentrates. On one of the mines of the Central Rand, where close concentration is resorted to, the value of the product has fallen from five ounces to three ounces, so that the treatment of the concentrates by the chlorination process has been abandoned. From the cases we have observed, we notice that concentrates get poorer the lower you get on the reefs.

It seems, therefore, that the chlorination process is nearly at its last ebb on the Rand, so far as the Main Reef series are concerned. Exceptional cases may occur where the concentrates will assay very high, but we believe such cases will be very rare.

We are thrown back, therefore, on the cyanide process, and the question is, how can the greatest extraction be obtained from concentrates by the cyanide process? The extractions obtained from the other classes of sands is most satisfactory, but the efficiency of the process on concentrates is low. Let us take an average case as an example:

A tank containiug 14% sulphurets and extra coarse sand aud 86% coarse sands gave the following results:

Original Value—	After Five Days' Treatment.	After Ten Days' Treatment.	Lowered Value.	After Twenty Days.	After Thirty Days.
12 dwts.....	4.56 dwts.	3.56 dwts.	3.88 dwts.	2.4	1.9

The value of the residue was 1.9 dwts., of which the sulphurets and very coarse sands contained 8.7 dwts. per ton and the other part 17 grs. to the ton. These figures are averages.

From these figures it is seen that after the tenth days' treatment most of the gold had been extracted. On account of the incomplete extraction of the gold in the sulphurets and very coarse sand the charge had to be treated for another twenty days.

It seems to us that the concentrate problem can be most economically solved by following the suggestion made in several quarters, namely, of concentrating carefully and recrushing the concentrates and coarsest saud to a sufficient fineness to extract the gold. The idea is not a new one and has occurred to many. As corroborative evidence as to the possibilities of high extractions from concentrates by the cyanide process, the figures given by Mr. E. N. Fell (see Vol. XXXI, page 764, Trans. Amer. Inst. Mining Engineers) are here reproduced.

In the course of his paper describing the treatment of tailings by the cyanide process on a mine in British Columbia, Mr. Fell said:

"We have also carried out a series of experiments on the treatment of concentrates from the mill in a revolving barrel. The results of these has been so satisfactory that I believe the process would be successful on a working scale.

"The following figures are the result of the last six runs which we made:

Dry Weight of Concentrates.	Value Before Treatment, ozs. Per Ton.	Residue, ozs. Per Ton.	Extraction, Per Cent.	Strength of Solution, Per Cent.	Loss of KCN, Lbs.	Duration of Treatment, Hours.
40 pounds....	7.58	.20	97.4	1	6.2	24
40 "	5.26	.76	85.5	1	8.1	24
40 "	4.74	.42	91.1	1	7.8	24
40 "	2.78	.14	94.9	1	9.75	24
40 "	4.60	.36	92.2	1.25	6.4	24
40 "	3.92	.12	96.9	1	6.1	24

"I infer that a recovery of at least 90% (and probably 92% to 93%) of the gold value could be ensured at a cost for cyanide of 8s 6d per ton."

This evidence, taken with the evidence of the Rand, gocs to show the possibility of getting a higher percentage of the gold from the concentrates by the cyanide process.

The two reasons given for the failure of KCN to give a high extraction from pure concentrates in the ordinary way are:

1st. The gold is "mechanically bound."

2nd. The unleachable character of the product.

Taking everything into consideration, we believe that the concentrate problem can be most economically solved along some such lines as the following:

(a) Classifying of concentrates and very coarsest of sand as clean as possible by means of increased spitzlutte capacity.

(b) Recrushing and treating these concentrates and very coarse sand in a revolving barrel or some similar contrivance with KCN of suitable strength.

(c) This careful concentration will allow the finer portion of coarse sand to run iuto the tanks with the fine sauds, thereby causing a more leachable product.

Of course, the extra expense of recrushiug conceutrates must be recognized, but we would like to point out the probable advantages to be derived:

1st. Considerably higher extraction. It does uot require a large increase in extraction on the Rand to mount up to thousands of pounds sterling.

2nd. A more amenable sand product by the addition of more coarse sands to the sand tanks.

3rd. A great säving of timc; also of cyanide.

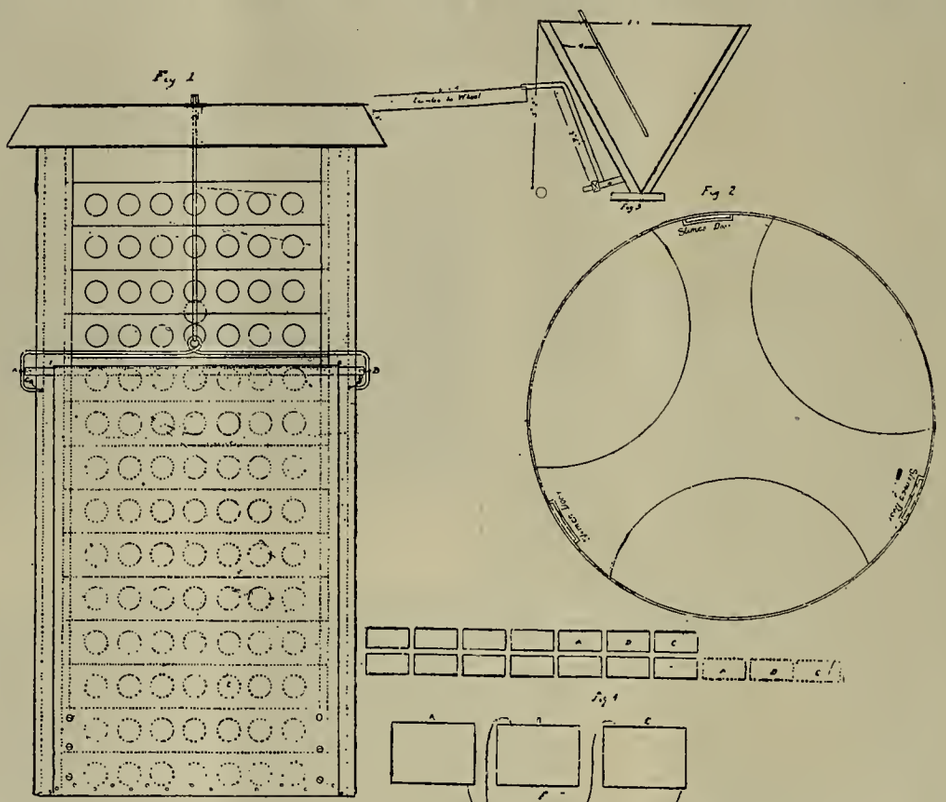
4th. The utilizing of portion of the tank capacity now occupied by concentrates and very coarse sands to sands, thereby giving sands an extra two days' treatment.

Opinion seems divided as to the amount of amalgam that escapes from the mill to the cyanide works. We know of a case where a chemist was sent to a gold mine on a certain gold field to investigate a by-product of the tailings heap. It became necessary to van a portion of the old coucentrate heap, and this chemist obtained an apprcciable amount of amalgam on the vanners. This seems to prove that amalgam getting into cyanide tanks from the mill is lost.

SANDS.—The filling of a sand tank is one of the important things of a plant, a badly filled tank causing the residue to assay high. There are two systems in vogue on the Rand, namely the "Kafir and a hose" and the Mein-Butter's distributors. In filling it is necessary to be watchful to prevent the formation of thick layers of slime. The danger of getting layers of slime in the tank is increased where much lime is used in the mills.

Fig. 2 gives a sketch of the method used in filliug a sauds tank. The high cones of sand are shown between the slimes doors. The water carrying the slimes thus has every facility of escaping through the slimes doors. The Kafir keeps the hose on the move, so as to disturb any settled slime.

A sketch is given (Fig. 1) of the slimes escape



Escape Doors in Cyanide Tanks.

*Abstract Journal Chem., Met. and Min. Soc., S. A.

doors in use on the Crown Deep. The heavy canvas is securely nailed down at the bottom. As the tank is filled the cauvas is unwound from the spool which slides up and down the two grooves. It is found that the slat boards answer best, being strong euough to withstand the pressure. In each board there are holes to allow the slimes to run off freely. All the slats are placed in securely, except the two bottom ones, which are screwed to the uprights, so they can be easily taken out in case of a block behind with sand.

(TO BE CONTINUED.)

Mine Telephone System.

Some one has aptly said that "economy is simply the judicious expenditure of money," and the remark continues to be quoted because it cannot be improved. Anything that saves expense is of economy about any surface or underground workings, and the convenience and usefulness of a mine telephone system is now becoming generally recognized. The chief objection—defective insulation and trouble from moisture—has been overcome.

The mine telephone, illustrated herewith, is built especially for mines, outdoor use and places where an instrument is subject to gases, acids or moisture. The apparatus necessary for the operation of each telephone is mounted in a cast iron moisture and weather proof case (Fig. 1). The generator is pow-



FIG. 1

erful enough to ring fifteeu or twenty telephones on the same line. The ringers are mounted in the dome on the upper part of the case with an opeuing on each side, so that a call may be heard at some distance from the telephone. These openings are so arranged that the ringer is protected not only from the weather, but also from mechanical injury. The talking and calling apparatus is located in the lower portion of the case, and is arranged to suit the purposes for which the telephone is supplied. All wiring in the instrument is done with rubber covered wire and all joints are soldered. An arrangement is provided for taking up the slack of the receiver cord when the receiver is replaced on the hook. (Fig. 2).

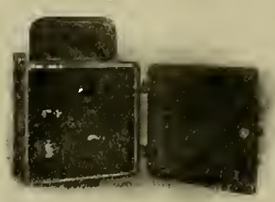


FIG. 2.

A lever on the outside door of the case enables one to close the instrument up air-tight; the door fits agaiust a rubber gasket. All exposed metal parts are treated with an insulating gas and moisture-proof compound. The inductiou coil, geuerator armature coil, ringer coils and receiver coils are boiled in a moisture-proof shellac varnish compound and afterward baked. This reuders the coils moisture-proof. The outside of the case is painted black and striped



FIG. 3.

in gold. The lugs on the back of the case for fastening it up are cast separately from the case and can be removed and other styles of fastening used if desired. A small cap containiug the line binding posts is fastened to the bottom of the case. Line wires from same are led out through an iron pipe screwed into the cap.

This mine telephoue system is furnished entire by the Stromberg-Carlson Tel. Mfg. Co., 70-86 W. Jackson Boulevard, Chicago, Ill., who have numerous testimonials from mining men as to its satisfactory operation.

That Number Scheme, Again.

TO THE EDITOR:—I note the commeuts of "Mine Superintendent" in your issue of Nov. 7th on my article entitled "A Number Scheme for Mines," aud I think I may add a few further words with benefit. The gentleman says:

"In workiug both ways from the shaft the system could be carried out by calling one side arbitrarily north or south, east or west, as the case may be."

Where there is but one vein this will work very well; but when crosscuts are ruu and the usual parallel veins are developed, it will not be so simple as the plan of lettering the veius as suggested in my article. To illustrate: We have worked the Kennebec vein north and south from the workiug shaft. There being no other vein, there is no need of naming the vein in any reference thereto, so we number the chutes and add N. or S. as the case may be, and there is uo danger of complication. In the course of development we drive a crosscut and open the Jerusha, a vein paralleling the Kennebec. Followiug the suggestion of your correspondent, we must mark the chutes on this vein N. and S. To distinguish the chutes we must now name each vein and follow the number of the chutes with N. or S., as, Kennebec 522 N., Jerusha 514 S., etc. By lettering the veins we are enabled to designate each of these locations by much less work, thus: 522 A would auswer for Kennebec 522 N., and 514 C for Jerusha 514 S.

The suggestion of "Mine Superintendent" as to the numbering of the chutes and raises is also open to the objection of requiring more words to designate the locatious than are necessary. Iu the system I suggested the even numbers were used for chutes and the odd for raises, so that the number itself designated whether the place was a chute or raise and saved the trouble of using the words. Using the uumbers in this way there will eveu then be numbers to spare, so the odd uumbers are uot needed to designate chutes.

Not long since the writer accompanied a gentleman through a mine where samples were being taken. In a certain raise where this gentlemau took his sample he turued to the foreman of the mine, who accompanied us, and said: "I mark this sample 'F. W. seam on main vein, above the 200, where Gunderson is working.'" That abbreviated by a few words was the marking of the tag that went to the assay office. It designated plainly where the sample came from and was all right for the time being, but I couldn't help thinking that if that face were abandoned temporarily, because of a low assay, and the records should be consulted later to find out what the assay went, one might easily be confused by finding a number of samples marked "Gunderson," and not knowing what one referred to this particular place. With the mine numbered as suggested in my article, the sample tag would have needed but three figures and one letter, as 283 B. That would locate the place definitely and a reference to the assay record would tell the result of a sample taken from the face on the date indicated. Several samples might be taken from the raise at one sampling and marked right side, left side, F. W. or H. W., or other specific designation, in additiou to 283 B, that still being the key to the location.

Recognizing that ore bodies are not continuous in size and that the skilled mining man will start raises and put in chutes where he thinks he can work the mine to advantage, I sought to make plain that the numbers for the chutes would give the approximate distance from the workiug shaft, a few feet one way or another being of no consequence, and it being immaterial whether the chutes are 25 or 100 feet apart, each 20-foot section having a uumber. In a worked-out section of the mine under the writer, on the 100-foot level, the first chute on one side of the shaft is 54 feet distant; it is 93 feet to the next chute and 32 feet from that to the third, so the first chute would be 106, the second 116, the third 118. The secoud chute is 147 feet from the shaft. If it were 140 feet it would be uumbered 114, but being 7 feet farther it is thrown into the uext sectiou and receives the number for the eighth section from the shaft, viz., 116. The third, though 32 feet from the second, is ouly 179 feet from the shaft and comes within the next section, and is numbered 118. The unused numbers will never be ueeded, the ore above having been all worked out.

The writer has kuown operators to give names to the individual shoots, as the Clevelaud, or Jumbo, for shoots of size, the Tyler for a narrow shoot, etc. The scheme is good, but not so good as the number scheme. It takes fewer words to direct an employe to go to work at 215 A than to tell him to work in the raise on the Cleveland shoot on the 200. One who installs and uses the number scheme will soon learn to appreciate its many advantages. It has definiteness, with the use of as few characters as possible, at the same time allowing latitude for lines and measurements in solid rock that cannot be and do not ueed to be made exact, aud it is easily understood by the men when ouce explained to them.

MATT. W. ANDERSON.

Baldbutte, Mont., Nov. 28.

Quartz Veins and Mines of Southern Oregon.*

Written for the MINING AND SCIENTIFIC PRESS by DENNIS H. STOVALL, B. S.

It has long been taken for granted, by a few at least, that the stratigraphical formation of southern Oregon is identical to that of northern California. Notwithstandiug the similarity of the two sections, there has been a vast difference in the developmeut aud progress of the two. The imagiuary line, known as the State liue, was sufficient to keep the enterprising mining meu ou the California side for a uumber of years; and while the camps and mines of northern California were flourishing, southern Oregon was making little or no progress in the matter of the development of its quartz mines. Southern Oregon is the pioneer mining section of Oregon, yet it has been the slowest in development. This condition of affairs was due entirely to lack of enterprise, lack of capital, lack of men who possessed an ambition to go deeper thau their shovel handle's length!

It required a half century for one question to be solved to the satisfactiou of moneyed mining men; this was the question of the continuity of the ledges of southern Oregon. It was not until the past two years that this question was satisfactorily answered, and even yet there are some who are skeptical and who have but little faith in the permaueuce of southeru Oregon's veins.

The vein matter of southern Oregon ledges varies but little throughout a wide extent of territory. Nearly all of the veins of the district run uorth aud south—that is to say, those ledges aud lodes which can be traced for any considerable distance.

In the western part of the district, and runuing aloug the westeru border of Josephine county, is the base mineral belt, the predominating values being in gold and copper. This belt, popularly known as the "copper belt" of southern Oregon, is really confined to one mammoth ledge, known as the "Yank." It is from 75 to 250 feet in width, and cau be traced from the Oregou-California line north for a distance of 40 miles or more. In those districts where it is exposed, notably Waldo, Slate Creek and Galice Creek, mines are being opened up upon it. A number of these are well developed and will be ready to begiu operatious next summer. The veiu matter of the Yank ledge is mainly a bluish quartz colored by copper, this metal being present in the form of copper pyrites. The Yank is a contact vein with a hangiug wall of slate, and syenite on the foot. In those tunuels that have been driven into it there is a thick coatiug of the soluble salts of copper. In the Waldo district there are eight or nine well developed mines on this belt. The values of these run higher in copper than farther north, assay returus showing from 11% to 60% copper and from $2.50 to $10 a ton in gold.

Farther north, on Galice creek, where the big ledge is cut by Rogue river, and where several miues are being opened up, the quartz shows from $6 to $30 a ton iu gold and copper. As the ore will require smelting, and occurs in largc quantity, some of these mines will probably become great producers when worked on a scale commensurate with their size.

The vein matter of the gold-bearing ledges of the southern Oregon district may be described as a hard, white and compact quartz, carrying metallic sulphides to a greater or less extent, and free gold, with some silver. The metallic sulphides consist of pyrite, copper pyrites, arsenical iron and galena. The last-named mineral has been found to be a "good sign" in southeru Oregon quartz veins, its preseuce being considered indicative of good values aud coutinuity of vein.

The average value of the veins may be considered as indicated by those of one mine. (Sec illustratiou, front page.) The Greenback, Grave Creek district, is a fair represeutative. It is operating forty stamps and a 100-ton cyanide plant, and opened to a depth of 1000 feet, and is a typical southern Oregon mine. Its values, it is stated, have averaged $16 a tou in free gold and concentrates since the mine first begun operatiou. Its ledges are from 2½ to 5 feet in width, with a dip of from 60° to 70°. The couutry rock here is diorite. There are other good miues in the southern Oregou district—mines that are operatiug mills of five to fifteeu stamps — that possess similar ledges, but which lie in granite, slate or other formations.

Much "specimeu rock" is produced by the mines of southern Oregon. This is due to the buuches of rich free-milling ore that are found at all depths, and more especially at cross sections of smaller veins with the main ledges. This is the "pocket" characteristic of the district, and it is not lost eveu in the largest mines. On the 800-foot and 900-foot levels of the Greenback masses of quartz have been shot down that were "peppered" with large and small fragments of gold. Flakes of the metal as large as a man's palm have been uncovered on the deep levels of this property. Nearly all of this free gold is found in hard, suow-white quartz.

But the ledges aud veins of the southeru Oregon district are more than "specimen rock" producers. They are permauent, as is proved by the success of

*See illustration on front page.

those who have energetically developed properties. The characteristics and general formation of the country makes the deep development of mines in southern Oregon expensive, but the results have proven satisfactory.

Treatment of Telluride Ores at Kalgoorlie, Western Australia.*

NUMBER II.

Written by W. E. SIMPSON.

ROASTING.—At the Boulder Main Reef mine the ore is conveyed from the mills to one of two small storage bins, which supply the three Edwards furnaces, each treating on an average eighteen to twenty tons per day. This type of furnace was first introduced to these fields by the Great Boulder Proprietary Co. some four and a half years ago, and until recently it had superseded all others. It is a single-hearth reverberatory furnace, with mechanical rakes, enclosed in a casing of boiler plate. The sides are made of two girders, each 60 feet long, built on the cantilever principle, and the ends of plain ¼-inch plate, while stout corrugated iron sheets, bolted to the lower web of the girders, act as the support for the 6-foot wide bed or hearth. The frame of the hearth, properly stayed and strengthened where necessary, is supported about 2 feet clear of the ground upon a couple of pivots placed midway between the ends, and it is held rigidly at the desired inclination by a couple of jackscrews. The rabbling is done by a line of fifteen revolving rakes, with vertical stems or shafts passing through the furnace arch; the actual stirrers are five small removable plows, attached to a cast iron arm, which describes a horizontal circle in the ore. Each revolving rake or rabble moves in the opposite direction to its immediate neighbor, and the ore is thus made to travel in a zig-zag course along the bed of the furnace. All the mechanism is easily accessible; the rabble bearings, gear wheels, shaftiug, etc., being held in position in an iron framework on top of the furnace. The five rabbles nearest to the firebox are hollow and are kept cool by a stream of water which is constantly passing through a central pipe in each, and, after ascending, escapes into a channel ring encircling the rabble axle on top of the arch. The inclination of the furnaces at the Boulder Main Reef Co.'s works is about 9 inches in the total length, 60 feet. The layer of ore is usually 2 to 3 inches deep on the hearth, and two hours are occupied in its journey from the inlet to the discharge.

Each furnace is fed by what is known as a "fluted roll." It is a cast iron cylinder, 3 feet long and 10 inches in diameter, with eight V-shaped channels on its circumference. It is carried by a horizontal axle, to which is also keyed a ratchet wheel with forty teeth. The roll is let into the front of the bin on a level with the bottom, and is always partly embedded in the powdered ore, which fills the channels, and is discharged into the furnace as the roll rotates. The rate of feed depends on the rate at which the roll revolves, and this is regulated by the ratchet mechanism. The power is obtaiued through an adjustable eccentric keyed on to the shaft which drives the furnace rabbles.

The Merton furnace has recently been introduced by the Great Boulder Proprietary Co. to the Kalgoorlie field; in its main features it is similar to the Edwards. Its chief differences are that it occupies less area, has three super-imposed hearths, all level and communicating with one another by vertical channels in the usual way, and is built directly upon the ground, instead of being placed in an iron framework, and, consequently, the angle of inclination of its hearths can not be changed. The rabbles, five in number, are in principle precisely similar to those of the Edwards furnace; but each rabble stem passes through all three hearths and is supported by a footstep underneath the lowest hearth, the arms or rakes being clamped on at heights to suit the different hearths. This arrangement, however, would appear to be somewhat disadvantageous in the case of a breakdown necessitating the withdrawal of the rabble shaft. The Merton furnace is economical in the consumptiou of fuel, as the arch of the lower hearth heats and really is the bed of the one immediately over it. The roast, too, is better, as the ore falls in a shower through the flame in its passage from hearth to hearth. This is, however, accompanied by a somewhat greater loss in dust. Its initial cost is considerably less than that of the Edwards, and its capacity some 20% greater.

The Edwards furnace can be altered by varying the angle of inclination of its hearth to suit the composition of the material being treated. A heavy sulphide would require a small inclination so as to make it travel slowly towards the flame, while a partially oxidized material could be treated more rapidly by having the furnace tilted at a greater angle. This is advantageous in a customs works treating many different parcels of concentrates, etc.; but on a mine where, as a rule, the ore does not suddenly alter in composition, the possibility of varying the inclination is of little or no use. As a matter of fact, the beds of the furnaces on the Boulder Main Reef have been kept with the same inclination—9 inches in 60 feet—since first erected, and are now all bricked in. With the Edwards furnace it seems possible to obtain still better results by allowing the hot, waste furnace gases, after passing over the ore, to travel back in flues underneath the hearth in a tortuous fashion, thence to the stack in the same manner as the gases of a Lancashire boiler. The ore, too, might be made to travel in a conveyor along the top of the furnace, as is now being done with the concentrates at the Lake View Consols gold mine, and so be fed into the furnace hot, and just on the point of oxidation. A further improvement would be to make the rabbles hollow throughout and open at both top and foot, so as to allow an air current to be drawn through them into the furnace. This would be better than the present plan of taking in the air through furnace doors open, because the air would be heated and so rendered more energetic for roasting; besides, the air current would keep the rabble cool. From 2 H. P. to 3 H. P. are required for each furnace.

The raw ore of the Boulder Main Reef contains about 3½% sulphur as sulphide, and the roasted product from a mere trace to about .04%. The success of the "dry process" depends largely on the "sweetness" of the roast, and the presence of more than .05% of free sulphide begins to tell seriously upon the extraction. Sulphides are generally supposed to interfere with, or, rather, prevent, the solution of the precious metal; but it seems more likely that the apparently poor "extraction" is due to the subsequent precipitation of the gold by the sulphide in the pulp. At any rate, it is nearly always found that in the residues from a foul roast nearly all the valuable part is contained in the "fines;" if residues assaying, say, 7 or 8 dwts., are sifted, the coarse particles retained on a 200 sieve will often contain only from 2 to 3 dwts. of fine gold per ton.

The roasted ore is discharged from the furnace through a small orifice in the side and falls into a push conveyor. This consists of a semi-circular though about 60 feet long, provided with a ladder-like frame, with blades hanging from the rungs, which is made to move horizontally to and fro on rollers. The blades are free to swing in one direction, but are prevented by a stop from swinging farther back than the perpendicular. When the ladder is traveling forward each blade hangs vertically and pushes a little heap of ore before it for a distance of 20 inches, the length of the stroke. On the return stroke the blades, being free to swing, slip over the tops of the little heaps, and, on the completion of the stroke, resume their original vertical position. A succession of these pushes conveys the hot ore to the end of the trough, and, by alternately collecting and then flattening the little heaps, exposes new surfaces to the oxidizing atmosphere and so improves the quality of the roast.

From the conveyor the ore falls into a rapidly flowing stream of weak cyanide solution and the dry part of the process is at an end. The pulp thus formed is elevated by a tailings wheel to the spitzkasten, where it is separated into sands and slimes. The sands, together with any free gold, go to the grinding pans and the slimes direct to the agitators.

The fuel in use in Kalgoorlie is the local salmon gum, a species of eucalyptus. It is of excellent quality and can be delivered at the mines at about 13s 6d per ton. The consumption amounts to about 2.6 tons per day (twenty-four hours) for each Edwards, and 2.4, or slightly less, for each Merton furnace.

The grinding pans are of the Wheeler type, six in number, and each 5 feet in diameter, and all of them were required when the plant was running to its full capacity of 2000 tons per mouth.

The charge of quicksilver is 10 lbs. per pan every ten days, and the loss of mercury is .2 to .3 oz. per ton of ore treated, or 25 to 30 lbs. per month. Each pan is cleaned up once a fortnight.

The shoes and dies are of iron and last from six to seven months. The weight of a complete set is 33 cwt. and the cost delivered on the mine is £33.

GRINDING AND AMALGAMATING.—The free gold becomes amalgamated in the pans and the sand is reduced to a slime. The pulp then goes to another set of spitzkasten and any coarse sand still remaining is separated out and returned for regrinding in the pans, the slimes passing on to the agitators. It will thus be seen that every particle of ore is eventually reduced to a fine slime.

Each pan makes sixty revolutions per minute and requires nearly 7 H. P. to drive it.

The flint mill is a hollow revolving steel cylinder, 16 to 20 feet in length and 4 or 5 feet in diameter, and closed at both ends, except for a small central opening in each. It is lined completely with cast iron or steel plates ¾ to 1¼ inch thick, and when in operation is partially filled with a charge of hard flint nodules. The sand is forced from the nozzle of a spitzkasten through the central opening in the receiving end, is ground in the mill and escapes as slime at the discharge orifice. One flint mill is sufficient for a 2000-ton per month plant using a 30-mesh wire screen, and the work is done so efficiently that 99%, or practically the whole, of the finished product will pass through a sieve of 200 holes to the linear inch. A complete set of liners weighs about 4 tons, lasts from seven to ten months, and costs £80 on the spot. The working charge of flints ranges from 4 to 6 tons, and about 1 cwt. of flints is consumed in grinding 100 tons fine enough to pass through a wire screen with 30 holes to the inch. Each mill consumes from 18 H. P. to 35 H. P., according to size, makes thirty revolutions per minute, and when working efficiently emits a low, dull note or roar, easily recognized by an experienced attendant. The function of a flint mill is to pulverize, while the pan has not only to grind but also to amalgamate.

For obvious reasons the flint mill can not be used as an amalgamator, and copper plates are decidedly objectionable in either case for the following reasons: All the waters traveling through the Kalgoorlie plants are in reality dilute cyanide solutions. Even battery waters carry from a mere trace up to .03% of free cyanide. The amalgamating plates are, consequently, rapidly corroded, as, for example, those of the Hannan's Star and the Kalgurli gold mines, which have to be replaced every nine months, and the dissolved copper must be precipitated subsequently in zinc boxes. The objection, therefore, is twofold, the destruction of the plates themselves and the production of impure, coppery bullion.

In performing their duty, pans polish and brighten the metallic particles and thus promote amalgamation, but, on the other hand, flint mills tend simply to flatten them and, consequently, amalgamation is retarded.

In my opinion the best results could be obtained by a combination of both these appliances—one or perhaps two pans to catch all the free gold and perform the rough grinding, and flint mills to complete the pulverization into an impalpable powder or slime.

(TO BE CONTINUED.)

*Abstract Trans. Institution Mining and Metallurgy.

The Silverton District, Colorado.

Bulletin No. 182 of the United States Geological Survey has proved so popular that, the supply of the original issue having been exhausted, a reprint has been published. This bulletin is the work of F. L. Ransome and is entitled, "A report on the economic geology of the Silverton quadraugle, Colorado."

The report is divided into two parts, a general description and discussion of the ore deposits of the district and detailed descriptions of special areas and individual mines. In the first part, the history, production, climate, vegetation, topography and geology of the Silverton quadrangle are considered. The methods of mining and treatment of ores are briefly described. The ore deposits are classified as lodes, stocks and replacement deposits, and are fully discussed with reference to their mineralogical character, origin, geological relationships and economic importance. The mineral waters associated with the deposits, the metamorphism of the country rock in connection with ore deposition, the origin and paragenesis of the lode and stock ores, the ground water, and the miscellaneous mineral resources of the quadrangle, aside from the important ores of gold, silver and lead which constitute the chief mineral wealth of the district, are some of the special themes handled in the first part of the report.

The lodes of Silver Lake basin, of Hazelton mountain, of King Solomon mountain, of Cunningham gulch, Galena mountain, Burns gulch, Sunnyside basin, of Placer gulch and Treasure mountain, of Mineral point, Henson creek, Poughkeepsie gulch, Uncompaghre canyon, Canyon creek, Savage basin, of the Red mountain region, Sultan mountain and Cement creek are discussed in the second part of the report.

The first production of gold ore in this district was in 1870, and Mr. Ransome estimates that the total production of the Silverton quadrangle from the beginning of mining activity to the close of 1900 was at least $35,000,000. The greater part of this has undoubtedly been of silver, but during recent years, largely owing to the activity of the Camp Bird, Tomboy and Gold King mines and to the lower price of silver, the value of the gold output has predominated.

The field work upon which this report is based occupied the season of 1899 from the beginning of July to the middle of October. The work was resumed in the autumn of 1900 and a period of six weeks was devoted to those portions of the quadrangle that had not been thoroughly studied in the preceding year.

The reprint of this report may be obtained by application to the Director of the United States Geological Survey, Washington, D. C.

$25, Not $35.

TO THE EDITOR:—In the article on "A System of Continuous Concentration of Ores by Oil," written by me for the MINING AND SCIENTIFIC PRESS, which appeared in the issue of Nov. 7, 1903, I note on page 304, where it says: "Two hundred and eighty-five tons of silver-copper ore was selected from the mines of Julio, Celia and Santa Teresa, the average assaying value being about $35 per ton."

The amount stated, namely, $35 per ton, was an error of my copyist, and overlooked in furnishing the manuscript. It should read $25 per ton. Will you kindly make this correction?

JAMES W. VANMETER.

San Francisco, Cal., Dec. 4.

Mining Summary.

SPECIALLY COMPILED AND REPORTED FOR THE MINING AND SCIENTIFIC PRESS.

ALASKA.

C. D. Lane of San Francisco and J. H. Conrad of Prince of Wales island have bought the Heid & Smith copper and gold group, on Windfall creek, on Prince of Wales island. The property consists of five claims, with favorable millsite, together with water and plenty of timber. One principal ledge and several smaller lodges of ore are said to cross the claims. Development work will be started in the spring.

Skagway prospectors returning from the stampede to Bullion and Sheep creeks, in Alsek district, 140 miles from White Horse, report finding gold on both creeks, and washing pans running from 5 to 70 cents. Between 200 and 300 claims have been staked. Weather conditions prevented spending much time to prospect. Bullion creek is staked to No. 75 above, and Sheep creek nearly as far. Between No. 30 and No. 42 above on Bullion runs a deep canyon. Dawson Charlie, who discovered the district, and his companions were found to have staked many claims; but white men did not hesitate to restake, laying a basis for their disputes and litigation with the Indians next year, report H. C. Boardman and G. W. Dellon.

Another flowing well is reported struck by the Alaska Development Co. on its land near Catalla, opposite Kayak island. The well is 1000 feet from the first well struck by the company. The drillers were at work forty days, going down from 25 to 40 feet each day, before oil was struck. It is said to be a flowing well, but not a gusher. The company is building a 1000-gallon tank near the wells, and a pipe line will be run to the drilling plants, so that oil can be used under the boilers instead of coal. The Cudahy Packing Co., the Alaska Petroleum & Coal Co. of Seattle, Wash., and Chancellor & Canfield, California operators, have drillers at work in Kayak district.

The Fairview group of mines, consisting of three claims across the bay from the Julian mines, near Juneau, have been bonded to Lane & Conrad.

W. E. Dickinson of the Nome Mining Record says the gold output of Nome district this year will aggregate $6,000,000.

ARIZONA.

Cochise County.

The Luckshire mine, near Tombstone, has been bonded to H. M. Morris of Chicago, Ill., for $25,000. Men will be put to work sinking the shaft and on other development. The Luckshire adjoins the Lucky Cuss.

Graham County.

The annual report of the Shannon C. Co., operating at Clifton, for the fiscal year ended August 31, shows:

Profit and loss account—Gross profit for four months' running time	$158,971.29
Less loss previous year made up from this year's earnings	20,818.70
Net gain	$138,152.59
Less loss caused by fall in price of black copper last year after inventory was taken	8,333.63
Profit for year	$129,818.96

President Gill says the report covers a period of many interruptions and of a continuous run of only two months, caused by the miners' strike of June 1, viz.: July and August.——During the year a contract was let for a 500-ton concentrator, designed in two sections, of 250 tons of ore daily capacity each. The first section of this plant has been running since March 7, its work being entirely satisfactory. The second 250-ton section is being set up and is expected to be in commission by February next. In January they installed a briquetting plant which takes care of the flue dust, etc. Prospecting and development work has been increased, opening up additional ore bodies. There were driven during the year 7107 feet of tunnels, shafts, winzes, etc., and the mine now has 5½ miles of underground workings.

Larger hoods have been placed over the converter stands at the Arizona C. Co.'s plant at Clifton.——A. Roscerans, manager of the Standard copper mines, near Morenci, says the aerial tramway is nearing completion. The work has been delayed by difficulty in getting the heavy timbers up the mountain side.

Maricopa County.

(Special Correspondence).—The owners of the White mine, in White Tank mining district, are getting out ore for shipment. They have hauled 400 sacks of ore to Beardsley.——The Jones & Porterie group of three claims have been sold to F. Webb.

E. E. Hewins has men at work on a group west of Frog Tanks, and also at the Pike's Peak mine.——The Arizona M. & Dev. Co. is working men at the Black Jack mine, west of Morristown. This mine is a silver-lead producer.

The Lime Creek smelter, near Alhambra, is being put in shape for another run. The Lime Creek Copper Co. has bought several claims in Cave Creek district.

Ensign Bros. report locating a group of claims in the mountains south of Phœnix. It is a cyaniding proposition.——O. D. Merrill has men at work on a gold-bearing group north of Mesa.

Men are at work at the Bismuth mine, near Phœnix, and reduction works will be built.

Phœnix, Dec. 7.

(Special Correspondence.) — Dunn & Welch have 900 feet of development work done on their mine in the White Tank district, near Buckeye. The ore is free milling.——Stewart & Rogers of Mesa continue developing their claims. They are getting ore for milling.

There is considerable activity in Cave Creek district at the present time.

Phœnix, Dec. 7.

Mohave County.

The John T. group, 4 miles from the Contact mines, Cottonwood district, is being worked by a company, with J. F. Tomlinson as superintendent. The main claim of the group shows a vein averaging 15 feet in width, with values in gold. The ore is free milling. The Cottonwood district is east of Hackberry, and the main camp is reached by wagon road from Peach Springs, 12 miles. There is said to be plenty of water and wood in that section for mining and milling purposes.

The Philadelphia & Arizona M. Co. has unwatered the Minnesota-Connor mines, and are preparing to reopen them.

The Cedar Valley M. Co., at Cedar, has contracts for a brick plant at the mines, and for the manufacture of 250,000 bricks. They are to be used in construction of a smelting plant for handling the product of the concentrators. When the plant is completed the mines will be equipped with additional machinery, and the raw ores handled in the most economical manner. The company has also let contract for building a wagon road from Yucca station on the Santa Fe to the mines, a distance of 23 miles. The roadbed will be built along grades on which rails can at any time be laid, and the road equipped with electric motor and rolling stock, says the Kingman Miner. The mines and mill are under management of R. G. Eckis.

The Gold Roads G. M. Co., near Acme, last week shipped two bars of bullion valued at $24,000, the cleanup from two weeks run of the mill. The bullion is valued at $15 per ounce. The company is reported in a position to keep up this bullion shipment regularly.

It is reported the Katherine and Sheeptail group of mines in the San Francisco district, near Kingman, 2 miles from the Colorado river and 10 miles northeast of the Gold Roads mines, have been sold to a company of Kansas City, Boston and Detroit men. The property was owned by the New Comstock M. Co., S. C. Bagg, manager. The ledge is 30 feet wide and the ore is free milling, carrying values of $6 per ton. There is a 20-stamp mill and a cyanide plant on the ground. The company proposes to use oil for fuel, and will ship it by rail to Needles, Cal., and from there 40 miles up the river to the mill.

The hoist for the Altata mine, near Chloride, is being set up.

Preparation is being made for sinking on the White Copper mine at Mineral Park, says Superintendent J. Uncapher. It is the intention of the Queen Bee Co. to sink the shaft to considerable depth to obtain water for milling purposes and at the same time develop the ore bodies.

Work has started up on the Elkhart mine, near Kingman, and more men will be put on next week. They will sink to a depth of 1000 feet.

The salt mines of the Virgin valley, near Kingman, are to be worked, says the Kingman Miner.

Pima County.

The Loma Verde C. M. Co. is resuming work on its group in the Rincon mountains, 18 miles east of Tucson, under the management of T. J. Driscoll, who says he will continue to sink to depth of 1000 feet.

Pinal County.

(Special Correspondence.)—J. N. Harn, superintendent of a group of mines owned by California parties, near the Silver King mine, 35 miles from Florence, has begun oporations.

Machinery and supplies are on the ground for the Arizona-Pacific Co. Superintendent S. C. Prouty reports work progressing on the mines. Sinking in the two double compartment shafts will be started this week.

Florence, December 6.

(Special Correspondence).—S. W. Guardam, operating in the Butte mining district, east of Florence, reports development work progressing.——J. H. Henness is developing his copper claims, near Kelvin. He is sinking a shaft.——Peterson Bros. expect to resume work on their claims next week. The ore carries gold, silver and copper.

Florence, Dec. 7.

Last week the Lake Superior & Arizona M. Co. made final payment of $30,000 on their group on Queen creek, near Silver King, which the company has held under a working bond. Superintendent A. C. Sieboth has kept thirty miners exploiting the group. Machine drills were used and a large amount of shaft, tunnel, drift and crosscut work was done, says the Florenco Blade.

J. De Armett reports taking out copper, iron and silver ore from his claims in the Big Wash district, 12 miles east of Florence. He with H. Brady located five claims along the bank of the wash and started work on the main lead, which is 10 feet in width, which they are opening up through tunnels.

Yavapai County.

The Old Mesa G. Co. of Big Bug will extend the tunnel being run on its group. The tunnel is in 380 feet and the contract calls for driving 300 feet more. E. Block, manager of the Gold Mesa Co., has on the ground 500 feet of 6-inch air pipe, 600 feet of T-rails and other supplies. It is expected when this tunnel is completed they will have cut the Old Mesa ledge, which carries free milling gold ore. The Rambler mines, Nos. 1 and 2, of the Old Mesa group, are also being developed.

Work is under way on the Cypress mine, near Big Bug, across the gulch from the Henrietta mine.

ARKANSAS.

Benton County.

A deposit of lead ore is reported found near Gravette.

Boone County.

The prospecting drill for the Almy mine, near Harrison, has been put in operation.——At Harrison N. Watkins is setting up the concentrating mill machinery.

The Red Buck mine of North Boone was sold last week to a company organized at Little Rock. Development work will begin this week.

A piece of pure jack, with but enough rock to hold together, measuring 6 feet long, 2 feet thick and 3 feet wide, was taken out last week from the Silver Hollow zinc mine on the Buffalo river, near Harrison, says the Joplin News-Herald. Its weight is estimated to be 16,704 pounds.

CALIFORNIA.

Amador County.

The Wildman mine, near Sutter Creek, will be reopened Jan. 1, says the Amador Record. The reorganization of the company has been effected and the new incorporation is known as the Wildman Con. Mines, with H. Wilson of San Francisco president. The first work to be done by Superintendent J. Ross will be repairing the Lincoln shaft, followed by running a drift from the Lincoln to the Wildman-Mahoney.

At the Bay State mine, north of Plymouth, the ore chute at the 1050-foot level has been completed, and crosscutting to the Bay State ledge is under way. Power drills are being used. A crosscut is also being run west to strike the west vein or foot wall ledge. This crosscut will have to be run about 400 feet.

T. Mayon has a bond on the Clark gravel mine at Oleta and has men at work.

Calaveras County.

The Nelson Contracting Co. reports its mining operations at Calaveritas progressing. As much of the gravel is hard cement, it is proposed to crush it before washing, and a 10-stamp mill is being built. There are twenty men employed at the mine. To facilitate washing, drifts have been run into the bank and large charges of powder exploded therein to loosen the gravel.

A mob of fifty strikers from the Royal mine at Hodson held up a number of miners being taken from Milton to the Royal mine, marched them down the track a mile and ordered them out of the vicinity. There are 150 strikers in Milton and trouble is expected, say the reports.

El Dorado County.

A 5-stamp mill is being built for the Witmer & Fuller mine, north of Placerville, says the Placerville Democrat.

The Montezuma mine at Nashville has its 10-stamp mill running steadily on ore from below the 300-foot level since the recent rains have given water for power purposes. —— Sinking at the Havillah mine at Nashville continues and the ledge at the 800-foot level is being opened up.

Burger Bros. have bonded the Fort Jim mine near Placerville and will put on men this week. —— N. H. Burger, superintendent of the Fairplay Placer M. Co. on Dry gulch, near Fairplay, says the company has a payroll of thirty hands. A 14-ounce gold bar was produced last week, the result of a test run of 100 cars of gravel.

Kern County.

It is estimated, says the Pacific Oil Reporter, that the production of the Kern river oil field, near Bakersfield, has increased 25% during the present year and that for 1903 it will exceed 16,000,000 barrels. Of this amount the Associated Oil Co. controls 60%. The Southern Pacific and the Standard are the heaviest buyers, and the former is virtually in control of the Associated. The production at McKittrick is estimated at 2,000,000 barrels, which is also about 25% increase. The same conditions provail largely at McKittrick as at Kern river, the railroad company taking a large proportion of the product. The production of Coalinga, Fresno county, has been estimated at 2,000,000 barrels.

Mono County.

The Standard Con. M. Co.'s cyanide plant at Bodie has closed down for the season.

The New Bodie Con. M. Co. continues operation on its group near Bodie. At the Sunshine three shifts are driving the crosscut.——The repairing of the University shaft is completed and the ore body on the lower levels will be opened up, says Superintendent W. H. Netherton.

Monterey County.

Boring for oil has begun near Seaside, 3 miles from Monterey, by B. N. Baker of Baltimore, Md.

Nevada County.

Development work is going ahead at the Gold Canyon mine, on the Middle Yuba river, above Moores Flat, near Grass Valley, says Superintendent F. B. Hill. In the spring development will be increased. The mine is being worked both by shaft and tunnel. The tunnel will cut the shaft.

Work has been resumed at the Old Home Con. mine at Mount Vernon, near Blue Tent, 6 miles from Nevada City, under Superintendent T. T. Kirkham. The hoisting and milling equipment will be overhauled. The property has been idle for three years. A tunnel has been run and an incline sunk from it to a depth of 300 feet.

Enzensperger & Porterfield of Nevada City are reopening the Osceola quartz claim, near Rough and Ready, and cleaning out the tunnel, and when the tunnel is completed they expect to have 400 feet of backs.

A. Naako, owning the Colfax and other quartz claims in Willow Valley, near Nevada City, reports taking out ore which milled $30 per ton. There are two tunnels on the property, one in 600 feet and the other 400 feet. The ore crushed was taken out of the lower tunnel, where the ledge is 4 feet in width.

Superintendent J. H. English of the National mine, near Graniteville, says the mill has been repaired and the stamps are again dropping.

Plumas County.

The Verdi Con. M. Co.'s claims on Mill creek, near Quincy, will be reopened and development increased. M. Splawn is superintendent.

Trinity County.

The California Surety Co. of San Francisco, composed of H. Hume and Smith & Pringle et al., has bought the California group of quartz mines, 2 miles north of Trinity Center, for $5000, says the Redding Searchlight. Development work shows a vein 7 feet in width, which assays $7 per ton.

Tuolumne County.

The Don Pedro G. M. Co., below Chinose Camp, has men at work. The shaft is 140 feet deep and going down at rate of 10 feet per week. When depth of 200 feet is reached a second level will be run northward to connect with the old workings. W. H. McClintock is superintendent.——Three miles west of the Don Pedro mine, at Golden City, N. Williams has men at work on the Oak Hill property (formerly the Olsen mine). He is making regular shipments of ore to reduction works.

The mill of 100 stamps at the Eagle-Shawmut mine, near Chinese, is in full operation, crushing five tons per stamp, says the Independent.

Pumping has been started at the Black Oak mine, near Soulsbyville, preparatory to resuming after being closed on account of trouble over Chinese ore sorters being employed.

Oliver, Deleray & Grant are putting in a Huntington mill at the Little Bonanza mine, near Columbia, which they are operating. The wooden rails in the tunnel have been replaced with T rails. It is intended to run the entire dump through the mill.

A cyanide plant is being put up at the Vine Spring mine of the Yankee Con. Co., near Columbia.

It is reported the Black Oak M. Co.,

owning the Black Oak mine, near Soulsbyville, will be reincorporated under the laws of Wyoming.

At the Mt. Jefferson mine, at Groveland, the 20-stamp mill has been put in operation, and the overhauliug and changes are expected to result in increased capacity. In the east shaft depth of 680 feet has been reached. The pump has been moved from the west to the east shaft and set up at the 500-foot level.

The Sierra G. M. Co., at the Del Monte mine, near Groveland, has men witb teams and scrapers grading for the mill below the hoist.

At the Belle mine, near Tuttletown, the railroad has put in a spur track. Owing to the difficulty of obtaining wood, El Rico M. Co., operating the Belle, has decided to use oil for fuel. Oil tanks are being built and the boiler in the hoist has been fitted with an oil burner.

San Diego County.

The Golden Cross mines at Hedges, which have been in the hands of a receiver for several years, will revert to the owners this month. For several months no mining has been done, the work consisting of operation of a cyanide plant on ore already mined. The product of the mines for the past year is reported to have been $150,000. It is expected mining operations will be resumed in January.

Santa Clara County.

J. Joyce and W. B. Hollaway of Boston, Mass., and Mauager R. B. Harper of the Santa Teresa Quicksilver M. Co., bave honded 200 acres of land south of San Jose, with right to buy for $10,000. They have also an option on ores and mining rights on the J. Borba place of 175 acres adjoining for $5000. The property is said to contain quicksilver deposits.

Reports from Morgan Hill say that gold has been found by C. Seavey ½ mile west of the depot while digging a well. When down 30 feet he is said to have struck rock which contained mineral, samples of which assayed $5 a ton in gold.

Santa Clara County.

At Sargent oil sand was struck last week at depth of 840 feet in the Alberta well. It was "heaving saud" and it rushed up through the pipe, covering the tools, as the pipe is of small diameter. Manager E. R. Snyder says a 16-inch well will be sunk.

Shasta County.

The Redding Land Office last week handed dowu a decision declaring twenty-seven acres of the center of Harrison gulch to be mineral bearing, aud recommended that a mining patent be granted on it as requested, in opposition to the petition of the town for a townsite patent. The townsite people will appeal from the local decisiou to the General Land Office. Bonanza quartz claim, located by E. P. Sherk, F. L. Large and A. Fletcher, extends diagonally across the main portion of the camp. Its surface contains improvements valued at $25,000.

The crosscut tunnel on the Evening Star mine, Old Diggings district, near Redding, is completed and tho main ore shoot openod at depth of 150 feet below other workings iu the mine. The tunnel is 1000 feet in length. The ledge is of quartz 3 feet in width.

Siskiyou County.

A bond on claims at Hamburg has been given to C. Tucker, J. S. Perky, L. L. Rees and B. A. Cardwell of Denver, Colo , for $300,000, and a ditch will be built from Scott river. The banks and bedrock in that section carry pay, but the lack of water permits only a sbort season. With a ditch from Scott river the ground can be worked all year round. The section for 10 miles from the Klamatb river to near where tbe Scott river joins the Klamath will bo made available.

The development work at the McKinley mine on Humbug creek, near Hawkinsville, is progressing, with fifty men employed. Ore is being taken out for the mill, which will be in operation this month.

Yuba County.

The acreage of river bottom land sold and honded along the Yuba river between Marysville and the Parks Bar bridge, 14 miles east of Marysville, exceeds 4600 acres, says thc Marysville Democrat. Payment made last week on the Sunset, Klondike and Gilt Edge claims, near the Parks Bar bridge, insures the dredging of land for gold from a point 1 mile east of Marysville to the bridge. But few tracts considered valuable are unsold.

COLORADO.

Boulder County.

The mill at the Wano mine at Jamestown is in operation. The cyanide process is used. The vein is said to be 40 feet wide, of low grade ore.

The Pennsylvania mill at Culbertson, 4 miles east of Boulder, will be remodeled and converted into a combination lead and pyritic smelter, says tbe Eldora Miner.

Manager Lake of the Boulder County mine, at Cardinal, is putting in an air compressor. This will he used in furnishing power for the 3000-foot tunnel.

Chaffee County.

H. Granfield, president of the Triad G. M. Co., is reopening the company's properties in Trout Creek district, east of Schwanders, near Buena Vista. Sinking from the surface is under way, and when a depth of 50 feet is reached the shaft will he equipped with machinery and sunk to 500 feet. The group consists of four patented claims.

Clear Creek County.

Superintendent W. B. Stewart of the Big Five Ceutral tunnel, near Idaho Springs, is starting work on the new sampler to be built on the south side of Clear creek and near the mouth of the tunnel. This sampler will be followed by a concentrator to be erected by the same company, both to handle the product of the tunnel properties. The track from the tunnel has been extended and timbers for the bridge over the creek and the trestle leading therefrom to the sampler are on the ground. The grade from the bridge to the sampler will be 1 inch per 100 feet. Tbe height of the bridge will be 32 feet, and the ore will be dumped from the mine cars directly into the mill bins.

S. E. Cadwallader has resumed work on his Franklin County mine at Lawson, adjoining the Murray mine, and across the creek from the Commodore power house. The shaft has been sunk 188 feet and three levels run east and west, there being a total of 800 feet of drifting. The mine formerly produced gold and silver ore. The upper levels have been stoped to the surface. The Commodore tunnel at Lawson will cut the Tabor vein.

Development work will be increased on the Santiago group of mines in East Argentine district, near Georgetown, bought by the Hazleton G. M. & M. Co. The group consists of eleven full patented claims, and has produced high-grade gold ore.

After a temporary suspension of three months, operations have heen resumed on the Pueblo mine on Griffith mountain, near Georgetown, owned and operated by the Progressive Eigbt M. Co., composed of Pueblo men. The upper tunnel is in 750 feet, while workings on the lower two are progressing, says Manager Knowlton.

Custer County.

The American Flag mine, near Custer (Rosita P. O.), is nearing the Cuter drift, where a body of ore was left, says the Record. The mine is still pumping considerable water, and it takes eight hours per day to keep it under control.

Men are at work on the Humboldt miue at Rosita, overhauling the machinery. Tbe hoilers have heen repaired, a pump set up and the work of unwatering the mine started. The shaft, which is 800 feet deep, is said to be filled for 125 feet with debris, as the mine has been idle several years.

Fremont County.

The Bluff Springs coal mine, near Florence, tbe difficulties betwcen the owner and the miners having been settled, is again in operation. The starting up of this property leaves but one idle independent mine in Fremont county, says the report.

Coal is reported opened up at tbe Ned Earle mine, 1 mile south of the Chandler mine and 8 miles southwest of Florence. The ground is under lease to C. Cowan. He has been prospecting with a diamond drill for an extension of the Chandler coal vein and struck it at considerable depth, but it proved to he practically worthless at this point. On drilling deeper at depth of 650 feet a 5-foot vein of bituminous coal was cut. The presence of this vein was heretofore unknown. But at 800 feet the drill tapped a 6½-foot vein said to be authracite. Cowan has stopped drilling and will begin sinking a working shaft and will equip the mine with machinery to mine to depth of 1000 feet.

The Union Oil M. & Dev. Co., which owns 480 acres of land 4 miles nortbwest of Florence, and a lease of eigbty acres from the United Oil Co., south of Florence, has begun drilling for oil. L. F. Collins is president.

Gilpin County.

Superinteudent E. Steffan of the Delmonico mine, on Quartz hill, near Central City, has resumed operations, which were stopped on account of the shortage of coal. A new steel cable, 1800 feet long and ⅝-inch thick, has been put on the drum of the hoist, and sinking operations will start this week. The shaft is down 1350 feet and is to be sunk to 1500 feet. Developments will be carried on in the tenth level. The shaft shows a 4-foot vein with 18 inches of chalcopyrite, zinchlende and galena, which carry good values. Louisville, Ky., parties are the operators.

During the last week of November the shipments of smelting and otber ores, tailings and concentrates from the Black Hawk depot to the Denver smelters and to outside points for treatment were fifty-five cars, or 1120 tons, making a total for the month of 199 cars (3980 tons). These shipments were not up to the average, on account of a temporary suspension of shipments at a number of mines on account of the shortage of coal supplies, says the Register-Call. Another reason was stoppage of shipments from the Saratoga properties, where operations have been curtailed at the shaft workings, with a reported view of making connections with the group through the Newhouse tunnel, which will drain it. The coal strike being settled in the Northern coal fields, on which Gilpin couuty is dependent for its coal supply, it is expected shipments will be increased during December.

A gasoline hoisting plant has been put in at tbe Nemeha mine on Bobtail hill, near Central City, says Superinteudent G. MacGregor, and development work will be increased.

A large amount of assessment work is being done around Rollinsville by outsiders, says the Post, believing that the Moffat road will benefit the entire northern section, embracing the territory in and around the Independent, Central, Phœnix, Moon gulch and South Boulder districts. Their remoteness from shipping points has retarded the growth of these districts, but tbe railroad will put them within 3 miles at most of transportation. It is expected tbe road will not reach Rollinsville before spring.

Work is progressing at the mill being built by the Blue Grass M. & M. Co. at Pbœnix, and at same time developmeuts continue under Superintendent R. L. Alexander in the Lone Star mine.

A shaft building and 12 H. P. gasoline engine have been put up on the Diedrick mine in Illinois gulch, in Illinois Central district, uear Central City. The shaft is down 150 feet and will be sunk 100 feet deeper and drifting done. H. E. Coru of Denver is manager.

Sinking operations continue at the Old Town mine, near Russell Gulch, and the shaft has reached the 1300-foot point, showing 4 feet of mineral in the bottom. The lower levels are being opened up. The shaft will go to depth of 2000 feet, provided water troubles do not become too difficult to handle with steam pumps, says Manager G. J. Kimball. He has fifty men at work.

Gunnison County.

The Venango group in Union district, near Pitkin, operated by Manager Halowell, will continue work during the winter. There is considerahlc milling ore on the dumps and in the mines.

At Whitepine the Akron M. Co. is increasing developments. Its Lake Hill tunnel is in 4000 feet and has cut ore on which they are drifting. In the 330-foot shaft a body of ore was cut. The company has been shipping steadily from the North Star shaft and levels. The tunnel has drained these workings of water. The concentrating mill is operating on low-grade ores and it is planned to increase the capacity to 100 tons daily.

Hinsdale County.

C. H. Turney of Smithville, Texas, manager of the Red Gulch and other mines in Park district, near Lake City, says they will sink a shaft on their Cooper Creek group to show extent of the ore body. The ore runs 1 ounce in gold and 150 ounces in silver per ton.

Las Animas County.

A party of five non-union men going from Berwind to Primero, on the 7th inst., were fired upon from ambush on tbe trail, supposedly hy strikers. A pitched battle was also reported on the same day at Seguando, a Colorado Fuel and Iron camp, between thirty striking Italian miners and seven of the company's guards. Three of the strikers were shot and two of them will probably die. Nono of the guards were hurt. The fight occurred at the coke ovens at the cdge of the camp. The miners went to the ovens, but were ordered to stop by the guards. While a number of deputies and clerks were driving from Berwind to Tobasco on the 9th inst. they were fired on by several men hid behind rocks and brush. They returned tbe fire. The sheriff and posse are hunting for the men. Several arrests have been made.

Ouray County.

The Wheel of Fortune mine, in Uncompahgre mining district, is again being worked under bond and lease hy Humphrey Bros. of Ouray. This property is at Bear Creek falls, 2 miles south of Ouray, on the line of the "Circle route" to Silverton via Red mountain. The pay streak averages 1 foot in width and the vein between the walls is 3 feet. It is smelting ore, and the local pyritic smelting plant, north of Ouray, is receiving the output. Considerable stoping ground is reported developed.

The Barstow M. & M. Co. has its mill building, near Ouray, completed, and the machinery is being placed. There are 100 men in the mine and on the surface works. The main output of the mino will be a high-grade product of gold and silver, says Manager J. Geise.——The Treasury Tunnel Co., near the Barstow, is making shipments to the smelters.——Twelve men are at work on the tunnel in the Blowout mine, near Ouray, says Superintendent J. W. Jones, for the Ouray Con. M. Co.——The American-Nettie has resumed under W. C. Wrisberg, president. The mill is running two shifts. The tram from tho mine to the mill has been repaired.

Park County.

Mining movements at Alma are progressing. Ore shipments are keeping up to fall average witb the exception of the London mines, which have had part of their teams hauling timber for winter supply. Preliminary to next season's placer mining at Alma three more reservoirs will be built along the Platte river, covering a distance of 6 miles above the town. This will increase the water supply as well as pressure for the giants of the Snowstorm Hydraulic Co.

San Juan County.

The Ruby Basin M. & T. Co. will build a 100-ton mill next summer and also a 1¼-mile tram line from the mill and mine in the basin to tbe Red Mountain R. R. tracks. The past year's development on the Ruby Basin properties has opened up the ore bodies, and although the main tunnel has not cut the principal veins of the group there is sufficient ore in sight to warrant the mill and transportation facilities planned, says the Silverton Standard.

Machinery has been set up at the Gold Prince mines, near Silverton, and the tunnel is being driven ahead with power drills. Tbe capacity of the compressor is sufficient to run fourteen drills.

P. C. Molan, superintendent of the Eureka Exploratiou Co., near Eureka, reports the main tunnel on the Silver Wing group is going ahead to tap the principal vein, the Denver Belle.

Payment in full was made last week by A. A. Brown for the Picayune group, near Silverton, for $20,000.

San Miguel County

The air compressor for the Badger tunnel at Ophir is on the ground and being set up. A flume for conveying water to keep the jackets of the compressor cool has been built. The bore in the interim is being driven toward the Suffolk and otber veins by hand, says Manager Dolf. It is expected to have the tunnel completed and other development work uuder way before spring.

The electric boist has been set up at the Mayflower group in Bridal Veil basin, near Telluride, and will be put in operation this week. Development on the vein has been slow owing to a horse whim being used. Twenty men are employed, says Manager Davis.

E. S. Platner et al., at the Gold King mine, near Telluride, have a lease on the principal workings of that mine, and twenty stamps in the Gold King mill are dropping steadily during tbe day shift on ore extracted by the lossees. There are twenty-five men at work and an eight-hour shift is in effect.

Judge Wardlaw, at Telluride, on the 7th inst. sustained the motion of the District Attorney to quash the baboas corpus proceedings for release of Secretary-Treasurer O. M. Carpenter and eleven other members of the Miners' Union, who had been committed to jail to answer charges of intimidation and conspiracy. Six of the strikers fined for vagrancy last week left town, and eight who remained were jailed and put to work on the streets in the chain gang to serve for forty days. ——Twenty stamps in tbe Buttorfly mill are dropping ou ore and thirty stamps at the Tomboy are also dropping. More will he operated as more men are put on. At the latter 112 men are employed. The majority of miners arriving daily are from employment agencies in Pueblo, and among them are many Greeks. Some Americans have gone to work, but the majority are foreigners.

Summit County.

Manager J. M. Tbomas reports a reorganization of the Fremont-Vineta Oil & G. M. Co., and the gold mining portion will hereafter be known as the El Dorado G. M. & M. Co. The property consists of a group of fourteen claims, near Breckenridge. They will increase developments and block out ore before erecting a mill, a site for which has been secured on the El Dorado claims, which run down to the county road, near the Swan river. The ore is a partly oxidized auriferous iron, disseminated throughout tbe vein filling; the country rock is slate, interscected by occasional bodies of porphyry.

Teller County.

The Granite mine, on Battle mountain, Cripple Creek district, resumed shipments and is sending out three to four carloads of ore per week with one shift numbering

thirty-five men at work. The ore is coming from several levels and returns of $25 in gold to the ton are received. Seven hundred feet south of the shaft, at a depth of 1000 feet, another ore body has been opened up.

The Cripple Creek Gold Temple M. Co., operating a lease on the Gold Sovereign mine on Bull hill, Cripple Creek, is shipping ore which gives returns of $25 in gold per ton. The ore is being mined at depth of 625 feet from the surface in a drift near the Trilby mine.

The El Paso mine on Beacon hill, Cripple Creek, shipped out during month of November 1000 tons of ore, which gave average returns of $40 in gold per ton. The ore is coming from all of the levels, from the first down to the bottom, or sixth level. In the sixth level, which the drainage tunnel has unwatered, the drift has been extended south on ore for 150 feet and north for 400 feet. Superintendent Bainbridge has 150 men at work. Only two shifts are employed, the management having dispensed with a "graveyard" shift. Few of the larger mines are now employing a "graveyard shift," says the Cripple Creek Times.

The output of Cripple Creek for month of November amounted to $1,299,000, with a total tonnage of 42,600. This is an increase in value of the output over October of $335,000, and an increase in tonnage of 7550 tons. This is the first time since the strike was declared that the ontput has reached $1,000,000. Every mine in the district worked all or a portion of November. The following tabulated figures were obtained from the mills and smelters:

	Tons.	Total Value.
U. S. R. & R. Co	16,000	$400,000
Smelters	5,0 0	300,000
Portland	9,600	288,000
Tellurlde	0,000	150,000
Dorcas	2,500	100,000
Economic	2,000	52,000
Cyanide Mill	1,500	9,000
Totals	42,600	$1,299,000

Governor Peabody has declared martial law in force in Teller county, and details of troops have been stationed in the towns of Altman, Victor, Independence, Goldfield, Anaconda and Cripple Creek. Troops are holding the county jail. Governor Peabody on the 9th inst. issued a proclamation suspending the writ of habeas corpus in the case of Victor Pool, the union miner being held by the military at Cripple Creek, and in whose case Judge Seeds has granted a writ. It is understood the attorneys for the Miners' Union will apply for a writ of habeas corpus to the Supreme Court, and thus test the status of martial law in Cripple Creek district.

Engineer Jaquith measured the flow from the El Paso drainage tunnel last week and found 5000 gallons per minute being discharged through the portal. The east lateral being driven toward the dyke, lying between El Paso and the Elkton Co.'s holdings, is in 1250 feet from shaft No. 2 of the El Paso. The water got to coming in so rapidly through this lateral that the men found it impossible to work. It is 8 to 10 inches deep, says the Cripple Creek Times.

Proclamations were issued on the 9th inst. by Colonel Verdeckberg, in command of the militia, in Cripple Creek district, prohibiting gambling and directing the closing of all saloons at midnight and forbidding the sale of liquor to soldiers.

At Stratton's Independence mine at Cripple Creek, while the daily tonnage is not as large as formerly, the grade is reported to have improved. Screenings have doubled in quantity and the grade of that class of ore has advanced to $60 per ton. Last spring the coarse rock did not run over $15, while now it is averaging $23.

Work on the mill of the Cripple Creek Cyanide Co., near Cripple Creek, is progressing. The foundations are in and the machinery is on the ground. The mill will have capacity of 150 tons per day.

IDAHO.

Ada County.

S. J. Baldwin has bought the tailings dump from the Steen 10-stamp mill at Boise and will put up a cyanide plant with four 15-ton leaching tanks, which will have a capacity of 30 tons per day. Assays of the tailings show an average value of $4.77 per ton, says Baldwin.

Blaine County.

F. Reed of the Liberal M. Co., owning gold-bearing mines in Smoky district, near Hailey, says he is arranging to build a mill on the group. The ore is said to average $12 gold per ton.

The Lipman M. & T. Co. has been incorporated under Arizona laws by F. J. Keisel of Ogden, Utah, and H. M. Wells, M. H. Lipman, F. S. Harris, W. A. Nelden, R. S. Wells, C. E. Hudson and H. J. Dininny of Salt Lake, Utah, to drive the Lipman development tunnel, near Hailey.

Boise County.

Horseshoe Bend reports say a vein of coal has been found at a depth of 200 feet, having been cut by a shaft being sunk.

Lemhi County.

The Lemhi Opal M. Co. has been incorporated to work its opal-bearing deposits near Salmon City. T. Marioneaux of Nephi, Utah, is president, with W. L. Cook, A. H. Birrill, H. M. Wells, J. A. Brown, S. S. King and S. R. Thurman as directors. The deposits will be developed under the superintendency of L. L. Pratt.

Thirty stamps are dropping in the Kittie Burton mill at Ulysses.

Shoshone County.

The American Lead-Silver Supply Co. has been incorporated by J. L. Brice, J. A. Bennington, T. B. Dennis and L. Frankell of Burke, L. Feldman of Murray and J. H. Wourms of Wallace. The mining ground of the company consists of a group of claims near the head of Tributary gulch, on East Eagle creek, 5 miles north of Murray. Development work is under way. The company has a showing of galena carrying silver values.

The Frisco mine, near Gem, has drawn the sinking pumps from the 2000-foot level, but the main pumps on the 1600-foot level are kept working. The property will be sold at sheriff's sale the last of this month.

Washington County.

S. French, superintendent of the Alaska group of mines in Seven Devils district, near Weiser, says he has men at work and will continue operations during the winter.

The Ladd Metals Co. of Portland, Or., which is operating a smelter and several mines at Mineral, near Weiser, and building a smelter at Homestead, Or., last week bought an additional four mining claims at Mineral. The claims are developed by tunnels and shafts. It is intended to operate these mines, which carry values in copper and silver. The Ladd Metals Co. is working 100 men at Mineral.

KANSAS.

Cherokee County.

At Baxter Springs, at the Sunny Side mine, Dilloway & Co. have struck ore in drifting, and a drill hole put down north of the shaft shows ore. They will build a mill at the Sunny Side.

After several weeks of driving the ore body has been opened in the Goodwin-Wagner shaft on the Gaines-Brewster lease at Baxter Springs. The drill showed 20 feet of ore and the shaft has been sunk 15 feet into the ore. Lead is being found with the jack. The drill hole did not show any lead. This shaft is south of the Quapaw Mission. A mill will be built.

MICHIGAN.

November products of lake mines are reported as follows: Adventure (Greenland, Ontonagon county), 95 tons of refined copper; Tamarack M. Co. (Calumet), 600 tons; Wolverine (Koarsarge), 510 tons; Mass (Mass City, Ontonagon county, estimated), 125 tons; Islo Royale (Houghton), 150 tons; Calumet & Hecla (Houghton county, estimated), 3200 tons; Atlantic, (Houghton), 345 tons 845 pounds; Quiucy, (Hancock), 1157 tons 385 pounds; Mohawk (Allouez, Kewcenaw county), 361 tons 1620 pounds. The Mohawk production increased over the previous month despite the burning of a shaft house. The Quincy output was the largest for any month in three years, this being due largely to the showing of the westward end of the property. The stamp mill turned out 1200 tons of mineral, exclusive of the mass copper sent direct to the smelter.

Houghton County.

Houghton reports say at the Atlantic mine, since the discontinuance of rock shipments of the F shaft last July, the mineral yield per ton of rock stamped has made a steady improvement. In August they did not exceed sixteen pounds. In September in one week the amount of mineral returns was a trifle less than twenty-one pounds per ton of rock treated, and during the second week of November rock shipments aggregated 8587 tons, from which there was secured ninety-six tons of mineral, equivalent to 22.31 pounds per ton of rock, or 16½ pounds of refined copper. During the week referred to the yield for one day was eighteen tons for a twenty-four hour mill run. The product for the succeeding week of seventy-seven tons was above the average.

Last week shafts No. 3, 6 and 7 of the Hecla end of the Calumet & Hecla mine, near Calumet, were thrown out of commission by breaking of blocks on hoisting engine. It is not known how long hoisting will be delayed.

The Copper Range Con. Co., at Painesdale, November product amounted to 1906 tons of copper. The three mines produced as follows: Baltic, 622 tons; Champion, 773 tons; Trimountain, 511 tons. The Champion figures are the largest in the history of the mine. The production of the other mines shows a falling off from October.

The Mineral Range Railroad has closed the Arcadian branch and is making shipments from the Franklin and Franklin Junior mines, near Hancock, to the mill at Grosse Pointe, by way of Hancock and the Lake Shore division to Woodside Junction. The Arcadian tracks will be abandoned. The installation of the fourth head at the Franklin mill has been completed. There will be no immediate increase in the amount of rock stamped, as advantage will be taken of new head to overhaul the other three, one at a time. Last lake shipments of copper for season were made on the 2nd inst.

Keweenaw County.

The Allouez mine shaft, near Allouez, is down 200 feet, and the second skip is running. The 3-ton skips that will be used during the development period will be replaced later by a 6-ton skip. It is figured that it will take a year to bottom the shaft in the Kearsarge lode, says the News.

The consolidation of the Miskwabik, Federal and a portion of the Union Land property, near Allouez, Keweenaw county, is expected to be completed by Feb. 1st., placing about 1200 acres of contiguous territory on the Kearsarge lode under one management. The exploratory shaft on the Miskwabik is down 63 feet.

Ontonagon County.

The Michigan mine at Rockland, which began production last month with a single stamp on half time at the Mass mill, is getting a run of masses. One was raised last week weighing 11,000 pounds. While the bulk of the Michigan's production is secured from the Calico amygdaloid, the existence of rich stamp rock and mass copper in the Minnesota contact vein and in the "branch vein" are noticeable factors in the mine's production.

MISSOURI.

The Joplin News-Herald says the highest price reported for zinc ore last week was $35 per ton, and the assay basis ranged from $28 to $32 of 60% zinc, with lead remaining unchanged at $52 per ton. A year ago the highest price for zinc was $36 and for lead $50 per ton. The shutdown of the mines to improve prices is the most general thing of the kind ever inaugurated in the district, 85% to 90% of the production being represented by the agreements reported by the Missouri and Kansas Zinc Miners' Association. Added to those shut down during last week are a number more that will shut down this week.

Benton County.

C. Dahlgren, consulting engineer for the Southwest Zinc Co., and acting manager at the mines at Raymond, says he is estimating for a mill to be built there by the company. He says the company has been losing considerable of the zinc mined, in the present mill, which is not suited to the ore being worked.

Jasper County.

T. R. Nicholas, G. B. McMorrick and J. W. Gray, who have been drilling on the S. G. Norton farm, 14 miles northeast of Carthage, report having struck oil at 85 feet and a heavy flow of water farther down.

At Carl Junction the number of men employed by the Jubilee Co. has been doubled. Sinking has developed a 27-foot face of high-grade jack.——The "A" mill, Ishpeming Co., is grinding out seventy tons of ore per week. Work at the Ishpeming "J" shaft is progressing, and three eight-hour shifts are being worked at the new Ishpeming shaft.

Howell & Lytle have their pumps and other machinery in operation at the L and H mine at Carl Junction.

M. F. and B. M. Robinson and M. S. Robinson have organized the Swastika M. Co. in Joplin.

MONTANA.

The State Legistature has passed two "fair trial" bills, which are now in the hands of the Governor. They were the judicial disqualification bill and the bill providing for a change of venue in civil cases. The Senate bill providing for a review of the facts as well as the law by the Supreme Court was also passed. The only judicial bill yet remaining to be acted upon in the House is the Senate bill providing for the payment of costs where a change of venue is had.

Deer Lodge County.

At the Gold Coin group of mines west of Anaconda, Superintendent J. R. Boarman reports development work progressing and the thirty stamps of the mill are kept running steadily on ores from the Red Fir mine of the group. It is expected the capacity of the mill will be enlarged.

In Warm Springs mining district, 25 miles northwest of Anaconda, a strike is reported made in the Yellow Metal mine, owned by Stagg, Percy & Heffron, of Anaconda. They are running a tunnel and at distance of 250 feet crosscut the lead, showing 4 feet wide, and an average sample assayed $22 per ton in gold. They are also working the Mint, which adjoins the Yellow Metal. They will build a mill next summer.——Adjoining this property is the group owned by Conrad, Smith & Heffron, consisting of three claims—the Lake View, Alpine and Bell. A shaft has been sunk 60 feet on the Lake View, showing a lead 18 inches wide at the bottom, which assays $30 in gold. On the Alpine a cut has been run showing a 3-foot lead and on the Bell a tunnel is being run on the vein, the ore assaying $5 in gold and 3 ounces in silver.——Near these mines the Chicago & Montana group of five claims, owned by Chicago, Ill., and Anaconda parties, is being worked. They have uncovered a 4-foot vein of ore on the Lark assaying $8 in gold. They are preparing to build a 10-stamp mill and cyanide plant.——North of the Chicago & Montana group is the Hannah group, whose Superintendent Savage is working twenty men putting up a sawmill, building roads and excavating for foundation for a cyanide plant.

Fergus County.

Reports from the Justice mine (the Alpino) in Maiden say ore is being opened in the stopes. The Justice is owned by P. W. McAdow. The ore is a lead carbonate, carrying gold values.

Improvements to the roaster of the Gold Reef mill, at Gilt Edge, have increased the ore treating capacity of the plant. Two more plows have been added, permitting the speed to be reduced from 74 to 57 feet per minute, giving more satisfactory results in the roasting, says the Argus.

The Judith M. Co., operating north of the mouth of Spotted Horse canyon, near Lewistown, is preparing for winter work by putting up buildings.

Flathead County.

At Cabinet H. G. Bodich of Libby has bought the Horse Mountain claim and has let a contract for sinking a 50-foot shaft. The Horse Mountain is 2 miles northeast from Cabinet and near the headwaters of Miller creek. It is intended by Bodich to run a tunnel 200 feet after the 50-foot shaft is completed.

Granite County.

The Willow Creek M. Co. has men at work in the Bluebird mine on upper Willow creek, near Phillipsburg. A mill, boiler and engine are on the ground and will be put up in the early spring. Grading for the mill is completed. On account of the heavy snowfall, all outdoor work has been stopped and the men put to work in the mine.

L. Winegar, operating on Willow creek near Phillipsburg, says Ainsley's mill is in operation on ore from Gwin & Winegar's mine, ½ mile distant. J. Ainsley reports having struck ore in his mine near the Ainsley mill on Willow creek. The pay shoot is 15 inches wide and carries free gold.

Madison County.

The Bismarck & Nuggot Gulch M. Co., operating the Toledo mine, near Sheridan, will increase the capacity of its mill from 50 to 150 tons a day. Development is showing up added bodies of ore.

Lewis and Clarke County.

At the North Star mine, near Marysville, owned by T. Cruse of Helena, in the 400-foot level a vein of 7½ feet of shipping ore has been cut. In the 100-foot level another find has been made, consisting of 5 feet of high-grade ore. In the former strike assays from the entire vein run $100 per ton, values being equally distributed between gold and silver. In the other the values are principally in gold. These discoveries are not on the vein that has heretofore been worked and are independent of the main North Star vein.

Silver Bow County.

The Ravon mine in Centerville, near Butte, is expected to begin producing copper-silver ore this month. The owners, C. Mattison and J. Berkin of Butte and W. W. Morris of Pony, have straightened the shaft and added 100 feet to its depth, making it 500 feet in all, and have also opened the vein at the bottom. In doing this work enough ore is being taken out to pay the expense of operation.

NEVADA.

Elko County.

The Dexter Tuscarora mine, near Tuscarora, has closed down for the winter. The management deemed it inexpedient to run the slimes plant during the winter, says Superintendent Archer. A few men will be kept at the mine.

Esmeralda County.

The Gold Mountain Con. M. Co., southwest of Tonopah, has leased a considerable portion of its ground to miners, who have begun sacking ore, which will be sent to the two mills at Tonopah as soon as these are completed, says the Bonanza.

The Tonopah M. Co. at Tonopah is employing 125 miners and is confining operations almost wholly to development work

in the lower levels. The Siehert shaft is down 900 feet and the next station will he cut at the 1000-foot point. The south crosscut on the 700-foot level has made connection with tbe Valley View sbaft, and is 850 feet long. This connection gives ventilation. The four ledges which were cut in the crosscut on the 500-foot level were found in place on the 700, the width and values being maintained. The ores are principally oxidized. A drift is heing run on a ledge 400 feet from the Siehert shaft, the width of the ledge heing 4½ feet, averaging $90 a ton.

B. I. Potter has hought and will work the Wheeler tailings at Pinegrove, hy cyanide process.

Lincoln County.

Manager Perew of the Southern Nevada M. & M. Co. at Searchlight reports work progressing. He says they have a full quota of men at work and are drifting on the lead from the new shaft at a depth of 140 feet. They have tapped it on the 200-foot level of the old shaft and are crosscutting on the 300-foot level.

The Empire M. Co., consisting of Eastern and Los Angeles, Cal., men, is working men on the Badger and Mountain Jewel group of claims (the Flynn mines) in Newberry mountain. The properties are 19 miles from Searchlight and 30 miles from Ibex. The road leading from Ihex, however, heing the much hetter road, all traffic to and from the camp of the Empire Co., supplies, etc., will go in by way of Ihex, with Needles, Cal., the supply point, says the Eye.

The mill on Bamherger's DeLamar mines, at DeLamar, is in full operation. With four Chilian mills in operation, they are crushing au average of 225 tons of ore daily for the leaching tanks. It is the intention of the management to resume work on the Magnolia group, says Superinter dent F. Keith. Meanwhile the main channels in the DeLamar proper and April are being opened up at greater depth with satisfactory results.

The Quartette M. Co., at Searchlight, has resumed sinking with three shifts. ——The three-compartment shaft of the Saturn M. Co. is under way. It is said the company intends sinking to depth of 1000 feet.

At the Good Hope mine, at Searchlight, Manager P. D. Carper says machinery is heing set up and sinking will be hegun in the main shaft. The pump is raising 12,000 gallons of water a day.

Manager O. E. Ellis of the Scoal Gold Reclamation Co., which has heen incorporated to work in El Dorado district, near Searchlight, says the holdings consist of two claims a mile south of the Eagle wash. The lead measures 20 feet wide in places. Development work will he hegun this week. A mill will he built as soon as the showings justify.

The Searchlight, at Searchlight, says that local conditions are improving is shown hy the fact that the freighting outfit, which handles the greater part of the freight and passenger traffic, has fifty-six animals on the road, and in January will put on three ten-animal teams.

At Calientes the principal mines in operation are the Keystone, Douhle Up, Forty-nine and the Mormon mine. At the Keystone fifty men are at work and ore which carries gold is heing mined, which is milled at Sandy. Near this mine is the Cinnahar mine, where quicksilver is being ohtained, as well as some gold. The Mormon mine is under hond to J. M. Kennelly, who is preparing to work it. South of this mine are the Douhle Up and Forty-nine mines, from hoth of which gold ore is being extracted.

Nye County.

The Tonopah Utica M. Co., which owns a group of three claims adjoining the Liherty mine on the north, is opening up its group, says C. F. Maunder, manager.

The Dolores Turquoise M. Co. has heen incorporated to work the turquoise prospects at Ray, north of Tonopah. The officers are A. & M. H. Kunze, J. C. Conklin, E. E. Kunze and A. Conklin. J. C. Conklin is manager.

Storey County.

Drill hole No. 6 on the Brunswick lode, at Virginia City, has reached depth of 425 feet, with the hottom in porphyry and quartz stringers.

Washoe County.

A 3-stamp mill and accessories are on the ground for E. Olinghouse at Olinghouse canyon, near Wadsworth. Thero are $15,000 worth of gold ore on the dump ready for crushing.

The prospecting drill heing used by the Springfield Nevada M. Co. is in operation on hore hole at mill No. 1, and is making 17 feet per day. The mill is heing put in order.——Nelson & Effrick's lease on the No. 1 is reported improving. Thirty-four tons of ore taken out in development have heen milled, yielding $20 per ton.

White Pine County.

H. A. Jackson, superintendent of the Rocco-Homestake mine at Hamilton, says machinery is on the ground for the hoisting plant. The gallows-frame is going up.

NEW MEXICO.

Bernalillo County.

The Peralto Canyon Con. G. M. Co. has heen incorporated, with principal place of business at Alhuquerque. Incorporators are D. C. Dunlap of Alhuquerque, P. A. Young of Chicago, Ill., and C. Sheldon of Milwaukee, Wis.

Grant County.

The American Con. M. Co., with headquarters at Amizet, near Twining, hut which is working prospects in Long's canyon at Gold Hill, has increased its number of men at work.

Lincoln County.

The Riaeto M. & R. Co. has been incorporated at Parsons.

The Bonito M. & R. Co., with principal offices at Parsons, has heen incorporated hy G. L. Gihson, T. B. Grist and R. C. Dryden of Parsons and Chicago, Ill., men.

Otero County.

The turquoise mines at Jarilla have been leased hy the Electric M. & M. Co., and operations will begin this week. Machinery has heen put in and horing for water started, says G. J. Moffett, manager.

Santa Fe County.

T. Neis reports locating a 3-foot coal vein in his mine near Cerrillos, the vein showing 3 feet wide at depth of 75 feet.

Sierra County.

The Bigelow G. & C. M. Co. is sbipping ore from the Mamie Richmond mine at Hillshoro. The company proposes to hlock out 50,000 to 100,000 tons of ore hefore putting up a treatment plant.

Taos County.

The Fraser Mountain C. Co. has its smelter at Twining in operation. More men will he put on at its mines.

OREGON.

Baker County.

The Pulaski G. M. & M. Co. will resume work on the Pulaski mine by Jan. 1st. The crosscut will he driven ahead to the main lead and drifts run hoth ways on the ledge. The company has nine well-timhered claims, with ample water supply, near Sumpter, on the line of tbe projected railroad to Bourne.

Superintendent A. Otness of the Gipsy King mine, in Cahle Cove district, near Sumpter, reports development work under way. He is drifting on tbe vein that has heen cut on the Bull creek side of the divide. The face of tbe tunnel is in porphyry. The company owns seven claims, reaching from Big Timher to Bull creek.

It is expected the Golden Wizard mill, near Sumpter, will be completed next month, says Superintendent McPhee.

Douglas County.

E. Wood of Spokane, Wash., superintendent of the Crystal Con. M. Co., says work is under way on their stamp mill being built near Bohemia. There are thirty men at work.

Grant County.

J. W. Messner, superintendent of the Prairie Diggings mines, near Prairie City, says that at the Mars group of copper claims a hoist is heing set up with depth capacity of 500 feet. Work at the Prairie Diggings is progressing. The shaft is down 200 feet and the main lead is expected to he cut in the next 100 feet. Messner will start the mill in January.

P. A. Brady, superintendent of the Belcher, near Granite, says work will hegin on tbe 20-stamp mill to he huilt at the mine, next week. It is expected to he put in operation in the spring. A raise is heing made from the lower to the upper workings a distance of 150 feet, and other development work done. Brady states progress is heing made on the Red Lion mine, of which he is also superintendent. The vein has heen cut on the lower tunnel showing width of 30 feet, with a 6-foot pay streak assaying $7. A mill will he put in.

SOUTH DAKOTA.

Lawrence County.

The Golden Crest M. Co. is running its 10-stamp cyanide mill, near the head of Two Bit creek, near Galena, near the Branch Mint ground. The capacity of the mill has heen doubled.

On Ruhy gulch, near Galena, the Ruhy G. M. & M. Co. is huilding a mill of fifty tons daily capacity, which will be ready for operation in Marcb. The mine is opened up, showing free milling and concentrating ore. J. Conzett of Deadwood is manager.

TEXAS.

Limestone County.

Oil is reported struck at Big Hill, 250 miles southwest of Beaumont, and a rush is on to the district. The wells are on the line of the Cane Belt railroad. A gusher was struck last week, and the owners capped the well, but it hroke loose, and is said to be gushing at the rate of 5000 harrels daily.

UTAH.

The ore settlements for the month of November were $1,718,500, as against $2,125,393 for Octoher. This does not include the value of over 3,000,000 pounds of matte, containing gold, silver and copper, from the independent smelting plants of tbe State. Figures on the value of the matte from the independent smelters are not obtainahle, except in tbe case of the Majestic, which has made $20,000. The output of the smelters for the month is given as follows in pounds:

Bingham Con	728,292
Highland Boy	1,103,636
United States	788,413
Majestic	380,000
Total	3,000,341

The output of tbe independent plants in Octoher was 2,656,200 pounds. The increase is due to the hlowing in of the Majestic smelting plant at Milford.

Beaver County.

W. J. Bowring of Salt Lake City, who has a hond and lease on the Copper Mountain group, near Milford, has put men to work on development.

W. A. Wilson, manager of the Sheep Rock mine, near Milford, says they are drifting on the vein on the 300-foot level, and it is intended to put in a gasoline hoist and sink 300 feet more.

The pipe line between Wah Wah Springs and tbe Newhouse smelter site, near Frisco, was completed last week and bas heen tested. In construction of this line, by which tbe town, the mines and reduction works will be supplied with water, 44,000 feet of pipe has heen used. Construction of the main reservoir at camp has hegun, says Superintendent J. Dederichs.

R. M. Pope of Salt Lake City, manager, says the American M. & Rare Metals Co. of Utah has heen incorporated, and has gained control of the Letitia group of claims near the Old Hickory mine, near Milford. This group consists of six claims. It is intended to increase development work. The ore carries values in copper and silver. Several shafts have been sunk and will he deepened and drifts run on the ore. The company also owns a numher of asphalt and gilsonite-hearing claims in eastern Utah. A vein of ozokorite in Grand county will be developed.

Box Elder County.

Work on the group of the Sunrise M. Co. at Park Valley is progressing, says Manager S. Simon. A mill will he built, which will have five stamps to start with. The ore carries gold values.

Work is under way on the Little Jimmy group of claims at Park Valley, owned by McCarrick, Page et al.

Carbon County.

Vice-President Kramer of the Utah Fuel Co. says they are securing Americans to work in the mines whenever possible. "The worst is over and the mines will be kept open." More men are being put on daily.

Garfield County.

The Clawson G. M. Co. has heen formed at Ephraim, to operate in the Henry Mountain mining district, west of Hite.

Grand County.

Work will he started up this week on the Beaver Basin group, near Basin, hy the Dirigo-La Sal M. Co. The merger of Beaver Basin and Deep Creek interests is settled. The Dirigo-La Sal Co. owns a comhined area of 600 acres of mineral land on the northeast slope of the range. Reduction works will he huilt.

The cyanide mill at the Inter-State Co. property in Gold basin, near Basin, is nearing completion and will he ready for operation next week. —— The Grouse Mountain M. Co., operating in Miners' hasin, has put in additional equipment, will increase its force to three shifts and drive the tunnel ahead to cut the vein. They have 150 feet to run before cutting the Mayday vein. This company is preparing to put in a 100-ton cyanide plant.

Iron County.

The Utah-Montana M. & M. Co. of Salt Lake City is heginning development work on its group in Indian Peak district, 16 miles north of Stateline.

It is reported G. P. Smith, superintendent of the Shawmut mines at Fay, Nev., has a hond and lease on the Amethyst and Wild Irish claims, south of Stateline, near the Nevada line. Smith also has a hond on the Snowflake in tbe same section, calling for $50,000. These claims are in a gold district and adjoin the Independence.

Juab County.

D. A. Depue of Rohinson and H. Joseph, manager of the Carisa, have a lease on the Sioux-Utah group, near Eureka, and have hegun stoping operations. The Sioux-Utah group was a former producer of Tintic district. Arrangements have heen made with the smelters for shipments.

Novemher shipments from Tintic district were as follows:

	Cars.
Bullion-Beck	24
Carisa	27
Centennial-Eureka	159
Gemini	31
Grand Central	78
Lower Mammoth	50
Swansea	15
South Swansea	18
Tetro	10
Yankee Con	12
Eleven others, total of	25
Total	449
May Day (concentrates)	3
Iron Ores—	Cars.
Black Jack	22
Dragon Iron Mine	102

Salt Lake County.

Manager L. C. Snyder of the Iowa mine at Bingham, says operations were resumed last week. The Iowa group is near the Red Wing, Julia Dean and Red Wing Extension, and consists of nine claims along the Montezuma vein.

The tracks of the Copper Belt railway at Bingham have been laid to the ore bins at the Yampa group of mines, says Manager W. Bayly, Jr., and the forwarding of ore over them has hegun. The Yampa has heen hauling hy team forty tons of ore daily to the furnaces of the Bingham Con. M. Co. As the contract with the Bingham Con. accords the Yampa the privilege of delivering to it 300,000 tons, it is expected the output will he increased to 200 tons a day. —— The spur to the Columhia group of mines, operated hy the Ohio C. Co., will be completed this week, when the furnaces of the United States M. Co. will get fifty tons daily from that source pending remodeling of the Winnemuck mill, which will he operated by the Ohio Co. Rail connection witb the Boston Con. ore hins are expected next week.

Last week the main fissure of the Erie mine at Bingham was cut hy the drift from Mystic Shrine tunnel and is sbowing 3 feet of smelting ore that assays 45% iron (low in silica), 4½% copper, 14 ounces silver and $2.80 in gold. The Erie is heing operated under hond and lease hy J. W. Cairns & Co.

The valley furnaces during the month of Novemher handled a total of 90,000 tons of ore, distrihuted as follows:

	Tons.
American S. & R.	37,000
United States M. Co.	24,000
Highland Boy	15,000
Bingham Con.	14,000
Total	90,000

The Bingham Con. had hut three of its furnacos in operation, hut with the increased tonnage from the Yampa and witb Boston Con. as a producer the present month will requiro the fourth to he put in commission.

The Harker M. Co., recently formed, has started operations in Skull valley, near Salt Lake City. A winze is heing sunk from the tunnel level on a vein of silver-bearing ore, which shows surface assays of $5 per ton. D. Harman is manager.

The management of the Bingham Con. smelter at Bingham is figuring with the railroads and the Eastern coal companies on the cost of importing Pennsylvania coke, says the Trihune. The railroads have made an arbitrary rate of $6.50 from Duluth, West Superior and Chicago, and the coking companies will sell the fuel, f. o. h. ovens, at $1.75 per ton. What remains to he ascertained is the cost of lake and railroad transportation hetween Pennsylvania and Duluth, Chicago and West Superior. The smelter has heen paying $10 per ton for Montana coke. It is thought the rate made by the Western roads will he revoked when the Utah Fuel Co. is in position to supply the local demand.

Work on the concentrator of the Utah C. Co. at Bingham is progressing. The iron for inclosing the huilding is on the ground, and as soon as this is up placing the machinery will he started. The working tunnel through which the ore is to be mined is well under way and the air line from the United States is nearing completion, which will enahle starting tbe drills.

Sevier County.

The Clawson G. M. Co. of Ephraim, Sanpete county, has been incorporated hy J. A. Clawson, J. A. Anderson & A. C. Bosen. The company owns the Grand Central, Pacific, Alice, Dewey, Admiral and J. A. C. claims in the old Henry district of Sevier county.

Summit County.

The contemplated improvements at the Liherty mine are to he postponed until spring owing to delays occasioned hy the carpenters' strike. It has beon the plan of the company to install a system of modern machinery, including power drills to drive their 2700-foot tunnel, hut this winter this work will be done by hand. Nothing is expected until the tun-

nel has advanced 600 or 700 feet, although several small fissures have already been crossed. Six hundred feet of tunnel ought to place them in the mineralized zone opened above.

At the Naildriver mine, at Park City, the drift from the shaft to the tunnel has been completed, opening up an air passage as well as providing means of escape in case of accident. It is intended to sink the shaft to the 700-foot level before crosscutting. The shaft is down 670 feet and work is progressing through a limestone belt. Considerable water has been struck. —— Superintendent Hickey of the Comstock mine has men cutting a station on the 450-foot level and will crosscut to the vein. It was intended to sink another 100 feet before the station was cut, but this could not be done on account of the water. Hickey expects to get the shaft down to the 550-foot level before spring.

Manager Turner of the J. I. C. mine of Park City says the shaft is down 650 feet, and is being driven at rate of 2 feet per day.——The steam plant of the Diamond-Nimrod mine at Park City started up last week, and a 1000-foot shaft will be sunk. This company holds the undeveloped ground near the Silver King, Daly-West and Ontario.

Tooele County.

The Honorine tunnel at Stockton, running through the Black Diamond ground, has tapped a ledge with a width 50 feet between walls, and to prospect it Manager J. Dederichs will begin work as soon as Superintendent Raddatz of the Honorine M. Co. gives him permission. Meanwhile he is working the ledge from the upper levels.

Utah County.

The Dutchman M. Co. has been incorporated, with American Fork as principal place of business. The company owns the Wild Dutchman and nine other claims in American Fork canyon. The directors are: W. G. Andrews, W. J. Holdon and F. S. Many of Cleveland, Ohio, and W. A. Madison and H. J. Kruse of American Fork. W. A. Madison is superintendent.

The Colton Wax M. & Oil Co. has bought the Colton wax mines No. 8, near Colton.

WASHINGTON.

Ferry County.

During month of November 152 carloads of ore were shipped from the mines of Republic camp, amounting to 5320 tons, valued at $95,706. The Quilp mine shipped 48 cars and the Mountain Lion 65 cars. The others were shipped from the Nob Hill, Morning Glory, Trade Dollar and Zala M. mines.

WYOMING.

Carbon County.

The directors of the North American C. Co., including W. G. Emerson and J. Carey of Denver, Colo., propose to spend an additional $250,000 for improvements in the equipment of the company at Encampment, says the Times. Their plants were closed down last week, throwing 500 men out of employment, the cause being necessity for repairs in the 16-mile aerial tramway and in the smelting plants. The improvements will include alterations in the reduction works and added development of the Ferris-Haggerty mine, including a complete system of underground compressed air railroads. These improvements will occupy the winter and the mine and works will be reopened in the spring.

FOREIGN.

AFRICA.

Transvaal.

The discovery of diamond bearing ground is reported at Jacobsdal. Twenty-two shafts have been sunk over a distance of 140 feet, in each case showing rich yellow ground, and blue ground at a depth of 40 feet.

BRITISH COLUMBIA.

Boundary District.

Shipments from the Boundary mines for the month of November amounted to 74,431 tons, against 73,256 tons for October. Shipments for the year to the last of Novemher were as follows:

Mines.	Tons.
Granby	336,417
Mother Lode	117,884
Snowshoe	70,252
Emma	19,650
B. C.	19,365
Sunset	15,521
Oro Denoro	12,766
Athelstan	4,156
Morrison	3,339
Winnipek	2,435
Providence	910
Elkhorn	213
Total	602,814

East Kootenay District.

At Perry creek, near Fort Steele, the Theis M. Co. is sinking a shaft to reach bedrock.——It is planned by the Kootenay Perry G. M. Co. to continue exploratory operations on their holdings all winter. A cable tramway is being extended from the wagon road to camp, to be used in transportation of supplies and machinery.——Several Chinese outfits which have been working in the bed of Wild Horse creek the past summer are reported to have made an average of $5 per day per man.

One hundred and fifty coke ovens are in operation at the Crow's Nest Pass Coal Co.'s mines at Morrissey. The remaining 100 will be completed in the spring, as construction work has stopped for the season, owing to unfavorable weather.

H. H. Shallenberger will work the Moreen claim, in South Deadwood camp, this winter. It adjoins the Buckhorn claim and is said to have a 60-foot ledge, with copper values.

Rossland District.

Shipments from Rossland camp for the month of November aggregated 38,576 tons, against 38,151 for October. Shipments for the year to the last of November were as follows:

Mines.	Tons.
Le Roi	197,045
Centre Star	72,556
War Eagle	54,168
Le Roi No. 2	24,115
Le Roi No. 2 (milled)	1,400
Jumbo	3,593
Spitzee	120
I X L (milled)	1,750
Kootenay	6,798
Giant	830
Iron Horse	40
Velvet	3,376
White Bear	297
O. K	25
Homestake	90
Total	367,140

P. H. Craven and G. Pringle have another lease from the I X L M. Co. at Rossland, this new agreement covering the mine itself, as heretofore the lessees have only had rights on the dump. Development work will be increased and the product of mine and dumps will be milled at the O. K. stamp mill. Alterations will be made in connection with the water system at the mill. The pipes conveying the water to the plant will be protected from the frost and the exhaust from the engine will be run through the tank inside the mill for raising the temperature.

The White Bear M. Co., at Rossland, is arranging to build a plant to use the oil process. It is understood the company will have a fifty-ton plant as a starter, with arrangements for increasing the capacity. Tests of White Bear ore have been made with the process. The company has a millsite and water records staked between Rossland and Trail on the line of the Canadian Pacific railway.

It is reported work will be resumed at the Monte Cristo mine, near Rossland, controlled by Montreal men. The Monte Cristo possesses reserves of ore, says the Rossland Miner, that were too low grade to be operated profitably four years ago, when the mine suspended work. The ore can be brought out by horizontal workings, and the mine drains itself. The Monte Cristo Con. M. & Dev. Co. owns the Monte Cristo and Buckeye No. 2 claims on west slope of Monte Cristo mountain. The Canadian Pacific railway runs through the lower end of the claims. Development on the group consists of 5166 feet of work, and the maximum depth on the vein 600 feet. Three tunnels are driven on the ledge, one 1100 feet in length, another 515 feet and a third 550 feet. The equipment includes a seven-drill compressor, 80 H. P. boilers and 20 H. P. hoist.

Manager E. B. Kirby of the Centre Star mine at Rossland, in his annual report, says the serious obstacle presented to large scale milling by the so-called 2% tax imposed by the British Columbia Government on the gross product of mines has not yet been removed. This tax has the effect of exacting an increasing proportion of the net profits as the grade of ore lowers. On the milling grades of the Centre Star (which are increasing in quantity with decrease of smelting ores) and other Rossland mines it will take from 10% to 20% of the net profits. The effect of this tax in repressing the mining and milling of low-grade ores throughout the province has forced the mining communities to join in active measures for its repeal, and the matter is being pressed by the Provincial Mining Association. A preliminary mill of 200 tons daily capacity, but designed for enlargement to 400 tons, is being built by the Rossland Power Co., Ltd., on the line of the Canadian Pacific Railway, near Trail. It is expected to begin operations by spring, affording outlet for the milling ores of the Centre Star and War Eagle mines. The costs of mining are as follows: Winzes, $38.77 per foot; raises, $29.97 per foot; drifts, $17.09 per foot; mining ore from stopes, $2.07 per ton. The entire cost of mining and delivering ore on the cars, including its pro rata of general expenses, was $2.07 per ton of ore from the stopes, and during several months ranged between $1.93 and $1.96. Including the additional ore broken by development headings, the average for the year was $1.97. The details of the mine costs for the twelve months ending September 30, 1903, are shown in the following table:

	Development work.			Ore extraction.
	Sinking small shafts.	Raising.	Drifting.	
Total advance, feet	79	186	2,903.5	
Ore stoped, tons				84,453

	Cost per foot.			Cost per ton.
1. Drilling	$6 10	$7 31	$1 53	$0 405
2. Blasting	2 48	3 40	1 08	030
3. Explosives	3 13	3.72	2 72	.145
4. General mine supplies	51	.64	43	040
5. Mine lighting—candles	.26	.19	.14	.015
6. Mine lighting—electric	.30	.22	13	.010
7. Smithing	1 00	1.14	72	.065
8. Tramming and shoveling, direct	5.51	.65	1 21	.240
9. Tramming and shoveling, apportioned	.64	.35	42	.085
10. Timbering—labor	1.81	3.08	.02	.190
11. Timbering—material	.33	.57	.01	.110
12. Machine drill fittings and repairs	.86	.94	.60	.055
13. General mine labor	1.57	1.18	.84	.060
14. Hoisting—underground	4.79			
15. Hoisting—main shaft	1 48	.89	.94	.190
16. Compressed air	1.74	2 08	1.07	.120
17. Mine ventilation	.23	.17	13	.015
18. Pumping	1.71	1 09	.34	.035
19. Assaying	.65	.47	.14	.030
20. Surveying	.20	.17	.11	.010
21. General expense	3.57	2 71	1.51	.185
Totals	$38 87	$29.97	$17.09	$2 065

Slocan.

The Alamo concentrator, near Sandon, which is being remodeled, is expected to be ready for operation by Jan. 1. At the mine development continues and several cars of ore have been shipped from the veins opened up. The Idaho, Manager Jenkins, is preparing to increase operations.

The Payne mine, at Sandon, shipped several tons of iron extracted from the zinc by the electric magnetizer to the smelter last week. It is used for fluxing. The saving of the iron ore means another source of revenue to the Payne, from material which until recently was thrown over the dump as waste.

H. A. Harris has taken a lease on the Charleston group at Whitewater. Ore has been opened up.

Vancouver Island.

The Dunsmuir Colliery Co. of Comox was last week convicted on seventy-six separate charges of employing Chinese in their coal mines, contrary to law. Fines aggregating $2000 were imposed. Unless all the Chinese miners are removed from the mines, it is said the Government will proceed with another 100 cases.

West Kootenay District.

The Alma group, on Pool creek, 5 miles from Camborne, has been bought by C. McCrossan of Los Angeles, Cal.

Pipe laying for the Oyster-Criterion stamp mill power line, near Ferguson, is progressing, and as soon as this is completed the mill will start, all interior arrangements being completed.

By the sale of the Alpha group, on Great Northern hill, in the Lardeau, near Ferguson, the Horne-Payne Co. winds up its mining business in British Columbia.

MEXICO.

Chihuahua.

At the Cigarrero mine, in the Almoloya mountains, 3 miles from Troya station on the Mexican Central Railroad, a 230-foot crosscut on the 300-foot level has opened up a body of lead carbonate running 32% lead, sixteen ounces silver and three ounces gold per ton. The company is shipping seventy-five tons of this ore per day.

L. Reed, manager of the Sahuayacan M. Co., in district of Rayon, 40 miles west of El Campo and 140 miles from Minaca, says the company has a 20-stamp mill on the property, which consists of twenty-four pertenencias, but the mill is not running at present while development work underground is being increased.

G. McManus and Sr. Urueta, operating at Cusihuiriachic, have their 10-ton smelter ready for operation, but have been delayed in accumulating a sufficient quantity of lead ores for fluxing purposes. McManus expects to blow in this month.

W. A. Stuart, of El Paso, Texas, has an option on the Oaxaca group of gold mines for $100,000 gold, says the Chihuahua Enterprise. The properties are 70 miles east of Chihuahua in the Placer de Guadalupe, and near the Orient railroad being built. The road will run within 2½ miles of the mines, but the present terminus, Las Trancas, is 30 miles distant. An 8-stamp mill is on the ground which is also included in the deal.

H. E. Cary of Salt Lake City, Utah, part owner of the Lluvia de Oro mine, near Urique, says he is arranging to put up an additional 20-stamp mill. The ore is mainly free milling, but concentrating tables are also to be put in. A 2-mile tramway will he put in from the mine to the Fuerte river. A. J. Underwood is manager, and development continues with the present mill in full operation.

Durango.

The La Cong mine, near Inde, owned and operated by E. Avila and W. S. Benton, is said to be shipping 200 tons per month of ore which runs 1000 ounces silver, 10% lead and 0.3 ounce gold to the ton. The Portillo, owned and operated by W. Petit of Parral, is also shipping 200 tons of ore per month, the ore carrying 150 ounces of silver per ton.

The Cia. de Oro de Guarisamey has been organized in Durango to develop a group of mines at Guarisamey in San Dimas district, northwest from Durango.

Guerrero.

Men are at work developing the Guerrero del Oro group, near San Nicolas del Oro. The ore carries gold values. W. Niven is manager.

Jalisco.

The Negales mine has been bought by G. N. Van Horn of El Paso, Texas, for $27,000 gold. This property is 40 kilometers west of Guadalajara. Van Horn will place machinery and start development work.

Mexico.

The Esperanza mine, at El Oro, has a 200 H. P. direct-connected flat-cable double hoist in use at the south or main shaft. The cages are two-compartment (upper and lower), and at each lift the hoist brings up two loaded cars. It is said to be the only flat-cable hoist in El Oro, Tlalpujahua district.

Michoacan.

The Perseo mines, consisting of thirty pertenencias, 4 kilometers northwest from Tlalpujahua, are equipped with single steam hoist, one pump and two boilers. A two compartment shaft is being sunk 160 feet, says Manager W. H. Case.

The Reforma mine, near Tlalpujahua, owned and operated by the Reforma M. Syndicate, Ltd., of Manchester, England, is being developed through a three-compartment vertical shaft which is down 690 feet, and sinking is progressing through the andesite capping. It is expected the black slate will be cut within the next 50 to 100 feet. The equipment consists of double steam hoist, three pumps, three boilers, buildings, etc., says Manager E. C. Hugon.

At the Venus mine, at Tlalpujahua, the hoist and boilers are being set up and sinking of the three-compartment vertical shaft, down 90 feet, will be resumed, says Manager V. P. de Alva.

At the Luz de Borda mine the grinding mill is expected to be crushing ore this month. The fifteen stamps are dropping regularly and 600 tons of ore per month are being treated. B. von Steinaecker is superintendent.

Nuevo Leon.

The Mexican Journal of Commerce says the steel plant at Monterey is in operation and turning out 350 tons of steel daily. The output of the plant is confined to structural steel and steel rails. Large orders for rails have been placed by several of the railroads of Mexico. One thousand men are employed, and in additfon the company gives work to over 2000 men at the iron and coal mines from which the supplies for the plant are drawn. The iron mines are near Golondrinas, and the coal mines are in the northern portion of the State of Coahuila. When the steel plant is in full operation and the iron and coal mines developed to meet the increased demand, the industry is expected to give employment to 5000 men. Vicente Ferrara is president of the company.

San Luis Potosi.

Construction work on the Matehuala smelter will be begun this month by the National Metal Co. of Matehuala. A

brick-making plant will be put in. The making of its own brick will save the company $100,000, says J. A. Kilton of New York, manager in charge at Matehuala.

Unwatering of the Tiro General mine, near Charcas, is progressing, and the company is shipping 500 tons of ore weekly from the dumps. A steam hoist has been set up on the Trinidad mine, adjoining the Tiro General.

Sonora.

The Cananea Herald says operations bave resumed at the Sierra de Cobre mines (the Indiana), near Cananea, and 400 miners will be put to work. F. L. Harrington is superintendent. The mines are owned by the Copper Queen C. Co. of Bisbee, Ariz.

The Providencia M. Co. at Cerro Blanco, near the Sonora railway, is shipping ore.

At La Verde, near Cumpas, in Moctezuma district, the Transvaal C. M. Co., composed of Cincinnati, Ohio, men, is increasing development work. The company is devoloping four copper mines—the Transvaal, Cobre Rico, Buckeye and Piedra Verde—and also two silver-lead mines. At El Padre, in the Sierra Madres, 15 miles east of Cumpas, the company has five gold prospects. At the mines O. L. Neer is superintendent, with C. L. Rogers assistant superintendent and chemist.

The Cienegita M. Co., of which G. Bebee is president, owning copper mines on the Yaqui river, 150 miles east of Hermosillo, proposes to build a railroad from Minas Prietas to their property, a distanco of 100 miles. Tbey will build a smelter. There is a branch line from Torres station to Minas Prietas, which is used by the mining company at Minas Prietas, and it is proposed to secure a traffic agreement with that company.

In the mineral belt of Chirunibabi, in Moctezuma district, on Nacozari creek, about 2 miles from Nacozari, the Dona Maria mines, being the Alaska and Julia Blanca, have been sold to the Sonora Development Co., which is operating other properties in Moctezuma district.

Tepic.

The Buena Vista y Anexas group, consisting of 300 pertenencias, is 1¼ miles north from La Yesca, in the district of Ahuacatlan, and is ownod and operatod by the Buena Vista y Anexas M. Co., J. M. Stark, superintendent. Development consists of two single comparment vertical shafts, 300 and 600 feet respoctively in depth, two tunnels respectively 150 and 1200 feet in leugtb, and several hundred feet of crosscuts, drifts, etc. Thore aro one 5-roll mill, two ongines, four boilers, four air compressors and a 70-ton cyanide plant on the group. To this equipment tho company expects to add ten Huntington mills, four concentrators, two additional rolls for the mill, and it also proposos increasing the cyanido plant to treat 120 tons per day. Thore are also two wire rope tramways on tho property, one 2300 foct long for carrying ore from the mine to the mill, and oue 4920 feet long for transporting wood to the furnaces. The company is mining 3000 tons of oro per month, and has 1000 men employed, says the Mexican Iuvestor.

Books Received.

"Ore Dressing," by Robert H. Richards, S. B., is tbe title of a monograph on the mauipulation and concentration of ores, just issued from the press. It is bound in two volumes, 1236+XXIX pages, with 560 illustrations and sketches. This is the most comprehensive work that has ever been issued on the subject of concentrating ores, and it deals with the important and interesting subject in a thorough manner. The work contains twenty-one chapters, besides an appendix, in which is found numerous valuable tables. The work is divided into four parts, as follows: Part I, breaking, crushing and comminuting; Part II, separating, concentrating or washing; Part III, accessory apparatus; Part IV, mill processes and management. Each part is subdivided into several chapters, in which each division is again divided under several heads, and oach subject treated in a thorough manner. There are a number of new ideas in the arrangement of the book, wherein by a system of abbreviation much space is saved, bringing the volumes to a normal size convonient to handle. The illustrations are carefully mado, in many instances giving dimensions, so that, if desirable, they may be used for working plans. Numerous mills throughout tho world aro described, together with tho process of ore treatment, these practical oxamples giving the work greater value. The Engineering and Mining Journal, Now York and Loudon. Price, cloth, $10.

Personal.

P. H. BARKER of Denver, Colo., is in San Francisco, Cal.

G. K. ARCHER of Butte, Mont., is in the State of Jalisco, Mexico, examining mines.

R. D. CULBERT of Amador City, Cal., is in San Francisco, Cal., on mining business.

W. H. COUCH is manager of the Belden mine in Chase gulcb, near Central City, Colo.

E. T. BROCKMAN of Pittsburg, Pa., interested in Idaho mines, is in San Francisco, Cal.

L. D. SIVYER, M. E., of Spokane, Wash., is examining copper properties at Globe, Ariz.

JOHN EDDIE is general superintendent of the mines of the Champion M. Co. near Nevada City, Cal.

W. Y. WILLIAMS, superintendent of the Granby mines at Phœnix, B. C., is visiting in Minnesota.

E. WOOD of Spokane, Wash., is superintendent of the Crystal Con. M. Co., at Bohemia, Douglas Co., Or.

W. MAGUIRE of Dutch Flat, Placer county, Cal., interested in Placer county mines, is in San Francisco, Cal.

H. W. TURNER, E. M., of San Francisco, Cal., has removed his offices to No. 14 Sansome street, San Francisco.

L. C. STODDARD of New Haven, Conn., interested in Utah properties, has returned from a trip to Salt Lake City, Utah.

P. C. MOLAN is superintendent of the Eureka Exploration Co., operating the Silver Wing mines, near Eureka, Colo.

M. L. REQUA, mine owner and president of the Pacific Stoel & Wire Co. of San Francisco, Cal., is in Denver, Colo.

H. V. CROLL, Salt Lake City, Utah, representative of the Allis-Chalmers Co., is in Chicago, Ill., on company business.

D. H. JACKSON has roturned from Pennsylvania and will make his headquarters in Placerville, Cal., this winter.

ASHLEY HALSEY, superintendent of the Kentucky Ridge mine, near Nevada City, Cal., is visiting in Charloston, S. C.

G. H. PARKER of Los Angeles, Cal., has returned there from Phœnix, Wickenburg and Kingman, Ariz., on mining business.

J. K. BURCH, superintendent of the Abbott quicksilver mine, near Williams, Colusa county, Cal., is in San Francisco, Cal.

G. F. SBURTLEFF, goneral manager of the O. K. M. Co. at Crown King, Ariz., has gone from San Francisco, Cal., to the East.

N. O. BACGE has rosignod as genoral manager of the Black Diamond Copper M. Co. at Los Augeles, Cal., owing to ill health.

R. G. WILSON of Salt Lako City, Utah, manager of the New York Bonauza of Park City, Utah, is in Texas on mining business.

E. W. MUELLER, manager of tbe Sumpter smelter and of the Standard mine, returned to Sumpter, Or., last week from New York.

J. MEICHAN, superintendent of the Mount Jefferson mine at Groveland, Tuolumne county, Cal., is in San Francisco, Cal., on business.

L. F. WRIGHT, manager of the Mountain Copper Co. at Keswick, Shasta county, Cal., is in San Francisco, Cal., on company business.

M. A. MARSBALL is manager of the Terrenates Con. M. Co. at Parral, Chihuahua, Mexico, vice F. Husted, rosigned. E. Graves is superintendent.

A. A. LANE, interested in La Bufa M. Co., operating at Minas Prietas, Sonora, Mexico, has returned to the minos after an extended visit in England.

W. H. KINNON has resigned as manager of the Majestic smelter at Milford, Utah, and M. M. Mays, assistant manager, is temporarily iu charge.

EDW. HOOPER, formerly a partner in the firm of Bewick, Moreing & Co., has left England on professional business in the Western States and Canada.

W. J. SHARWOOD, motallurgist for the Montaua M. Co., Ltd., operating cyanido works at the Drum Lummon mino near Marysville, Mont., is in Berkeloy, Cal.

C. E. BUTLER, formerly of Now Mexico, is suporintendent of tho Trinity County G. M. Co. and the Jenny Lind & Maple M. Co. at Dedrick, Trinity county, Cal.

W. WRAITH, assistant superintendent of the Amalgamated C. Co.'s Washoe smelter at Anaconda, Mont., returned there last week from a trip to Salt Lake City, Utah.

C. F. STURTEVANT has resigned as assistant superintendent of the Anaconda smelter, Anaconda, Mont., and has gone to Bingham, Utah, as superintendent of the Yampa smelter.

J. P. EVANS, general manager of the Colorado Iron Works, Denver, Colo., accompanied by A. W. Gillette, the general counsel for that company, is in San Francisco, Cal., en route to Denver, via Butte, Montana.

A. H. KENNEDY of the Compania Industrial, of Chihuahua, Mexico, has gone to Peru to take the management of the building of the smelting and reduction plant at the Cerro de Pasco mines, at Cerro do Pasco, Peru.

Obituary.

J. GASKIN, a pioneer miner of the Cariboo district, B. C., died at Kamloops, Dec. 1, aged 74 years. Deceased was a native of Ireland.

WILLIAM JONES, a pioneer miner of Tuolumne county, Cal., and former owner of the Star mine, noar Columbia, died near Shawmut, Tuolumne county, November 27, the result of pneumonia.

CHARLES RUNYON, a pioneer miner of Colorado, died on tbe 24th ult. at Leadville, Colo., from old age. Deceased was a member of the John C. Fremont party which went to Colorado in the early 40's, and was with Fremont when he was made Governor of Colorado in 1847. Deceased was a stationary engineer by profession, but has prospocted and mined in many Colorado camps. He was born in Kentucky in 1824.

Catalogues Received.

Of standard size, suitable for permanent file, is the 1904 catalogue of the Buff & Buff Instrument Manufacturing Co. of Jamaica Plain, Boston, Mass., a good specimen of trado treatise dopicting a fine line of engineering, surveying and mining instruments.

The 5th edition of Catalogue 100 of Mining and Motallurgical Machinery, issued by tho Allis-Chalmors Co., is a Spanish one throughout, every line in the sumptuous little volume being in faultless Castilian—a piece of euterprise that purchasers and consumers in Spanish-speaking countries will doubtless appreciate. "Maquinaria para la Minera y Metalurgia" will have a ready welcome south of Lat. 32 Nor.

Cataloguo No. 57, from the Stilwoll-Biorce & Smith-Vaile Co., Dayton, Ohio, is the latest and most complete trade treatiso they have published on their power pumping machinery, including electric pumps, gas or gasoline pumping plants, water wbeels and pumps, hydraulic elevators, otc. A copy will be sent to any address. G. W. Ingils, 11-13 First streot, San Francisco, Cal., is their Pacific coast representative.

Commercial Paragraphs.

CLARENCE S. KING has bought a one-half interest in the C. A. Luckhardt Co., 71-73 Stevenson street, San Francisco, Cal., and has personal charge of the laboratory and oro testing department.

G. C. RICBARDS of the Richards Pump Co., Oakland, Cal., has set up a Richards 3-stamp mill at No. 124 Fremont street, San Francisco, Cal., whore it may be seen in operation. The principal features of this mill are a rocker-arm movement instead of cams, individual mortars and circular screens.

THE firm of John A. Yoatman & Co., San Francisco, Cal., has been absorbed by the United Iron Works (formerly the Oakland Iron Works), of No. 330 Market street, San Francisco, Cal. J. A. Yeatman will have chargo of the hydraulic department, and will continue the manufacture of step pressuro centrifugal pumps and other hydraulic machinory.

J. R. DEREMER, president and general manager of the DoRemer Water Wheel Co., writes from Glenwood Springs, Colo., that the DeRemer Water Wheel Co. have recently installed thirty-three plants of water wheels, and that their works at Denver, Colo., are now in continuous operation to complote water wheels contracted for under time limit. Among the recent installations he reports three at Baker City, Or., two at Sumpter, Or., two at Spokane, Wash., two in British Columbia, three at Lake City, Colo., and one at Encampment, Wyo. The latter plant consisted of twelve wheels, viz., two 4, seven 5 and three 6-foot two nozzle wheels. The company is in receipt of a testimonial from General Superintendent C. H. Tracy as to the satisfactory performance of the wheels.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the follnwing U. S. patents issued tn Pacific Coast inventors:

FOR THE WEEK ENDING DECEMBER 1, 1903.

745,471.—FENCE—I. B. Abraham, S. F.
745,472.—TREATING ORES—W. H. Adams, Jr., Los Angeles, Cal.
745,566.—BOTTLE—I. N. Burke, Butcher Ranch, Cal.
745,428.—HINGE—A. F. Enquist, S. F.
745,600.—CIGAR LIGHTER—J. W. Gray, S. F.
745,601.—STERILIZER—L. L. Gross, Petaluma, Cal.
745,346.—LATHE CHUCK—C. C. Harris, Ukiah, Cal.
745,615.—DENTAL DIES—C. A. Holmes, Seattle, Wash.
745,505.—CUTTING CAN ENDS—J. Lee, S. F.
745,870.—SEPARATOR—L. P. Lowe, S. F.
745,648.—STOVE SUPPORT—D. C. McFarland, Lebanon, Or.
745,510.—TRACTION WHEEL—D. W. McLaughlin, S. F.
745,511.—STEERING WHEEL—D. W. McLaughlin, S. F.
745,641.—DRYING FRAME—E. A. Messerly, Santa Barbara, Cal.
745,647.—FASTENING JAR CAPS—R Murr, Seattle, Wash.
745,518.—BURNER—F. B. Pettingill, Los Angeles, Cal.
745,906.—BEVEL SIDING HEAD—E. C. Price, Eureka, Cal.
745,663.—FARM GATE—B. H. Pursell, Napa, Cal.
745,678.—MOLDER'S TOOL—L. A. Schulze, S. F.
745,679.—MOLDER'S STICK—L. A. Schulze, S. F.
745,680.—CLOCK—H. Schumacher, S. F.
745,918.—WIRE HOLDER—J. Sharp, Portland, Or.
745,682.—WATER HEATER—M. H. Shoenberg, S. F.
745,393.—LOCOMOTIVE TENDER—H. J. Small, S. F.
745,910.—PAINTING SHINGLES—B. F. Smith, Seattle, Wash.
745,688.—CAMERA—A. L. Swartz, Junction City, Or.
745,463.—WIRELESS TELEGRAPH—G. T. Swenson, San Pedro, Cal.
745,949.—GOLD SEPARATOR—M. O. Wright, Sultan, Wash.
745,710.—ORE CRUSHER—H. Yarnell, Pasadena, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

ELECTRICAL WATER HEATER.—No. 745,682. Dec. 1, 1903. M. H. Shoenberg, San Francisco, Cal. This invention relates to an apparatus which is especially designed for continuously heating a flowing stream of water, which may be received at a low temperature at one end of the apparatus and constantly discharged at a higher temperature at the opposite end. It consists of a continuous tube having an enlarged section intermediate of the ends, said section having an insulating non-conducting coating and a high-resistance wire wound thereon, with means for passing an electrical current through the wire. There is also a means for maintaining a continuous return flow through a flexible or other pipe, whereby a column of heated water will be constantly maintained at the nuter end of said pipe and in conjunction with a discharge apparatus at said outer end, through which the hot water may be drawn for use at any instant.

STERILIZING AND DRYING APPARATUS.—No. 745,601. Dec. 1, 1903. L. L. Gross, Petaluma, Cal. This invention relates to an apparatus which is especially designed for sterilizing and drying implements of various descriptions, such as razors, barbers' tools, surgical implments, and the like. It consists of a chamber having a screen or other equivalent surface formed within it adapted to receive the implements to be treated and circulating pipes through which air and the vapor of any suitable antiseptic or sterilizing substance may be passed and brought into contact with the implements within the chamber. There is also a chambered cover adapted to contain water which is heated therein and which may be withdrawn therefrom whenever needed.

GEOGRAPHICAL CLOCKS.—No. 745,680. Dec. 1, 1903. H. Schumacher, San Francisco, Cal. This invention relates to improvements in time pieces whereby the time for any place in the world may be determined instantly and the time of that place noted relative to any other place. The invention consists, in part, of a stationary dial having radial division lines corresponding to certain units of time measurement, between which lines are printed the names of cities lying in any corresponding meridian interval. Concentric with this disk is a revoluble dial making one revolution in twenty-four hours and having the hours marked nn weighted disks pivoted to the dial and adapted always to maintain an upright position so as tn be easily read. This dial is movable in relation to a stationary pointer which is set over the city whence time is to be measured.

ELECTRIC CIGAR LIGHTING DEVICES.—No. 745,600. Dec. 1, 1903. J. W. Gray, San Francisco, Cal.; all assigned to H. E. Pyburn, same place. This invention consists of a standard and support adapted to be fixed to the wall or other convenient point, a cone fitting a corresponding recess in the support having a handle by which it is turnable, a means for supplying a jet of gas through the standard and cone and through a projection on the opposite side from the handle, electrical contacts carried by the handle and by an insulated post, so that when the handle is turned to complete the electrical contacts this action will first open the gas supply port and in time to allow the gas to reach the point of electrical contact, so that it will be ignited when such contacts are made and broken. There is also a spring for returning the handle after the operation is completed.

Latest Market Reports.

SAN FRANCISCO, December 11, 1903.

METALS.

SILVER.—Per oz., Troy: London, 27½d (standard ounce, 925 fine); New York, bar silver, 54¾c, refined (1000 fine); San Francisco, 54¾c; Mexican dollars, 43@45c San Francisco, 41c New York.

Silver has fallen over 3 cents in New York and San Francisco during the past week, while the London price remains unchanged.

COPPER.—Now York: Standard, $12.25; Lake, 1 to 3 casks, $12.50; Electrolytic, 1 to 3 casks, $12.12½; Casting, 1 to 3 casks, $12.00; San Francisco: $15.00. Mill copper plates, $17.00; bars, 18@24c. London: £56 10d spot per ton.

Within the week copper has advanced somewhat in London, while declining a fraction in New York. The slight advance in London of about ¼ cent per pound is stated to be due to speculative buying.

LEAD.—New York, $4.25; Salt Lake City, $3.50; St. Louis, $4.00; San Francisco, $4.50, carload lots; 4¼c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5½c; pig, $4.75. London: £11 1s 3d ₱ long ton.

SPELTER.—New York, $5.25; St. Louis, $5.10; London, £21 ₱ ton; San Francisco, ton lots, 6½c; 100-lb. lots, 7c.

TIN.—New York, pig, $27.00 @ 27.25; San Francisco, ton lots, 28½c; 500 lbs., 28½c; 200 lbs., 29c; loss, 29½c; bar tin, ₱ lb., 30@32c. London, £123 7s 6d.

PLATINUM. — San Francisco, crude, $18.00 ₱ oz.: New York, ingot, $19.00 ₱ Troy oz. Platinum ware, 75 @ 82c ₱ gram.

QUICKSILVER. — New York, $46.50@47.00, large lots; London, £8 7s 6d; San Francisco, local, $44@44.50 ₱ flask of 76½ lbs.; Denver, $48.00. Export, $42.00@42.50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 31½c; Eclipse, 35c.

SOLDER. — Half-and-half, 100-lb. lots, 18.75c; San Francisco, Plumbors', 100-lb. lots, 15.75c.

ZINC.—Metallic, chemically pure, ₱ lb., 50c; dust, ₱ lb., 10c; sulpbate, ₱ lb., .04c.

NICKEL.—New York, 50@60c ₱ lb.; ton lots, 40@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30@34c.

ANTIMONY. — New York, Cookson's, 7½c; Hallett's, 6½c; San Francisco, 1000-lb. lots, 8c; 300@500-lbs., 8½c; 100-lb. lots, 10½c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, $15.35 @15.85; gray forge, $13.35; San Francisco, bar, 3c ₱ lb., 3½c in small quantities.

STEEL. — Bessemer billets, Pittsburg, $23.00@23.00; open hearth billets, $23.00 @23.00; San Francisco, bar, 7c to 12c ₱ lb.

LUMBER. — (Retail): Pine, ordinary sizes, $24.00@25.00; extra sizes bigber; redwood, $28.00@30.00; latb, 4 feet, $4.50 @5.00; pickets, $21.00; sbingles, $2.50 for No. 1 and $2.25 for No. 2; shakes, $13.50 for split and $15.00 for sawed; rustic, $28.00 @35.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wiro, $3.35; Cut, $3.55; 10d to 16d, Wire, $3.45; Cut, $3.35; 8d Wire, $3.50; Cut, $3.50; 6d and 7d, Wire, $3.60; Cut, $3.60; 4 and 5d, Wiro, $3.70; Cut, $3.70; 3d, Wire, $3.85; Cut, $3.85; 2d, Wire, $4.10; Cut, $4.10. Special rates for carload lots.

LIME.—Santa Cruz, $1.60 country, $1.75 city ₱ bbl.

CEMENT.—Imported, $2.50@2.75 ₱ bbl.; California carload lots, $2.25 f. o. b. at works; small lots, $2.50 ₱ bbl. in sacks, 4 sacks to bbl.

GENERAL SUPPLIES.

OILS.—Linseed, boiled, bbl., 45c; cs., 50c; raw, bbl., 43c; cs., 48c; Lucol oil boiled, bbl., 44c; cs., 49c; raw, bbl., 42c; cs., 47c. Kerosene—Pearl, per gal., 22c; Astral, 22c; Star, 22c; Extra Star, 26c; Eocene, 25c; Elaine, 28c; Water White, in bulk, 15½c; Mineral Seal, iron bbls., 19c; wooden bbls., 21½c; cs., 25c; Mineral Sperm, cs., 26½c.; Deodorized Stove Gasoline, bulk, 17c; do., cs., 23½c; 86° Gasoline, bulk, 21c; do., cs., 27½c; 63° Napbtba or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19½c; Lard Oil, E W. S., bbl., 85c; cs., 90c; Neats-foot Oil, pure, bbl., 75c; cs., 80c; Sperm, crude, 50@55c; Natural Wbite, 70c; Bleacbed, do., 75c; Whale Oil, cs., 50@55c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less tban one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less tban one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less tban one ton, 13¾c. No. 2, 40%, carload lots, 10c; less tban one ton, 12c. No. 2, 35%, carload lots, 9½c; less tban one ton, 11½c. No. 2** 30%, carload lots, 9c; loss tban one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2.00 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less tban 1000.

FUSE. —Triple tape, $3.60 por 1000 feet; doublo tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c ₱ set; 14 oz., 40s., 10c.

CHEMICALS. — Cyanide of potassium, 98%-99%, jobbing, 23@24c ₱ lb.; carloads, 23@23½c; in tins, 30c; soda asb, $2.00 ₱ 100 lbs.; byposulpbito of soda, 3@3½c per lb.; caustic soda, in drums, 3@3½c ₱ lb.; Cal. s. soda, bbls., $1.20@1.40 ₱ 100 lbs.; sks., $1.05; cblorato of potasb, 12@13c; nitrate of potash, bbls., 10c; caustic potasb, 10c in 40-lb. tins; roll sulpbur, 2½@2¾c; powdered sulpbur, 2@3c; flour sulpbur, French, 3½@3¾c; alum, $2.00@2.25; California rofined, 1¾@2c; sulpbide of iron, 8c ₱ lb.; copper sulpbate, 5¼@5¾c; cbloride of limo, spot, $2.50@2.75; sulpburic acid, in carboys, 66% B, 1¾@2c ₱ lb.; nitric acid, carboys, 8c ₱ lb.

BONE ASH.—Extra No. 1, 5@6c ₱ lb. No. 1, 4@5c.

WHITE LEAD.—Por lb., in kegs: 500 lbs. and over at one purcbase, per lb., 6½c; less tban 500 lbs., per lb., 7c; in 25-lb. tin pails, ½c ₱ lb. above keg price; in 1 and 5-lb tin cans, 100 lbs. per case, ½c. per lb. above keg price. Dry Lead—In bbls., 1 ton and over, 6½c; do. in kegs, 7c.

RED LEAD.—500 lbs. and over at one purcbase, ₱ lb., 6½c; less tban 500 lbs., 7c.

LITHARGE.—Pure, in 25-lb. bags, 8@9c ₱ lb.

BORAX.—Concentrated, 6@7c ₱ lb; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

MANGANESE.—Pure, ₱ lb., 60c.

SODIUM.—Metal, ₱ lb., $1.00.

BISMUTH.—Subnitrate, ₱ lb., $1.75.

MERCURY.—Biebloride, ₱ lb., 90c.

MOLYBDENUM.—$2.00 ₱ lb.

CHROMIUM.—90% and over, ₱ lb., $1.00.

PHOSPHORUS.—American, ₱ lb., 75c.

SILVER.—Cbloride, ₱ oz., 90c@$1.00; nitrate, 55c.

ALUMINUM.—No. 1., 99%, small lots, 37c ₱ lb.; 100 lbs., 35c; 1000 lbs, 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

URANIUM.—Oxide, ₱ lb., $3.50.

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Practical—not theoretical—knowledge of construction and operation of mills, aerial and surface tramways, power transmission, installation of boilers and machinery, shaft sinking, mine timbering, assaying, etc. References from present and former employers.
Address "Resolute," care Mining and Scientific Press, San Francisco, Cal.

COMPETENT YOUNG ASSAYER AND METallurgical Chemist, with experience in the mines, especially cyaniding, but at present laid off on account of shut-down for the season, desires a steady position. Address K., this paper.

ENGINEER DESIRES POSITION AS SUPERintendent of mining. Best experience obtained in Idaho, Butte, Utah and Colorado. Excellent references. Address T. Worth Bowen, Butte, Mont.

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MECHANICAL ENGINEER, TECHNICAL graduate, desires responsible position with gold dredging company. Ten years' experience as manager, constructing and consulting engineer gold dredges. Special experience saving fine gold. Can design and build complete plants. Will take position opening new ground or with going company. Address "Dredging," care of Mining and Scientific Press.

MINING ENGINEER AND METALLURGIST, graduate of German University, with large experience in the treatment of refractory gold ores by all processes, desires position with good company. Cyaniding and treatment of slimes a specialty. Age 33. Excellent references. Address N. W. 43, care of Mining and Scientific Press.

MINING ENGINEER AND METALLURGIST, with sixteen years of practical experience as superintendent, manager and consulting engineer of mines and mills, desires position on or after January 1st. Speaks Spanish fluently. Address P. O. Box 77, Durango, Mex.

PHYSICIAN, WHO IS ALSO METALLURGIcal Chemist, wishes position as mine surgeon and assayer. Accustomed to base ores. Best references, character, ability. Speaks Spanish. Good location desired more than large salary. Address Dr. Porter, this office.

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WANTS POSITION AS SUPERINTENDENT, Assayer, Millman, Steam Engineer, or Tool Sharpener. Fifteen years' experience. Have good assay outfit. Address J. L. Wetmore, Rich Gulch, California.

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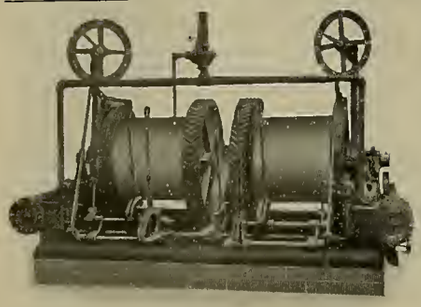
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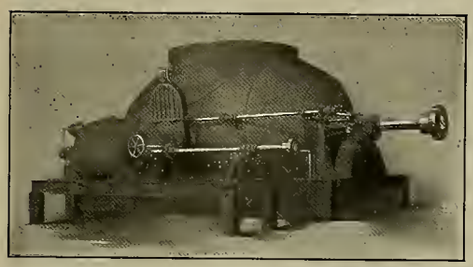
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Douglass Pump, No. 6, force feed, never used.
Iron Turntable, 7 ft. diam., having two 30" gauge tracks.
Two Mine Water Buckets, 54 gals. capacity, complete with valves.
One Ore Skip, body 36" top, 48" bottom, 30" high, 24" wide.
5 H. P. "Almond" Right Angle Coupling, new.
Barrett Swivel Wrench, good condition.
6 H. P. Gasoline Hoist.
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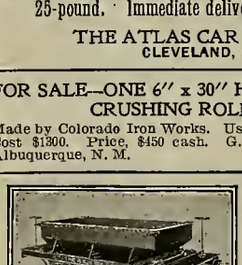
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Whole No. 2265.—VOLUME LXXXVII. Number 25. SAN FRANCISCO, CAL., SATURDAY, DECEMBER 19, 1903. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Application of the Cyanide Process.

Since its first discovery and application the cyanide process has grown steadily in importance and considerable further progress is possible. A great deal has been learned concerning it, and great advance has been made in its proper application, but there still seems much to be desired in this process. Its success is being measured largely by its commercial result. In low-grade camps, or in those districts where nothing remains to be treated by this process but low-grade tailings, the strictest economy prevails and extraordinary effort is made to secure the highest possible extraction at the least expense. The result is that such low-grade material after treatment is so depreciated in value as to be, at the present time, practically worthless. In other districts, where the ore or the tailings are high grade, much less care is used, and extractions are comparatively much lower, and the value of the discarded tailings in those regions is often greater than that of some of the low-grade ores and tailings before treatment in the districts first referred to. In the high-grade mines the standard of excellence, while high, still leaves values in the tailings, which makes the extractions low as compared with those of the low-grade camps. This is of course due to local conditions which sometimes do not admit of a higher extraction at a profit at the present time. A few years later these now valueless tailings dumps may be retreated at a good profit. In the operation of the cyanide process many valuable discoveries are made in a purely accidental way. In Western Australia one writer states that higher extractions were obtained from a charge of ore which while under treatment by the cyanide process was accidentally charged with a quantity of sulphuric acid instead of bromo-cyanogen. Experiments along this line in the treatment of telluride ores may result in further important discoveries.

Bromine and iodine have both been used in this process, the latter in an experimental way. The former is in extensive use in association with cyanide, and usually with satisfactory results, particularly in the treatment of telluride and arsenical ores, carrying gold.

Liquid chlorine has also given satisfactory results in some instances when charged with cyanide solution, especially in the treatment of auriferous sulphides, but the fact that it works well at one place cannot be taken as an indication that it will operate equally well elsewhere. In fact, after about a dozen years of extensive experiment and application of the cyanide process in its many forms, it is becoming recognized that no hard-and-fast rule can be adopted. Each district requires its peculiar manipulation, and often the ores of different mines in the same district require different treatment. This refers to the detail and chemistry of the process, for the various mechanical devices employed in the process have, apparently, almost reached perfection, and are a tribute to the inventive genius of the men who have devised them.

No great improvement has been made in the recovery of the gold from the solutions. There are a number of ways by which this is accomplished, but the zinc precipitation process is the one most commonly employed. In this part of the process there is still room for improvement. If some means could be discovered to recover the gold in as easy and simple a manner as in the chlorination process, where gold is precipitated by a solution of iron sulphate, or in the bromine process, where the gold is thrown down by sulphuretted hydrogen, it would be a long step in the improvement of the process.

The success of the cyanide process has proved a great incentive in discovering newer and better wet processes. It has also led to the invention or introduction into the metallurgical world of a number of processes, which have nothing in particular to recommend them over processes already in use. It is possible to devise a process which will extract precious metals from their ores, but at a cost that is in excess of the amount recovered. This is a feature of metallurgy not greatly sought after.

In the early history of the process the treatment of slimes formed a great drawback to the progress of this method of ore reduction, but to-day in some works slimes are purposely created, for the reason that usually a higher extraction results, and the difficulties are almost wholly of a mechanical sort. To a great extent this has been overcome by hydraulic sizing of the pulp from the crushing mill before changing to the cyanide vats, it having been found that it is more difficult to treat coarse and fine material together than to treat them separately. A notable instance of this is found at the large cyanide plant at the Homestake mine in South Dakota.

Among the latest efforts, as well as among the first, in the application of this process, is the treatment of sulphides direct, after concentration. It was long since learned that finely pulverized pyrite and other sulphides generally yield a high percentage of their gold values, while coarser material will yield only 50% to 75%. The high-grade sulphides should be finely ground before treatment, but low-grade material usually cannot afford the additional cost of grinding.



Crystal Formation in Ore Chamber in Mine, Santa Eulalia, Mexico. (See Page 402.)



Dam of Consolidated Mines Co., Southern Oregon, Showing Winter Head of Water. (See Page 402.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market Street, San Francisco, Cal.
Telephone, Davis 771.

ANNUAL SUBSCRIPTION.

United States, Mexico and Canada.....$3 00
All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

BRANCH OFFICES:

NEW YORK CITY, 720 Park Row Bldg. BOSTON, 27 School St.
CHICAGO, 1115 Monadnock Block. DENVER, 606 Mack Block.

J. F. HALLORAN.....Publisher

SAN FRANCISCO, DECEMBER 19, 1903.

TABLE OF CONTENTS.

ILLUSTRATIONS: Page

Crystal Formation in Ore Chamber in Mine, Santa Eulalia, Mex. 399
Dam of Consolidated Mines Co., Southern Oregon, Showing Winter Head of Water.....399
Freid Gravity Dry Process Separator.....403
Ice Formed in Stope in Last Chance Mine, Park County, Colo...404
Four Stage Air Compressor.....405
Mining and Metallurgical Patents.....407

EDITORIAL:

Application of the Cyanide Process.....399
Creation of a Mining Court for British Columbia.....400
Must Conform to the Government Land Surveys.....400
The Selection of a Plant.....400
The Government and the Miner.....400
School of Experience Needed for Mining.....400

MINING SUMMARY.....408-409-410-411-412

LATEST MARKET REPORTS.....413

MISCELLANEOUS:

Concentrates.....401
The Mines of Santa Eulalia, Mexico.....402
Conserving Water for Hydraulic Mining.....402
Gold Mining in Nova Scotia.....402
Freid Gravity Dry Process Separator.....403
Detection of Adulteration in Cement.....403
Ecuador and Peru.....403
An Ice Palace.....404
Treatment of Telluride Ores at Kalgoorlie, Western Australia..404
Mining and Milling in Mojave Desert, California.....405
Topaz.....405
A Four Stage Air Compressor.....405
Notes on Classification.....406
Mining and Metallurgical Patents.....407
Personal.....412
Books Received.....412
Obituary.....413
Catalogues Received.....413
Commercial Paragraphs.....413
New Patents.....413
Notices of Recent Patents.....413

THE creation of a mining court for British Columbia is being agitated in that Province, the particular function of which would be the settlement of mining disputes, and to do so promptly. In the United States, when mining property becomes involved in litigation, it is entirely beyond the range of human knowledge to even surmise when such litigation will come to an end. In many instances mining suits have dragged along for years, until the principals to the dispute grew old and gray, and the legal battle has been left as a legacy to their children. If the real reason for this long-drawn and expensive litigation is due to the fact that the courts are overtaxed with lawsuits of many kinds, then a mining court would be a welcome thing in the United States as well as in the British colonies, where such tribunals have long since demonstrated their usefulness.

FOR many years the mining industry was conducted almost wholly by practical men who had grown up in the business and learned what they knew in the school of experience. The knowledge and experience of many successful men have been placed in forms where others may have the benefit of it, usually either in a textbook or a series of lectures. Both are used at the various mining schools where students are familiarized with the best methods in use everywhere, besides which they are instructed in various scientific branches of use in the mining industry, including chemistry, metallurgy and engineering. The result is that the management of the industry is passing into the hands of younger men, who have been thoroughly coached in the fundamental principles of the industry, and this is called a "technical education." In addition to this technical training, which is also practical, they have each year opportunity for practical work and observation in the mines, mills and other metallurgical works. They are trained to observe, and though not usually proficient workmen at first, they generally advance with rapid strides, because they apply the knowledge they have gained to the best advantage, are usually quick to grasp any new idea and apply it intelligently in new places under differing conditions.

The Selection of a Plant.

The owner of mining property is not infrequently undecided as to the character of works that should be built to treat his ore. Despite the fact that mining has now been successfully carried on in the western United States for more than fifty years, and much longer than that in some of the Eastern States, and notwithstanding the extensive and valuable knowledge gained through the medium of operations in foreign countries, it is not always a matter easy of determination in deciding on the kind of metallurgical works to build for the beneficiation of ore. In the early history of mining in the West, both mills and smelting plants were erected at the wrong places. Mines that had mills would have been better fitted to treat their ores had smelters been provided, and sometimes where smelters were erected mills would have answered the purpose better, and in other instances properties were equipped with both mill and smelter when there was not sufficient ore to supply either. In the greater number of instances the mill was the better for general purposes in the early days, but in more recent years the smelter is finding a wider application. In many places both mill and smelter are run in connection with one property, the ore first being crushed, then concentrated and the product smelted. Such instances are not common, but are found, particularly in connection with the copper mines of Butte and some other copper districts. Where the ore is of the concentrating class in many cases, the ores are concentrated at the mine and the concentrates shipped to smelters at a distance. The building of an extensive railway system throughout the West has made this possible. The ores of the greater number of lead-silver mines are treated in this way, and also many of those producing copper with gold and silver as an accompaniment. In some districts, the ores are more complex, zinc and iron sulphides appearing, as well as copper and lead in the ore. The introduction of processes and machines to effect a separation of the several sulphides to themselves has still further added to the possibilities of ore treatment, until it would seem that the mine owner could not easily make a mistake in ordering a reduction plant of any kind, but such is not the case. The ore may be adapted to smelting, and still the cost of flux and fuel and other considerations, due to location of the property, may render the smelting process unprofitable. There are few smelting ores which cannot be concentrated to a greater or less degree, and the problem is often solved by building a concentrator. Where a mine will pay by neither the milling or smelting process, under existing conditions, the only solution of the problem is to wait until conditions change for the better.

In many instances mines which are free milling at the surface, in depth develop base ore which must be smelted or concentrated, and in not a few instances the character of the ore changes entirely. A vein carrying a free-milling chloride silver ore at the surface, has in depth run into galena and iron sulphide, and at greater depth into zinc sulphide to the almost complete exclusion of other ores.

Lead mines have in depth become copper mines, and in rarer instances a base mine has developed a free-milling zone in depth.

In view of the uncertainty as to character of plant best adapted to the treatment of the ore, when viewed from the standpoint of the inexperienced owner, the best way is to submit the proposition to a mining engineer of experience whose opinion, while it may seem high priced, may save the cost a hundred fold, beside which it may mean eventually the difference between success and failure. The problems of metallurgy are so numerous, and often of uncertain character to those unfamiliar with them, that this would seem the only safe course to pursue.

THE Supreme Court of California has handed down a decision to the effect that all locations must conform to the pre-existing Government land surveys, even though the subdivisous of the section in which the land is situated shall exceed 160 acres, due to inaccuracies of the land survey. The existence of narrow, usually wedge-shaped pieces of ground along the section lines, as is frequently the case, has led to the location of small fractional claims between to full-sized previously existing locations. Oil lands are subject to location under the placer laws. A single location shall not exceed twenty acres, though an association of persons may take 160 acres, and the Supreme Court has decided that the location must conform to the lines of the land survey, notwithstanding any inaccuracies. In rendering this decision the Supreme Court has reversed the Superior Court of Kern county, Cal.

The Government and the Miner.

The principal condition under which the locator of a mining claim holds possessory title to his location after the preliminary act of locating is by means of performing annually on his claim not less than $100 worth of labor or making bona fide improvements on his claim to that extent. This is the minimum, and to it State and Territorial Legislatures and district laws may add, but they cannot decrease the requirement of the Federal law. Many are the schemes to defeat this moderate demand of the Government. Claims are relocated year after year by the same persons; others make a mere pretense of working; still others claim work done in previous years as having been performed within the year past, but the fact remains that the Government requires the annual expenditure of money or work or betterment of the claim, directly or indirectly. Men may defeat the law by failing to comply with its requirements, but it is safe to say that in the majority of such cases the neglected, or misrepresented, claim would not sell for $100 cash. No claim holder can hold his location against an adverse claimant if the assessment work is not actually performed according to law. Failure to perform the labor or make the improvements required by Federal, State and local laws is equivalent to abandonment of the claim, and therefore it becomes, under the law, subject to appropriation by another.

Discovery of a claim and assessment work are entirely separate. By the discovery and act of location the prospector establishes a source of title, but it is only by the performance of the assessment work required by the laws that he can preserve and perfect that title. The law does not require the claim holder to take out a patent for his claim, but permits him to do so after having made improvements, or performed development work to the extent of $500, on the claim.

Some large and valuable mines are held for years and even worked out without a patent ever being applied for. The miner is entitled to as many rights under the possessory title as he secures under a patent, the only advantage in which appears to be that he becomes absolute possessor of the claim and is no longer required to annually perform assessment or representation work. Few owners of profitable patented claims care to cease operations when patent has issued, merely because the law permits it, unless, indeed, the claim becomes unproductive.

There are those who consider the cost of securing a patent to mining land a great hardship as compared with a patent to agricultural land. The usual full-sized mining claim contains about twenty acres of ground; the usual agricultural entry contains 160 acres, or eight times as much as a mining claim. The difference in cost is considerable, it is true particularly when a comparison is made of the relative area of the two claims, but, as previously stated, taking out a patent to a mining claim is not peremptory, and the owner of such a location would be unwise to patent a claim that would not produce a profit. Ordinarily, a single foot along the course of a good-paying mineral vein will produce more profit than several farms of 160 acres each are capable of producing in a number of years. This is not by any means the rule, but it is often the case.

The year 1903 is about closing and those holding claims by performance of annual assessment should not neglect to begin at once upon this work if they have not already done so, and to continue it to completion. The mining laws are sufficiently liberal, and are framed with the purpose of developing and advancing the mineral resources of the country while affording to the bona fide locator the protection of the Government.

CONCENTRATES.

THE Hungarian riffle as now made is usually of cast iron, and is broader at the top than on the base. This leaves a blunt, wedge-shaped opening between the riffles.

✣✣✣✣

DESCRIPTION of a "beach washer," which, it is said, works well on beach sands containing fine as well as coarse gold, was published with a sketch of the same in the MINING AND SCIENTIFIC PRESS of June 6, 1903.

✣✣✣✣

SANDSTONE, when employed in buildings, should never be set on edge, but always laid with the bedding in a horizontal position. When the weight comes upon the upturned edge of standstone it has a tendency to split.

✣✣✣✣

AS rope carriers in shafts, particularly where the angle of dip changes, and idlers are required on the hanging wall side of the shaft, grooved sheaves in pairs are better than any form of cylinder of either wood or iron.

✣✣✣✣

NO ONE may enter a placer claim legally located and held by another for the purpose of searching for a lode or vein, nor can men working for wages on a placer location, claim a vein which they may discover thereon in the course of their work.

✣✣✣✣

THE rock specimens from Mazama, Wash., are: No. 1, diabase, and No. 2 diahase-porphyrite. The only essential difference being in the fact that No. 2 carries well defined crystals of feldspar, which are absent in No. 1, at least in the specimen sent.

✣✣✣✣

WHEN mixing sand, rock and cement for making concreto, it is necessary to keep the mixture free from dirt, soil, etc. It is also a good idea to wash the broken rock. The best results are obtained hy screening the sand used. It is not good to use too much very fine sand.

✣✣✣✣

THE magnetic compass cannot be depended upon in making underground surveys owing to the unreliability of the needle, which is attracted by tracks, drills, pipes, machines, etc., and also often hy magnetic mineral in the rocks. The compass will sometimes vary several degrees within a few feet, in underground workings.

✣✣✣✣

A SKIP can be provided with safety clutches similar to those in use on cages, but for their operation guides are also essential. When safety clutches are placed on either a cage or skip they should be of the best design and workmanship, as in case of necessity all depends upon their prompt action to avert disaster.

✣✣✣✣

A TUNNEL started on A's claim cannot be continued through B's claim, even though the distance be but 20 feet, without the consent of B. There are decisions of the United States Supreme Court determining that point. If the distance be so short it would be better to run around the line of B's claim, which can be done without interference.

✣✣✣✣

THE stress on a hoisting rope in a shaft sunk at an inclination of 63°, which is equivalent to a rise of about 200 feet in 100 horizontal distance, is about 1800 pounds per ton of 2000 pounds. To this must be added friction. At 28° to stress is only about 1000 pounds per ton of 2000 pounds. The stress decreases with decrease of angle of inclination of the shaft.

✣✣✣✣

STEAM may be conveyed from a boiler to points several hundred feet distant underground in a mine, but to prevent excessive condensation the pipes should be thoroughly wrapped with non-conducting packing and hoxod. Valves should also be provided to drain any low places which occur in the pipe line where any condensed water would accumulate.

✣✣✣✣

THE Coxbeath mines of Cape Breton, N. S., comprise a series of veins in rhyolite and diorite. The gangue is quartz, in which occurs argentiferous and auriferous chalcopyrite. Copper veins occur elsewhere in rhyolite, granite, quartz-porphyry, amphiholite schist, diorite, limestone, quartzite and in a great variety of other rocks.

✣✣✣✣

COPPER can not he mined in Mexico without previously obtaining the proper concession, and for this reason no workings are permitted in mines or placers which are not properly protected by a legal title which has been registered. Any inhabitant of Mexico may present an application for a mining concession, hut foreignors are subject to slight restrictions in certain localities.

✣✣✣✣

THE so-called blue leads of California are ancient rivers, usually containing gold in the gravels. These streams in many cases have been uplifted by geological disturbances, above the level of the recent gulches, though in some instances they are below them. These ancient streams are rarely below the main canyons of the vicinity when they are found. Some of the channels of the Forest Hill divide are 1500 feet below the summit of the ridge under which they occur, having been buried to that depth beneath the volcanic mud and debris, hut these channels are several hundred feet a hove the forks of the American river. Tho channels, which are red, were bluish or gray in depth, the red color being due to oxidation of the iron of the gravel.

✣✣✣✣

THE spectroscope is an instrument otten employed in determining mineral substances. This is done by heating the substance to be treated to white heat, and the spectrum produced by passing the rays emanating from the burning hody through a prism is examined by means of the spectroscope. The spectrum is crossed hy perpendicular lines, which, according to their number and position on the spectrum, afford a means of determining the mineral.

✣✣✣✣

WHEN setting boilers everything should be so arranged as to he in plain sight and easy of access, so that should anything go wrong, the danger could be detected at once and the necessary repairs made. There should be no dark corners, or if such are necessary, provision should be made to light them artificially. When a boiler explodes, an examination is made to ascertain the cause, but it is not always possible to learn it after the explosion. By proper setting and competent engineers or firemen an explosion may he averted.

✣✣✣✣

ANNEALED SILVER WIRE offers less resistance to the electric current than any other metal known. With pure copper at 1, annealed silver is 0.98, gold 1.3, aluminum 1.5, zinc 3.2, iron 6.22 and mercury 63.2. Resistance is affected by temperature, length of conductor and cross-section. The resistance of a conductor having a uniform section or area is directly proportional to its length. A conductor (wire) 2 feet long would offer twice the resistance that would be offered hy a wire 1 foot long. Resistance is inversely proportional to area of conductor—that is, resistance decreases with increasing area. A rise in temperature of a conductor increases the resistance of metals, but decreases that of carhon.

✣✣✣✣

MINERALS are said to he pyro-electric when they emit a dull phosphorescent light when struck or rubbed in the darkness or hoated to certain temperatures. There are a number of minerals which possess this property, as well as some organic substance. In Mariposa county, Cal., is found a vein of mineral composed largely of lime, with numerous base metal sulphides, blende, galena, chalcopyrite, etc., with also silver and gold. This rock, when scratched in the dark, emits a phosphorescent light. Loaf sugar will act in the same manner when rubbed or scratched. Fluorite is strongly phosphorescent when heated. Some diamonds become phosphorescent after exposure to the rays of the sun and will emit light in the dark.

✣✣✣✣

THERE are no extralateral rights in Mexico. The miner is confined to the lines hounding his claim extended downward and vertically. The unit of a claim is the pertenencia, a block of ground 100 meters square; hut a claim may consist of several pertenencias. For the purpose of taxation, a fraction of a pertenencia equal to or exceeding one-half a full claim is considered as a full claim. Fractions comprising less than one-half a pertenencia are not taxed, unless they constitute a separate concession by themselves. Such a fractional claim can not be taken unless it lies between two other claims already taken. The number of pertenencias which may be taken by one or more applicants is not limited, so long as there remains free ground to take.

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WHERE the owner of a mine, located at a greater elevation than the neighhoring property and the water flows naturally to the lower mine, there is no redress for the lower proprietor; but where a higher proprietor purposely carries on mining operations in such a way as to cause water to flow into an adjoining proprietor's mine, which would not go there naturally, then the lower proprietor has redress in the courts. Where the owners of a higher mine removed the mineral to such an extent that the ground caved, forming a catchment therein, causing the water to accumulate therein and to flow into and damage an adjoining mine, the court held that the owners of the higher mine were responsible for damage to the lower mine. (Homer vs. Watson, 79 Pa. St., 242; 21 Am. Rep., 55.)

✣✣✣✣

THE latest available statistics on production of asbestos are those of 1901. When in the United States the production was confined to the mines of Sall Mountain, Ga., with a small amount from Riverside Co., Cal., and from Berkshire Co., Mass., the whole production being 747 short tons, valued at $13,498. The largest amount of ashestos produced in the United States since 18$0 was in 1883, when it reached 1200 tons, valued at $36,000. The succeeding two years 1000 tons were produced anually, worth $30 per ton. Since that time—1894—the production has ranged between 50 tons and 500 tons annually, until 1900, when it reached 1057 tons, valued at $16,310 or about $15 per ton. The demand is apparently not on the increase. Magnesite has hcen substituted for asbestos in many kinds of fire proof and refractory materials.

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A PIT for the reception of a mortar block of any description need not necessarily go deeper than the bedrock. A short mortar block—6 or 8 feet—will answer as well as a longer one, if it rests upon bedrock. The block should be of sufficient depth to afford a substantial anchorage for the mortar bolts. Where bedrock foundation is not encountered in a pit 12 to 14 feet deep, it is sufficient to make a foundation of concrete. This should be broader and longer than the mortar block itself, which may be of concrete or of wood. There is much diversity of opinion as to the best material for mortar blocks. Some prefer concrete, others solid blocks of wood, and others favor blocks built up of planks, spiked together. The latter, when properly made, have afforded good satisfaction. It is not good practice to form a pit hy building concrete about it, and sitting the block within the pit so formed, unless the pit be sufficiently large to permit a man to work between the side of the block and the walls of the pit. A mortar block rots, if at all, on the outer portion, while the center may remain solid. By having the pit wide enough to permit men to work between the block and the wall, the decaying portion may be removed, if it he a built-up block, and new planks placed in their stead. The plan of forging rings on the lower ends of the anchor bolts, and securing them hy driving a heavy iron bar through them and entirely through the block, is a good one, and prevents the bolts from shifting in case of the decay of the outer portion of the block. When the block is in position, the pit may be filled with tailings, which makes a firm, unyielding packing for the block, but is a material easily removed, in case that repairs are necessary.

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REPLYING to an inquiry from Plumas county, Cal., it would be difficult, if not impossible, to estimate the power to run an arrastra owing to lack of any co-efficient for friction. An arrastra made with great care, having a turned spindle working in a well-lubricated box with ball-bearing carriers on the outer rim of the horizontal water wheel would require far less power than one built in the usual fashion, having wrought iron spindle forged by a blacksmith, and working in a hole drilled in a rock. The friction of the drags on the floor of the arrastra basin changes with the condition of the ore, being the greater when the ore is coarse than when it has been ground to the condition of sand. The amount of water employed in the pulp also makes a great difference in friction. The speed of an arrastra varies all the way from two to three revolutions per minute with a horse or other animal, up to fifty or more revolutions per minute with steam, water or other power. Less power is required to turn it slowly than rapidly. As fast as it can be run without surging the pulp out of the basin is not too fast for an arrastra to run. A round nozzle will afford as much power on a horizontal wooden water wheel as any other shape. The amount of force which the wooden buckets of an impact wooden water wheel will stand is proportional to the kind of material employed in construction, as well as the manner in which the wheel has been built. A well constructed wheel will stand a great deal more force than a light, flimsy wheel. The loss of power by rope transmission is practically the same for a long as for a short distance providing there be no intervening idlers. The amount of power which a given quantity of water will develop under stated head will he found in any book dealing with hydraulics.

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TO ROAST copper ores economically by the "heap roasting" method, the bed should be laid in a situation where the ore can be delivered from cars passing over a trestle or bridge, so that the ore may he cheaply distributed. The coarse ore is laid on the wood at the bottom of the heap, the finer material following, and the surface finished by placing still finer material over all. It is economy to build two heaps close together and to then fill the space between these heaps with an additional quantity of ore, forming one large heap. The central heap is not built until the two outside heaps have been completed, fired and been burning at least two weeks. A bed of wood is laid in the floor between the two burning heaps, and extending well up on their sides. This layer of wood is thinner than that laid for single heaps. When the wood has been placed the ore is dumped on as quickly as possible and the top finished with fines, as in single heaps. The result of this method of roasting is that a much larger percentage of the ore is thoroughly roasted than in single heaps, as the layer along the sides of the original piles is completely roasted, which is not usually the case in the ordinary method. This method, known as the "V" method, reduces losses by insufficient roasting to a minimum. It also economizes space in the roasting yard. The "V" method was first introduced by the Canadian Copper Co. at their Sudbury mines, Ontario, and it has since come into extensive use wherever heap roasting is practiced. Copper matte may also be roasted in heaps, but matte is much more difficult of desulphurization than sulphide ore, and requires two or three separate burnings to eliminate the sulphur preliminary to smelting. The process of desulphurization of matte proceeds to only a limited degree upon the first roasting, and this fact has led some of those undertaking this method of treatment to abandon it, but the desulphurization has usually progressed further than the appearance of the matte indicates. A second or even a third roasting is, therefore, necessary. Each succeeding roast, however, requires an increasing amount of fuel, owing to the decreasing amount of sulphur. Matte heaps should not exceed 12 feet square in area. Such a heap, when about 6 feet in height, will contain 60 to 70 tons of matte. The wood is placed on the floor as in ore roasting. A single central chimney formed of sticks of wood is sufficient, and about this the matte is heaped. When completed, the mound of matte should be covered with completely burned ore from the roast heap.

The Mines of Santa Eulalia, Mexico.*

Written for the MINING AND SCIENTIFIC PRESS by P. B. AIKEN.

The Santa Eulalia mines are situated southeast of the City of Chihuahua, Mexico, about 15 miles. Most of the mines are located upon a low mountain at about 1500 feet above the snrronnding valleys, and 6000 feet above sea level.

GEOLOGY.—The formation of Santa Eulalia is limestone, capped in places with porphyry of greater or less thickuess. The ore, which consists of silver-bearing lead carbonate and sulphide, occurs chiefly in the limestoue, either in fissures or in floors, and irregular masses. The limestoue is stratified, and is tilted usnally to the east. At some geologic period there has beeu a disturbance, accompanied by the intrusion of the porphyry, which resulted in the fracturing of the limestone. It is chiefly in and near the fissnres that the ore bodies are found.

The fissures have been the channels for the passage of mineral solutions, which had penetrated from the fissure along the bedding planes of the limestone, and at favorable places has dissolved, and carried away large masses of limestone, leaving great natnral caves at various depths, and sometimes several hundred feet away from the fissnre, and then afterwards by a process of alteration and of deposition mineral solutions have filled, or partially filled, many of these caves with ore.

These great caves, now open in many of the mines, are of wonderful extent. Ou the 1300-foot level of the Hearst miue was enconntered what they call the "Bnll Pen" (from its oval shape). In some places it measures as much as 450 fcet in diameter and 100 feet high. From this great cave many thonsands of dollars of high-grade ore has been taken. The great cave in Parcionera is said to be large enongh to contain the Chihnahua Cathedral without a spire touchiug the roof or walls. Similar caves are fonnd iu Sau Jnan and Bustillos and other mines. Some of them are wholly natural, while others arc the result of the extraction of massive ore bodies in mining opcrations. The illnstratiou ou the front page shows the formation of stalactites aud stalagmites iu one of the mines.

HISTORY.—It is difficult to place the exact date of the discovery of these mines. They certaiuly antedate the founding of the City of Chihnahna, and have probably been worked for over 300 years. They were first worked by the "Ancients," later by the Spaniards, Mexicans and Americans.

The Spaniards apparently did mnch intelligent development work, aud extracted great quantities of ore. Then the Mexicans followed; but did little more than simply remove bodies of ore left by the Spaniards, and when these bodies in the upper level were removed the mines were abandoned as worked ont, for a Mexican will not look for ore at greater depth, if it becomes exhansted or of too low grade to give him a profit.

At abont this time the Mexican Central Railroad entered the conntry and a concession of the mountain was secnred from the Government by a Mr. Robinson, and after some years of inactivity they decided that they were paying taxes on too mnch land, so they abandoned to the Government all land save two pieces, which they cousidered their best promising mines. These are Sau Domingo aud Zubiate, which they still own and are now operating.

The abandoned properties were gradually relocated by various parties, and mauy of them have developed into great and paying mines. Sau Juan has since produced scveral million dollars. Miua Vieja, Percionera, Bustillos, Galdeano and othcrs are now producing many thousands each month. Recently El Potosi was repnrchased at the price of $250,000 by those who once abandoned it as worthless, and they have developed an ore body in it estimated to be worth $75,000,000.

Up to 1895, when the Americaus began au active development of the old mines, it is estimated that the camp, having a radius of less than 3 miles, had produced over $700,000,000. Some idca of its prodnction may be gained from the fact that the Chihnahua Cathedral and the old chapel at Santa Eulalia were bnilt at a cost of $900,000 exclnsively from the tax on the production of these mines during the early years of the eighteenth ceutnry. In about 1898 or 1899 diamoud drills were introdnced and large ore bodies were discovered at greater depth. A new era of mining began. The Mexicans nsed only the primitivc system of carrying out the ore on their backs and transporting it ou burros to their small furnaces uear by, and then, in their crude method, extracting the silver and other minerals.

The town of Santa Enlalia lies less than 1 milc from the base of the monntain, and here can be seeu the ruins of former great activities. Thc slag to the extent of huudreds of thousands of tons is positive evidence of the work of the miniature smelters.

General Lew Wallace, who visited the mines in 1868, is rcsponsible for the statement that at that time there were 188 of these small smelters at work in and abont the town.

Wheu one considers these facts and that 600 pounds of ore and flux constituted a charge, aud that the necessary heat was obtained by the use of a foot or hand bellows, one can appreciate the infinite amount of work it has taken, first to extract the ore and transport it to the town, and then to smelt it with these crude methods. And he will fnrther appreciate the vast extent of the ore bodies when he knows that the mineral belt was hardly 1 mile in length. Thns the work of operating these mines has dragged through many generations by these crude methods, so that to-day the camp is, as a matter of fact, practically in its infancy, as in most of the mines drifts have not been run below the 400-foot level; and when it is remembered that it has proven the almost nniversal rule in this camp that the grade of the ore improves with depth, we realize that the fnture production will probably snrpass the past. Santa Enlalia presents one of the most striking examples of secondary enrichment of ore bodies by downward passage of snrface waters.

CHARACTER AND GRADE OF ORE.—The greater part of the ore consists of a mixture of carbonate of lead and oxide of iron. This class contains from 10% to 15% of silica and a little lime. The carbonate ores run from 10% to 60% lead, and contain from 6 to 80 onnces of silver per ton.

The snlphide ores are richer and sometimes run very high in silver, as in the case of the San Jnan mine, where, for months at a time, the ore has run hnndreds of dollars to the ton. The greater portion of the ore in the camp is low grade, rnnning perhaps 20% lead and 10 to 20 ounces of silver to the ton. This ore, if in large bodies, will pay a good profit, for the Santa Enlalia ores are much sought after by smelters as fluxing ores, and command the best smelting rates.

The ores from the San Juan have averaged considerably more than this. Those from the Santo Domingo, El Potosi and Bnena Tierra, eveu in the large bodies, at a depth of 1000 to 1400 feet, run considerably higher than this, and yield a net profit of $15 to $30 per tou; while those at the 450 level of the Americau Smelting & Refining Co., and of Bueua Tierra, rnn about 10 ounces silver and 20% lead.

In the Hearst mine (Miua Nneva), I am informed by the owners, that their ore from abont the 1400-foot level paid them a profit of over $35 pcr ton.

R. D. Jackson, late Professor of Mining in the Universily of Nevada, made an examination of the camp and for some of the facts herein I am indebted to his report. While there he inspected the ore body on the 1300-foot level of El Potosi and says it is abont 800x600 feet in size.

A short distance east of El Potosi lie the claims of the Zubiate, 325 feet sqnare, and Coronel, 325x650, now beiug worked by thc Standard Oil people. Znbiate is repnted to have been one of the richest mines in the camp, despite its small size. Mr. Robinson says that a conservative estimate of Zubiate's production is between $40,000,000 and $50,000,000.

*See illustration on the front page.

Conserving Water for Hydraulic Mining.*

Written for the MINING AND SCIENTIFIC PRESS by DENNIS H. STOVALL.

An excellent method for conserving water for hydraulic mining has recently been adopted by some of the larger sonthern Oregon placer mines. Those properties that derive their water directly from the main streams nsually are afforded an ample supply by the uatural flow duriug the winter months, bnt are required to close down dnring the summer ou account of the streams getting to snch a low stage as not to afford a fnll pipe-head.

The bnilding of reservoir dams has solved the problem, not only of a snmmer snpply, but also insures a steady and constant flow in the ditches. Snddeu freshets aud alternate dry spells and low water, which formerly resnlted in overflowing ditches, caves and slides, are held in check by these reservoir dams. By their aid the flow of water is kept constant and regular.

These reservoirs are different from those formerly in use by hydraulic mines, and still in use extensively, in that they are built at the head of the ditches instead of the mouth. They are not built to tnrn the water into the ditches, bnt are located ½ mile or more above the head of the ditch, and on the creek itself.

When the snmmer months arrive and instead of closing down the giants entirely, the dams are closed dnring the night and the reservoir allowed to fill. Eight or ten acres of watcr accumulates above the dam—enongh to supply two or more giants all the following day. In this way operations can be carried the whole year throngh, which is a big item to the euterprising placer miner, who fully recognizes the valne of utilizing every moment, for the greater the time the giants can be kept at work on the gravel bauks the greater will be the cleau-np.

The dam shown in the illnstration on the front page, is made of a donble tier of pine logs. These were cnt the right length, peeled and cribbed, and the cribs filled in with boulders and gravel, the whole being set firmly into either bank.

*See illustration on the front page.

THE next annual session of the Amcrican Miuing Congress will be held Angust 22 to 27, 1904, in Portland, Or.

Gold Mining in Nova Scotia.

Gold mining in Nova Scotia began abont the year 1860, and has not made rapid progress since that date. The annnal ontpnt has varied from 10,000 to 35,000 onnces, says the Canadian Mining Review.

The early operations were condncted with little skill, and some thirty years passed before the experience gained in other countries was applied to the provincial mines. At present several companies are working on business lines and getting good returns. Continnal losses, however, show that many have not learned the principles of legitimate mining.

Owing to the abandonment of every mine in the earlier days, as soon as the quartz fell below the high figure reqnired to yield profits, it soon became an nndisputed dogma that all Nova Scotia gold was shallow. The gold being free milling, no one tried to see if it still remained in the quartz and sulphides, if invisible. Mines were abandoned which to-day show no free gold, but enough in the metals to pay the carefnl miner. It may safely be said that for a long period iu Nova Scotia no assays were ever made, and it became a maxim that all ore was valneless unless the miner could see the gold in the quartz.

This fallacy has now been pretty well exposed, and tailings and concentrates receive considerable attention. Still the lakes, rivers and swamps have received thousands of tons of tailings, which represented in many cases handsome margins of profit.

The other axiom, the persistence of gold to shallow depths only, is dying hard. For years the capitalist iuvited to iuvest in our gold mines invariably objected, "Your mines carry gold only to limited depths," and there is no opening for investment. The criticism was trne as far as experience had gone. The dome shape of the Nova Scotia gold fields became known at an early date, with its intercalated qnartz bands radiating away from an anticlinal and sweeping round the dome of elevation. The veins were worked as they outcropped down as far as the gold held, to depths up to 500 feet. It appeared from the strnctnre probable that there might be veins nnderneath these not coming to the snrfacc and bending over the anticlinal. It was some time before this was proved by working.

The discovery at Bendigo, Anstralia, that a shaft sunk on the line of the anticlinal axis wonld cnt the crowns of such unexposed veins as they turned over the fold, led to a comparison with the strnctnre of the Nova Scotia veins. It may be said that the veins in Nova Scotia do turn over the anticlinal axis as in the Australian district referred to, but it may be qnestioned if the facts so far observed in Nova Scotia can be relied upon to permit of a prediction that the physical conditions of the strata here will reprodnce equally large aud rich vein crowns, or saddles and legs.

Any dictum as to the finding of gold at any particnlar point along the vertical plane of an anticlinal axis mnst be based on the rules governing the deposition of the gold. As yet it may be said this important point has not been studied in Nova Scotia.

It may be stated that the gold in the Nova Scotia veins was deposited before thc transverse foldings took place, and possibly to some extent later. There is presumably no proof that the gold came from ascending waters, as the lessening in thickness of the legs, with depth, wonld point to a line at which the strata were absolutely compact.

Inferentially the sonrce of the gold is to be fonnd in the rocks adjacent to the openings or loosened portions of the folds. These rocks, originally receiving the fold as an allnvium, wonld receive it with more or less irregularity. Hence cantion as to any positive assnrauce of any shaft in any anticlinal axis giving access to succeeding rich quartz bands.

However, the analogy with Bendigo, Anstralia, is striking, and thc practical comparison seems to be fairly borue out.

For a number of years the Government of Nova Scotia has been importnned to sink a deep shaft and settle forever the question of the existence of gold at depths in this province. The only practical outcome seemed to be a preminm to the miner who found gold in depth, but it was difficult to see how any miner could do his share without some gnide as to location, etc.

Mr. Faribault, the geologist of the Canadian Geological Snrvey, having made for years a close stndy of the Nova Scotia gold fields, satisfied himself that the conditions here closely paralleled those of Bendigo, and the life of the indnstry warranted the test of the pick. His advocacy of this view inspired the bolder miners of the province, and they seem to have so far proved the correctness of his reasoning. The Government was now enconraged to believe that it saw a reasonable ground for action. The gold fields, if they could be proved to be capable of systematic development, offered, owing to their great extent, a source of revenne greatly exceeding that derivable from coal, and the Government appears willing to veuture again. In order that the public interested in this snbject might be informed, they procured from Mr. Faribault a report embodying the conclnsions he has arrived at. This report gives im-

portant suggestions. He urges that aid should be given to vertical shafts sunk close to the antielinal axes, so that the apices of veins in the richer zones should be intersected and their legs be tested by crosscuts. As far as mining developments have been carried, his advice is good.

The Government recently passed legislation pledging itself to subsidize the sinking of shafts already 500 feet deep, provided they are properly located, if the owners are ready to go to greater depths.

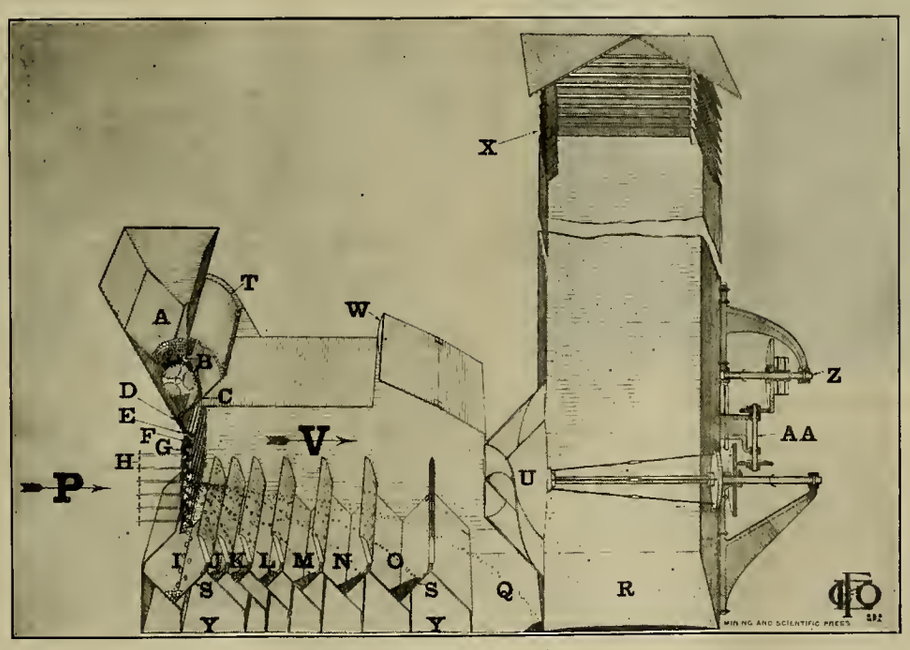
In these notes no reference has been made to fissure veins. There are a number of these in the province, some of which have yielded good returns. Mr. Faribault contends from the standpoint of his theory of the intercalated veins that the permanency in depth of the gold contents of the fissure veins is a matter already so well thrashed out in other countries that no special government attention is needed as far as they are concerned.

This point of view is, again, connected with the source of the gold, but every one acquainted with the gold fields of the province will agree that the interests involved in the development of the intercalated veins as to number, etc., is greater than in the case of the comparatively limited number of fissure veins heretofore opened. Under the head of the fissure veins may be classed the hitherto little known auriferous veins and deposits of several other old geological horizons of the province.

Freid Gravity Dry Process Separator.

Written for the MINING AND SCIENTIFIC PRESS.

The accompanying illustration is an isometric-perspective view of the Freid gravity dry process separator, in which the principle of separation is gravity and deflection. The deflecting action is caused by a non-cavitating balanced screw propeller, placed at the end of the action chamber, which creates a partial vacuum in the chamber, and allows the small or lighter to deflect from the larger or heavy particles as the material which is to be separated falls on the line of gravity, which is on the perpendicular plane of the staggered baffle plates, as shown at the end of the action chamber opposite to the propeller. The entire area of the action chamber proper is left open, and the baffle plates arranged as shown, in this manner allowing atmospheric pressure to lay uniformly against the entire opening of the chamber and the perpendicular gravity line.



Freid Gravity Dry Process Separator.

The material which is to be separated is delivered in the hopper indicated by the letter A, and is fed through opening B, at which point the stream is regulated by a gate and agitated by a roll, the gate being raised and the roll caused to revolve at a speed suitable to feed a given quantity of material per hour. The material falls on dead plate C, slides off this plate and falls on cleaner plate at D. The cleaner plate has an angle turned up at E, where the material builds up on this turn-up edge and overflows, dropping on baffler F, and accordingly builds up to its natural angle of repose, overflows and drops on baffler G. While dropping off this baffler a horizontal opening H allows atmospheric pressure to rush into the action chamber V. The material following this arrangement of bafflers on the line of gravity to the bottom of the opening of the action chamber over which atmospheric pressure indicated by large arrow and letter P deflects the light from the heavier or the small from the larger particles of material so treated. The heavy or larger finally finds its way to compartment I and the light or smaller particles are deposited in O, N, M, L, K and J, according to their respective weights and sizes. The product in these compartments is discharged automatically through gates S and is delivered to suitable chutes or conveyors at Y. The curved plate T, which is hinged to the dead plate C, is for the purpose of preventing any spill at the roller feed.

The deflecting action is caused by the balanced non-cavitating screw propeller U, which creates a partial vacuum in the action chamber V, and the valve S controls the pressure at P. The louvered arrangement X at the top of the settling chamber R is to allow atmospheric volume to exceed the openings H at the bafflers. This causes the light particles to settle in the chamber R. The driving mechanism is arranged to allow minute change of speed of the propeller, and is driven by direct coupled motor, by means of flexible flange couplings at Z, or belt from motor or line shaft to loose and tight pulley, as shown. By adjusting counter drive A A the speed of the propeller U can be changed from 120 revolutions per minute to 1600 revolutions per minute. By this arrangement the action in the chamber V is controlled, making it possible to separate or concentrate material from 0.5 to 22 specific gravity.

Mr. Freid, the inventor, deemed it necessary to conceive a means whereby an absolute uniform action could be constantly created over the entire mass of material. The non-cavitating balanced screw propeller is a development of previous research made by Mr. Freid regarding marine propulsion. He claims that, as the propeller is readily controlled regarding speed or displacement of volume, the action at the baffle plates on the gravity line can be regulated so that a reduction of ore passing ½-inch ring and finer, up to 200 mesh, would be separated by deflecting the light or smaller from the heavy or larger particles, in the first separator of the mill unit the action to be so regulated as to hold the fine values in the separator, not allowing them to pass the propeller and tail off to the dump, the action of the second separation in a mill unit regulated to treat the concentrates from the first machine, and so on, as shown in the diagram.

Mr. Freid has a demonstrating laboratory, wherein he has a full unit of the separator, which is used to demonstrate the commercial value of his process.

Detection of Adulteration in Cement.

Portland cement is defined as a product obtained by firing to sintering a mixture of limestone and clay; the product is very finely ground after the firing, and has the property of setting hard with water, says Slate and Cement. It may contain 2% of gypsum. Its composition should be: Lime, 59–56%; silica, 20–26%; oxide of iron and alumina, 7–14%; magnesia, 1–3%; alkalies, up to 3%; sulphur trioxide, up to 2%. As many substances can be added which affect the properties of the cement without altering its percentage composition, R. and W. Fresenius suggested the following limiting values: Minimum specific gravity, raw, 3.00; ignited, 3.12; maximum loss on ignition, 3.4; alkalinity of aqueous solution of 0.5 gramme, 7.2 c.c. of deci-normal acid; permanganate reduced by 1 gramme, not more than 2.8 milligrammes; magnesia content, not more than 3%. Now that blast furnace slag is used in the manufacture of cement, these limits no longer hold, for a cement may be made from slag which shall be quite normal in these respects. The permanganate measures the sulphide-sulphur present, but if there be much sulphur, some may escape as hydrogen sulphide during the titration. This may be avoided by addition of excess of permanganate and back titration, but the limit must in that case be altered, for normal cement so treated may require 6 milligrammes of permanganate. Instead of permanganate, the author now recommends addition of excess of arseuious acid, in hydrochloric acid solution, which precipitates the sulphur as arsenic trisulphide, and back titration; or two titrations with permanganate, one direct, the other after removing the sulphur as cadmium sulphide.

Normal cement should not contain more than 0.15% of sulphide sulphur, while one made with admixture of ground slag may contain 0.8%. This limit, however, may be found in the centrifugal separation, and examination by permanganate or arsenious acid, of the constituents of the slag of different specific gravities.

Ecuador and Peru.

Written for the MINING AND SCIENTIFIC PRESS by F. W. CARNAHAN.

Ecuador was created into an independent State owing largely to the slow means of communication then (and now) maintained, as between Bogota and Quito, on the one hand, and Lima and Quito, on the other. Peru, as it exists to-day, is the remnant of Pizarro's domain, retaining the capital, which he founded. Quito is an ancient seat of the Incas, and probably of their predecessors. Prescott's "Conquest" is the only recognized history of Peru, so said a Peruvian. Ecuador has history. Wolf's works are accepted as the standard source of information about Ecuador. Each of these countries has recently completed new railway mileage, and it will be admitted that this fact alone may lead to results of importance to the mining and metallurgical interest. One thing not disputed is the wide extent of the land lying just beyond these railways, and which practically contains no white men. There are, of course, sporadic instances where white people enter and dwell in this forest.

Certain indigenous tribes and a large proportion of the visitors prospect for placers. It is rare, indeed, that a party prepared to make any test further than panning traverses any part of the interior. In Ecuador a variable small amount of gold each year finds its way to Quito. Ten thousand dollars will likely cover this amount, mainly, it is said, from the Napo river. A jeweler in Gualaceo had an order for a gold ring while our party was sojourning there. He said that he had secured one ounce a week or so before from the Sig-sig Indians, and doubted if they would have another ounce so soon. Gualaceo is probably not the only market for the Sig-sig output. The larger city of Cuenca would logically secure more than Gualacco, and, beside, it would be more in line with what we conceive the Indian habit to be for them to distribute the gold as widely as possible. Taking account of all this, however, our impression remained that the product of the Sig-sig placers is unimportant. I saw a little gold dust brought out from the province of Esmeraldas. The man who secured it there said that one trader held at that time $4000 worth of dust which he saw. The Playa de Oro Mining Co. recovered a considerable amount of gold in the same vicinity a few years ago. Of my own personal knowledge I saw gold produced in the province of El Oro only. Here is an important system of veins, since visiting which I am inclined to hear with attention reports of other promising showings in that neighborhood.

In Peru, Casapalca is an important mining and metallurgical headquarters. Cash is paid for ore by the smelter at this point; ordinary charge, 100 tons per day. Practically all the material here run into matte is the product of ore-dressing plants, briquetted. The high price of fuel bars out ore carrying under 20% copper.

In Cerro de Pasco were several small establishments and stacks in operation. As elsewhere in Peru, matte is the product. Santa Barbara and Yauli also support matte furnaces. Llama droppings are utilized as fuel. This material yields an intense heat. There is also some coal found, but, so far as developed to the present time, the supply is precarious and the quality doubtful. Petroleum is a product of the Peruvian coast, largely employed in the roasting operations at Casapalca. Near Oroya occurs a fuel of the asphalt series. In appearance it differs little from the limestone which almost universally caps the formation in that portion of the Inter-Andine valley. I am not aware that this material is utilized. In the vicinity of Chimbote are said to be extensive anthracite exposures. In the progress of time it is possible that the fuel supply of Peru will be drawn from Chimbote. It may be another century will elapse before the unparalleled feat of crossing the Peruvian Andes with a railroad will be again attempted, and until this is done from Chimbote, we may regard Callao as a promising point for development of smelting.

There is one installation of stamps—100, I believe—

some 5 or 6 leagues north of Cerro de Pasco. The operatious here are reported to be satisfactory to the owners, mainly English.

The mining laws of Peru, and these are apparently the model for those of Ecuador, are worked out in great detail. Foreigners have rights equal to native born. In acquiring property there, however, it will be well to iuvestigate the status of any drainage tunnel in the viciuity with the same care that should apply with reference to tunnel rights in the United States.

An Ice Palace.

In some of the mining districts of Colorado the altitude is so great that the temperature is always below the freezing point of water. In some of those high altitudes the water in the rock is frozen throughout the rock mass. Some years ago, at one of the large mines in this high region, a gravity tramway was installed. The descending buckets carried ore and the ascending buckets each carried a stick of cordwood, which was used for steam making at the mine and also to thaw out the rock faces in the mine. The accompanying illustration is that of a stope in the Last Chance mine, in Park county, Colo., and is called the Ice Palace. This formation of ice is due to the freezing of the moisture as it exudes from the rock walls of the excavation. Its general appearance is not unlike a cave in which stalactites and stalagmites have formed from the crystallization of calcium carbonate, in caves and sometimes in ore chambers, as illustrated in an engraving on the front page, which occurs in a mine at Santa Eulalia, Mexico.



Ice Formed in Stope in Last Chance Mine, Park County, Colo

Treatment of Telluride Ores at Kalgoorlie, Western Australia.*

NUMBER IV.

Written by W. E. SIMPSON.

AGITATION AND FILTER PRESSING.—Every particle of the ore is eveutually reduced to slime and sent to the agitator vats. Of these there are four, each 20 feet in diameter and 7 feet deep, and fitted with mechanical stirrers making eight revolutions per minute. It is here that the pulp is tested and the solutions brought up to working strength—.04%—by the addition of solid cyanide. The solutions are always to be found strongly alkaline from the lime present in the wasted ore.

Seven hours are usually occupied in filling a vat, then ten in continuous agitation, after which the pulp is ready for filter pressing. The fact that the solutious are always hot, ranging in temperature from 120° F. when entering the tailings wheel to 80° when leaving the agitators, may have something to do with the rapidity of the extraction. Each vat holds 20 to 25 tons of dry slime mixed with 40 to 50 tons of solution, and for agitation requires about 3 H. P. From these agitators the pulp is allowed to discharge through a 4-inch plug cock in each, iuto one of two montejus, vessels resembling large egg-ended boilers set up on end, and from these it is forced by compressed air into the filter presses.

Four filter presses are in use on the Boulder Main Reef, each containing forty-eight slime cells. The cakes obtained are 40 inches square by 3 inches thick and weigh on an average 220 lbs. moist or 182 lbs. dry, so the complete press contains 3 tons 18 dwts. of dry slime. Each of the presses is filled and discharged twice per shift of eight hours. The rich solution resulting from the filtration of the pulp is forced by a plunger pump through a small clarifying press, and passes on to the precipitatiou boxes. The cakes or residues are washed, first with weak solution, under 40 lbs. pressure for an hour, theu with water, and are finally dried by blowing compressed air through them for a few minutes. The press is now opened and cleaned out, and the residues are trucked to the dump. The moisture still left in the cakes varies from 18% to 24%, and appears to be in a state of chemical combination, as no amount of mechanical effort cau appreciably reduce its quantity. A considerable degree of heat is required to expel it completely.

The pulp from roasted ore is passed through a filter press with more difficulty than that from the raw slime, as the action of the hot saline solutions soon hardens the filter cloths and makes them less porous, consequently the presses take louger to fill. For the same reasou the washing with water is less effective, and the amount of air consumed in drying is slightly greater. The roasted ore, however, is finely granular, and consequently is exceedingly porous. The washing of cakes a foot thick presents no greater difficulty than is uow experienced with those only 3 inches. But the great drawback is that a 12-inch cake will weigh nearly 8 ewts., and this is far more than a couple of pressmen can handle efficiently.

Up till quite receutly montejus alone were used for charging the filter presses. They are convenient, as the compressed air is easily regulated, and gives a steady pressure, free from all jar or percussion, on the presses, and thus do not cause leaks, but compressed air is expensive. Triplex pumps are now being installed at many of the mines. They are much cheaper in operation, but have some disadvantages, the weak point being the packing rouud the plungers. This appears to be unable to stand the highest working pressure—viz., 120 lbs. per square inch, and is constantly blowing out. The slime also works up about the glands, and the plungers become so much scored that they will probably have to be replaced frequently. An internal jet of cyanide solution might be used with advantage, but its introduction would always mean so much dilution of the pulp. Pumps also cause jars in the presses and so lead to leaks, and an even greater apparent disadvantage of pumps is the liability of obtaining a diminished extraction of gold owing to the lack of effieient aeration of the press charges.

As the operation of charging proceeds the press becomes filled, the filtering area diminished, and eonsequently the capacity for receiving pulp is gradually lessened. It is therefore necessary that the rate of delivery to the press should be correspondingly reduced—in other words, the speed of the pump must be gradually reduced. The best pump would appear to be one driven by the electromotor, regulated by a switch which would automatically reduce the speed as the press filled and as the pressure on the plungers increased.

On the Boulder Main Reef the air from the montejus, which has just charged a press, is exhausted into its pulp-filled neighbor, thereby making it unnecessary to use the compressor except for the end of the charging process. The residues are discharged from the presses through chutes into trucks underneath, and these are drawn out to the dump by horses; but the tendency is to supersede the truck as far as possible by the Robins belt conveyor, and the horse by the electromotor. There seems to be a splendid opening for a filter press which could be discharged by some simple mechanical means; for instance, it might be possible to sluice out the cakes with water, and run the resultant pulp into reservoirs. This would reduce the labor cost to a minimum, diminish the wear and tear by rendering it unnecessary to be opening and closing the presses continually, save the filter cloth, dispense with the use of compressed air for drying, set free the obligation of limiting the thickness of the cakes to sizes which can be easily handled, and probably bring down the cost of filter pressiug to one-half of what it is to-day.

The cleanup is performed in the usual way—viz., treatmeut of the precipitate with sulphuric acid, filter pressing, roasting, or rather drying the bullion slimes, and smelting with borax or other flux.

On the Boulder Main Reef the gold from the amalgamation and that obtained by cyanidiug are melted together, and an analysis of the bullion obtained on June 3, 1903, was as follows:

Gold	71.73%
Silver	25.65%
Copper	00.91%
Iron	00.82%
Zinc	00.89%

On all the larger plants the tilting furnace is iu general use for melting gold. It is a cast iron box lined with firebrick, and mouuted ou a pair of trunuions like the Bessemer converter. The crucible—or "retort," as it is called—is bricked iu with the lining, aud rests on a firebrick arch a few inches above the fire bars. Wheu the charge has to be poured in the whole furuace is tilted over by means of au endless screw aud worm wheel, and the molten metal is discharged iuto moulds or other convenient receptacles. With this furnace 10,000 ouuces of "bullion slime" from a cleanup of a cyanide plant can be melted iu from twelve to sixteen hours. The crucible itself will last for two runs, and costs in Kalgoorlie £12.

The advautages of this contrivance are numerous; its capacity is great, the crucible remains undisturbed and embedded in the hot fuel during the whole of the meltiug; no heat is lost in pouring; the crucible mouth is outside the furnace away from the fierce draught, and therefore uo fine bullion dust can be drawn into the flues and the loss by volatilization is at a minimum. These are all matters of great importauce, deserving serious consideration.

The Taverner process, so successful in South Africa, has been tried ou a small scale ou several of the Kalgoorlie mines, but has invariably given lower results than those obtained by the ordinary method. The reason of this is probably that the loss of gold in cupelling lead bullion is greater than in simply melting "bulliou slimes." The material dealt with in Kalgoorlie is very much richer than that which is usually met with in South Africa, for it often contains 60% to 70% of fine metal.

LABOR.—The amount of labor employed ou any plaut depends on its size. A millman is required per shift no matter what be the tonnage treated. On the large dry crushing plants it is found that one man per shift can attend to the running of six ball mills or ten Griffin mills, one can do the firing of six Edwards roasters, and it takes auother to attend to the amalgamating pans or flint mills. Two pressmen can, per shift of eight hours, discharge about thirty tons of residues, and oue man is required to see to the charging and washing of the presses. In Kalgoorlie the minimum wages for any kind of unskilled labor is 10s per shift; furuace men, filter press hands, boilers, stokers, etc., receive 11s 8d, eugine drivers 13s 4d to 15s, and mechanics, carpenters, bricklayers, and other tradesmen 15s to 16s 3d per shift of eight hours.

EXTRACTIONS AND COSTS.—Comparisons of costs for different plants are difficult, as no two mines use precisely the same process, or treat the same tonnage, and there is no uniform standard cost sheet on the fields. Ou the Boulder Main Reef, during the year 1902, there were treated 22,284 tons of ore with an average assay of 16 dwts. 8 grs. fine gold per ton. Of the gold contents, 92.2% were extracted at a cost of £1 3s 9d per ton for treatment. During the half year ending June, 1903, this percentage of extraction has been maintained, even with ore of lower assay value, and the cost has been gradually reduced until it now stands at about 18s. The eonsumption of cyanide averages slightly under 1¼ pound per ton treated.

Peculiar results are often observed in treating the Kalgoorlie telluride ores. Thus, in the dry process, it has been noted occasionally that excellent extractions have been obtained when the roast was so foul that the ore leaving the furnace was actually buruing blue. The consumption of cyanide, however, as might be expected, was very great.

In the Diehl process, on more than one occasion, a charge of sulphuric acid has accidentally been run in with the pulp into an agitator vat, in mistake for cyanogen bromide, and the agitation continued for some time before the error was detected; and it was

*Abstract Trans. Institution Mining and Metallurgy.

found that the extraction from that particular vat was distinctly better than that obtained from the rest of the pulp under treatment.

The addition of small quantities of zinc sulphate (spent clean-up liquor) to the working solutions is utterly opposed to all theory of cyaniding; but the value of the salt as a precipitant, when soluble sulphides are present, is now generally recognized.

The Diehl vats are all covered in, to the complete exclusion of atmospheric oxygen, which seems in direct defiance of the ordinary run of cyanide practice; but then the cyanogen bromide, added during the agitation, is in itself a powerful oxidizer, and more than makes up for any lack of aeration.

(TO BE CONTINUED.)

Mining and Milling in Mojave Desert, California.

TO THE EDITOR:—The desert region, from an economic standpoint in regard to mining, has a number of disadvantages that militate against the profitable extraction and reduction of low grade ore, as compared with more favored localities. The scarcity of water, fuel and timber, and in some cases an entire absence of same, increases the cost of mining and reduction to such an extent as to render the mining and reduction of low grade ores unremunerative. The last named conditions obtain at Randsburg, Kern county, Cal. In the following extract from the monthly report of the Yellow Aster M. & M. Co. it will be seen that low grade ore—from $3.50 up—can be made to yield a good profit under proper conditions. The above-mentioned mine is equipped with two mills—one of 100 and the other of 30 stamps—reducing on an average 500 tons of ore per day. Although within a distance of 2 miles of the terminus of the railway, freights are high, as will be seen from the prices of supplies, a few of the important ones being: Fuel oil, 4¼ cents per gallon; lumber, $32.50 per M.; other supplies in proportion. Water is obtained from two wells, sunk to depths of 450 and 300 feet, respectively, at a mean distance of 6 miles from mine and mill, at an elevation of 1500 feet below point of delivery. On account of the strike declared against the company June 10, 1903, the mine remained closed until September 1st following. Since that date the mine has been in operation steadily to its full capacity with non-union employes. The following is the scale of wages:

Miners, 9 hours	$3 00
Muckers, 9 hours	2 50
Car men, 9 hours	3 00
Timber men, 9 hours	3 50
Amalgamators, 12 hours	4 00
Stationary engineers, 12 hours	4 00
Hoisting engineers, 8 hours	3 50
Pump men, 12 hours	3 50

EUGENE H. BARTON,
Supt. Yellow Aster M. & M. Co.

	YELLOW ASTER MINE. 14,601 TONS TREATED.			From Nov. 1 to Dec. 1, 1003. Total disbursements, $30,183.06. Total cost per ton, $2.067.
	Total expenditure.	Expenditure.	Per ton.	REMARKS.
ORE EXTRACTION	$17,656 40			
Labor		$10,696 69	$0 73206	Miners, muckers, car men, ship bosses, etc.
Timbering		803 55	05500	Timber men, framers and assistants.
Timber		2,661 47	18228	8x8, 6x8, 2x12, Oregon pine.
Powder		580 68	03977	
Fuse		93 90	00643	
Caps		44 97	00308	
Lights		306 96	02100	Candles, electric and oil.
Blacksmithing		498 32	03414	Tool dressing, horseshoeing, car repairs, etc.
Development		628 72	04306	Hoisting, tramming powder and incidentals.
Haulage		643 90	04410	Drivers, mules, feed, etc.
Hoisting		607 02	04780	Tons hoisted, 6900; cost per ton, $0.1012.
Totals		$17,656 40	$1 20872	
MILLING	$5,981 69			
Power		3,340 70	22880	Attendance, fuel, maintenance, etc.
Labor		1,123 40	07604	Amalgamators, foreman, etc.
Rock-breakers		674 67	04620	Attendance and repairs.
Shoes and dies		538 79	03690	
Repairs		256 53	01757	General repairs.
Mercury		47 60	00326	Total cost, exclusive of water, $0.40067 per ton; .0815 ounce loss per ton.
Totals		$5,081 60	$0 40967	
WATER	$3,220 09	3,220 09	22053	Total cost, including water, $0.63020 per ton.
Totals		$3,220 09	$0 22053	Pumped 6½ miles against 700 pounds pressure at a cost of 19 cents per 1000 gallons.
GENERAL EXPENSES	$3,325 88			
Miscellaneous		1,460 10	10000	Including taxes, insurance, interest, expressage.
Assaying		160 61	01100	Assayer, fluxes, fuel, etc.
Salaries		950 87	06507	Superintendence, engineering, etc.
Tailings		313 33	02146	Impounding tailings and water.
Incidentals		440 97	03020	Office expenses, legal telegraphing, livery, etc
Totals	$30,183 96	$3,325 88	$0 22773	

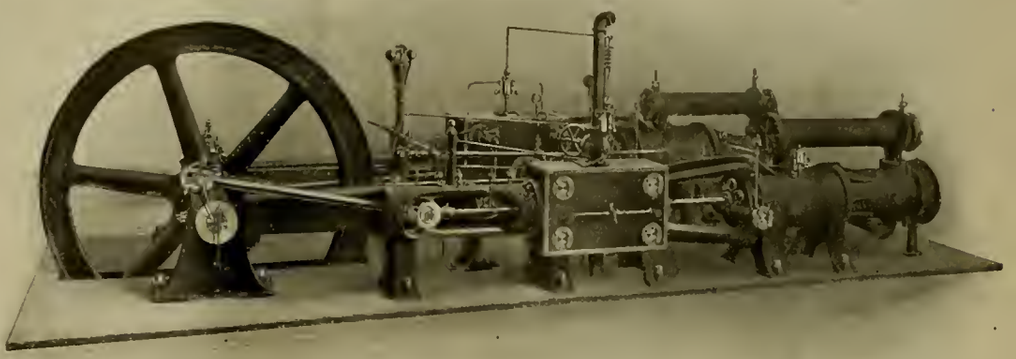
THE mineral now known as topaz was not the original topaz, for that name was applied to the gem stones now known as peridot and chrysolite (olivine). The topaz of to-day was not formerly recognized as a distinct mineral. The prefix "oriental" before the name of some stones gives the name a different significance. Thus, oriental topaz is a variety of sapphire, and oriental ruby is different from the common ruby, the former being a beautiful red sapphire of great value and the latter is commonly known as spinel, a magnesian-aluminous oxide.

THE price of the newly-discovered metal, radium, which has been quoted at a fabulous figure, is now said to be worth only $2000 per gram. The demand for radium is said to be chiefly for medical purposes.

A Four-Stage Air Compressor.

Written for the MINING AND SCIENTIFIC PRESS.

The compressor illustrated herewith was built by the Sullivan Machinery Co. of Chicago, Ill., for the Oliver Iron M. Co., or the United States Steel Corporation, and was recently installed at one of their largest mines at Norway, Mich. It consists of a cross-compound, condensing Corliss engine, built for 150 pounds boiler pressure. A reheating receiver is placed between the high and low pressure cylinder. This receiver contains a reheating coil for reheating the steam during its passage from the high to the low pressure cylinder, a feature that is essential to the economy of engines of this type, especially in connection with a compressor, as it is sometimes running at a very slow speed, and without a reheating device condensation would be very great. The cylinder lagging is made of heavy steel plate, and a space of from 4 inches to 5 inches is allowed inside of this lagging for magnesia covering. The lagging around the cylinder, resembling a square box, is filled with this non-conducting material, so as to prevent losses by radiation.



Four-Stage Air Compressor.

The compressor was built entirely of semi-steel, this metal being much stronger and denser than ordinary cast iron, and all of the wearing parts will, therefore, it is claimed, wear much better than if soft cast iron were used. The weight of the machine is also reduced to a minimum, on account of the great strength of the material.

This class of machinery is heavy, and, in most cases, has to be transported thousands of miles through parts of the country where the freight rates are high, and the saving in freight between a machine that is built of the strongest kind of metal and one that is built of soft, inferior metal is considerable, as the difference in weight is stated to be nearly 25% between the two. Another loss that must be constant, as long as the machine is in operation, is the power required to keep in motion an unnecessarily heavy, unwieldy machine. The poorer the material, the heavier the revolving and reciprocating parts of the machine will have to be, and the energy required to keep it in constant motion, and to overcome the friction of these heavy parts, will be much greater than that necessary to keep these parts in motion when made of lighter, stronger material. The cranks, crank shaft, connecting rods and piston rods are all said to be made of the best grade of steel procurable for this purpose. All motion rods and pins for the valve gear are made of steel, and all boxes and bearings for the valve gear are made of phosphor-bronze, and are adjustable for wear. The piston rods are packed with metallic packing. Sight-feed lubricators are provided for the low and high pressure steam cylinders. The governor operates the Corliss valve gear in combination with the air pressure. The fly wheel is made sufficiently heavy to maintain a uniform speed at 10 R. P. M. This compressor was built for an air pressure of 1200 pounds, and is of the four stage type, with the air cylinders so arranged that the work done in the high and low pressure steam cylinders is nearly equal. The four cylinders are single acting. In the intake and second cylinder, where the air pressure is lowest, it is compressed against the front heads. In the third and fourth cylinders, where the pressure is the greatest, the air is compressed against the back heads of the cylinders. In this way the use of stuffing boxes and piston-rod packing under the heavy pressure has been avoided.

Concerning its operation, the manufacturers say: "The pistons in the intake and second cylinders are of the adjustable bull-ring type. This kind of pistons are also used in the engine cylinders. The pistons in the third and fourth cylinders are made in the shape of a straight ram or plunger, and fill the cylinders their entire length. They are also provided with a special spring packing. Special provision is made for the lubrication of these pistons, and, in view of the fact that they fill the cylinders their entire length, the air cannot leak past them. The suction valves in the intake and second cylinder are mechanically moved. The discharge valves of the intake and second cylinder are of the poppet type and of the following design: The valve and valve seat are located inside of a removable cage, and held in place by hand-hole plate. When this hand-hole plate is removed the valve cage containing the valve and seat can be removed from the recess in which they are located with bare hands, without even the use of eyebolts. The pressure of the hand-hole plates forms a tight joint between the cylinder head and the valve cage. By this method we avoid making the valve seats against part of the cylinder head, which is so annoying to keep tight when the seat becomes worn or leaky, when the loose cage valve and all can be removed; a spare valve and cage can be kept on hand to put in its place when taken out. It can then be ground and fitted, and be ready to take the place of the next one which becomes leaky. By using a spare valve seat and cage one can be taken out and changed each week, if required, as it requires no longer to make the change than the time required to remove the three nuts that hold the hand-hole plates in place. By this method these valves can be kept tight at all times. Where part of the cylinder head forms the valve seat, several grindings will destroy the proper shape of the seat to such an extent that when a new valve is inserted it will not fit the seat properly. The consequences are leaky valves and valve seats ever after. The suction and discharge valves in the two high-pressure cylinders are of the poppet type. The valves are made of nickel steel. The recess in which these cages are inserted are tapered, and the outside of the valve cage is ground to fit in these tapered recesses. The cages fit on their outside their entire length, or the thickness of the head, as it is not advisable to depend on a narrow joint or shoulder for an air-tight fit under so heavy a pressure. With the smallest amount of leakage across a joint of this kind, with so heavy a pressure, it would soon cut away the metal, and a very small leak under 1200 pounds pressure would impair the efficiency of the machine enormously. With these cages fitting their entire length, and ground to fit like a plug cock, all

danger of leakage or cutting away the metal with the high pressure is eliminated. The poppet valves in all of the cylinders are cushioned, so that they work without noise or clicking. The water jackets arouud the intake and the secoud cylinders are so designed that a body of water 3 inches in thickness circulates around the cylinder liners. The amount of water space around the third and fourth cylinders varies from 4 inches to 6 inches between the outer shell and the cylinder liner, which allows for the free and unrestricted circulation of cold water around the cylinders. The liners in the air chambers are independent of the cylinder castings, and are pressed into the outer shells with hydraulic pressure, so that in case of cutting or scoring from lack of oil, either one of these liners can be removed and new ones inserted in their place. If the cylinders and the liners were cast in one piece and the water jackets cored out, the cylinder would have to be rebored in case of cutting and a new piston made, or else the entire cylinder must be thrown away and a new one purchased in its place, which is more expensive than a new liner. The air enters through the mechanically moved intake valves in the front end of the forward air cylinder, located behind the low pressure steam cylinder. When compressed, it is discharged through the pipe shown on the side of the cylinder into the first intercooler, located below the floor line. From this intercooler it is taken into the second cylinder, located on the left hand side of the machine nearest to and behind the high pressure steam cylinder. After this second compression it passes through the intercooler located on top of the second and third cylinders, and the third stage takes place after passing through this intercooler. It is then discharged through a pipe passing under the floor line from the third cylinder, and enters the intercooler located on top of the intake cylinder, on the right hand side of the machine and the fourth cylinder. This intercooler is separated into two compartments, so that the air travels in the shape of a loop through the intercooler tubes, and it is drawn into the fourth or final cylinder, where it is compressed to a pressure of 1200 pounds to the square inch. The front end of this intercooler is merely resting on the upper side of the intake cylinder. There is no connection between the intake air cylinder and the intercooler. Copper is used exclusively in the intercoolers for circulating tubes for the cold water. The arrangements of the copper tubes in the intercooler is such that they are free to expand and contract from heat and cold without affecting the joints, so the expansion and contraction can take place without causing leakage. The speed of the machine is automatic, and varies automatically from 10 to 125 R. P. M. An automatic air governor acts on the automatic cut-off mechanism of the valve gear, and the speed is automatically increased and decreased, according to the amount of air used. In order to economize on the foundations the third and fourth cylinders may be built overhanging from the ends of the intake and second cylinders. The foundation may terminate at the back ends of the first and second air cylinders. A pedestal may then be located under the rear ends of the third and fourth air cylinders, and a cast-iron plate, on which these pedestals rest, bolted to the floor. The pedestals themselves however, are not bolted in this case, so as to allow for the expansion and contraction of the metal of this part of the compressor taking part without hindrance."

Notes on Classification.*

NUMBER II.—CONCLUDED.

Written by T. LANE CARTER.

It is believed that this slimes escape gate is an improvement on the former method of putting the slats in as required. The kaffir in the tank generally has the faculty of getting them in crooked and allowing pieces of blind to get in between the slats, causing an aperture through which the sand escapes.

Another successful scheme for providing for the escape of slimes from sand tanks is to have heavy iron slats without a blind of any kiud.

There would be a higher extraction from sands if the rich sulphurets found with sands could be kept in the concentrate tanks and more of the coarse sand now in concentrates could mix with the sands, forming a more amenable product. The following figures are the averages of assays carried out to investigate this point:

Average residues of sands = 1.05.

3.73% concentrates from these residues assayed 14.1 dwts.

96.27% sands from these residues assayed .57 dwt.

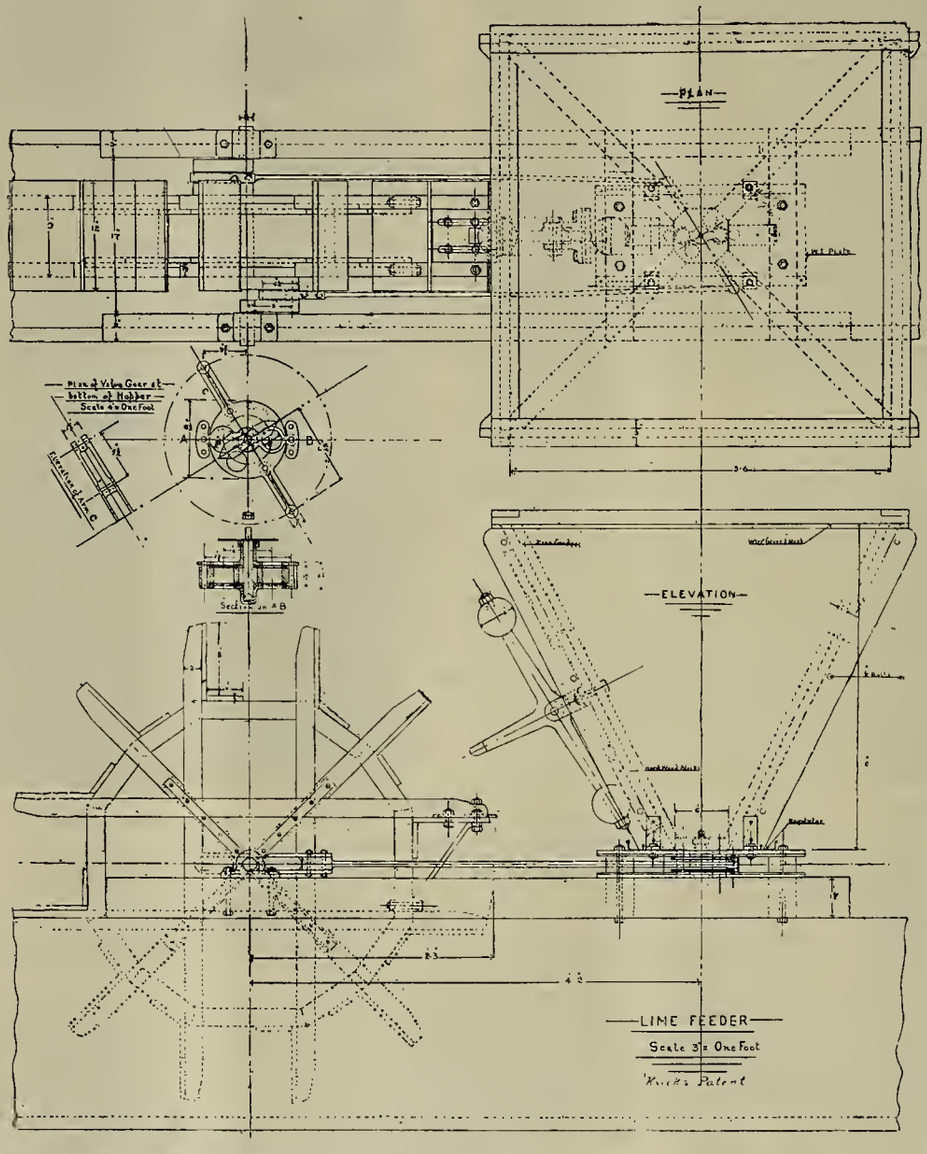
Showing conclusively that the larger proportion of the gold in a residue is in the sulphurets and the very coarsest of the sand. If, therefore, the 3.73% of concentrates could have been kept out of the sands tauks the average assay values would have been .57 dwt.

Much has been said regarding the tank capacity of a cyanide plaut, and it is, indeed, true that the tank capacity of the average plant is underestimated. A simple plau has occurred to us for increasing the treatment capacity on a plant with top and bottom tanks. For instance, on a 200-stamp mill the cubic sand tank capacity is 201,060 cubic feet, which is made up of 100,530 cubic feet top settlement tanks and 100,530 cubic feet treatment tanks. Now, on most plants top treatment has been abandoned. It is evident, therefore, that, except for the purpose of having one tank over the other, this enormous settling capacity is unnecessary. Why not allow 2-5 of this tank space remain for settlement, and remove the other 3-5 to the level of the lower tanks? The installment of a belt conveyor to carry the sand from the settlement tanks to the treatment tanks would be a simple matter and of no very great cost.

Slimes: The treatment of slimes is comparatively new among us, but great improvements have been made, and the extractions from same are gradually increasing. Perhaps different and less costly methods will spring up, but the chief method at present is the decantation process.

For the successful treatment of slimes it is essential to prevent fine sands and float sulphurets entering the slimes treatment tanks. This is easier said than done.

To a great extent the saud escaping from sand tanks is kept from the slime plant by means of a re-



turn spitzkasten to the tailings wheel. The secret of success is to have the spitzkasten sufficiently large to allow the fine sands to settle. On many plants the dimension of this spitzkasten is totally inadequate, and much incouvenience is caused by not having sufficient fall-back to the wheel.

It is often a good plan to have two spitzkasten working either in tandem or abreast, both discharging into the same launder.

Another important point in dealing with this product from classification is to have a continuous feed of ground lime to get good settlement.

A native feeding by hand has been used in the past, but this method at the best of times was not continuous.

There are, no doubt, a number of contrivances for regulating the supply of lime. The automatic lime feeder shown (see accompanying sketch), has proved successful on several mines. The chief features of this feeder are the continuous feed and the ease with which the feeding of lime can be regulated as to the alkalinity of the water.

Often a fine sulphuret, assaying from one to three ounces, is found in the overflow from the return spitzkasten. This is a rich product to be mixed with a 2 dwt. slime. It is possible to catch this fine rich stuff on blankets, burlaps or raw hides, with the hair pointing up stream, and if the scheme for concentrates was adopted this stuff could be returned to the barrel to be treated with the sulphurets.

The first slimes plants were generally provided with large spitzkasten, which were considered essential, especially on plants of 200 stamps, to procure a thorough settlement of the slimes. In the latter plants these large and expensive spitzkasten have disappeared, and the tendency seems to be to put up tanks 50 feet in diameter and allow the slimes to run into these tanks direct. With these large tanks excellent settlement is obtained.

On some mines it is usual to run the washings of the ore from the sorting house into the tailings wheel. This practice is not to be recommended. This slimy material contains a great deal of free gold, and this free gold, which is supposed to be caught in and extracted from sand tanks, has been found iu the slimes plant.

A preferable method of dealing with this material from the sorting table is to run it into pits, feed lime, which would not only cause the stuff to settle rapidly, but help to neutralize it, and then send it to the mill, where the free gold would be caught.

We understand there has of late been extensive experiments made in the treatment of tailing dumps in situ. Now, the gold left in a tailings dump must be either gold in solution, from the moisture left in the residues, or gold left unattacked by the cyanidc. After a number of years' exposure almost all of the soluble gold must be washed out by the rains, so that the only gold to be extracted from a heap is the unattacked gold. We have tried to point out previously that the great percentage of gold in a residue heap occurs in the concentrates and that the amount of gold left in the sands is small.

We have noticed on the tailings heaps at several mines that the cubes of the sulphurcts are gradually split open by the action of the elements, thus exposing particles of gold which were "bound" when the material was first deposited. It strikes us that the gold which might be extracted from a tailings heap would come principally from this class of the product.

It seems unnecessary, therefore, to deal with the whole heap when the gold is principally in the concentrates. Should the necessity of treating tailings heaps occur, it may be well to dump the comparatively rich concentrates residues in a spot already

*Abstract Journal Chem., Met. and Min. Soc., S. A.

prepared for their future treatment after oxidation and to keep the poor sands separate.

Personally, we believe it a better policy to get the gold from the concentrates before they go to the tailings heap, provided, of course, it pays to get the extra extraction. Judging from the attention being paid to this part of classification, and the confirmatory evidence from all sides as to the possibility of getting high extractions from concentrates by the cyanide process properly applied, it seems certain to predict that the concentrates residues in the future will be lower than ever they were in the past.

Mining and Metallurgical Patents.

PATENTS ISSUED DECEMBER 8, 1903.

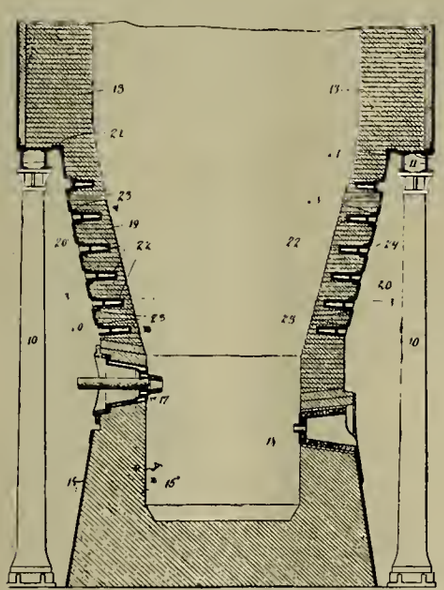
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

TESTER FOR BLAST CAVITIES.—No. 745,357; C. B. Lanham, Pittsburg, Pa.



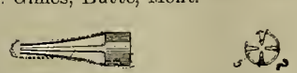
In tester for blast cavities, main protecting casing, measuring chain adapted to operate within same, means for operating chain, and elbow connected to bottom of casing to direct chain.

SUPPORT JACKET OR FRAME FOR COOLING PLATES OR COILS IN BLAST FURNACES.—No. 745,430; A. Farrell, Gladstone, Mich.



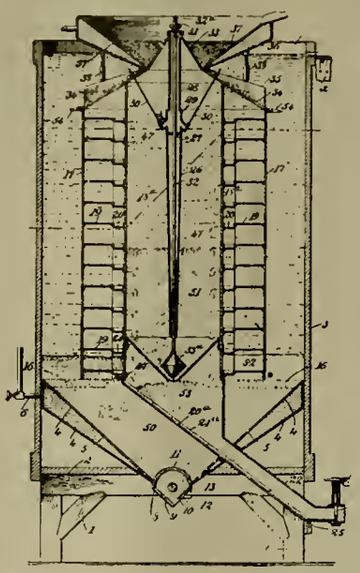
Blast furnace, bosh wall of which is encircled by metal jacket having series of superposed holes formed therein, holes being separated by integral portions of jacket, jacket being provided with projecting supports about holes, and cooling plates or coils extending into body of bosh wall and suspended at outer ends by supports of jacket.

DEVICE FOR PROTECTING BLASTING CAPS.—No. 746,262; D. B. Gillies, Butte, Mont.



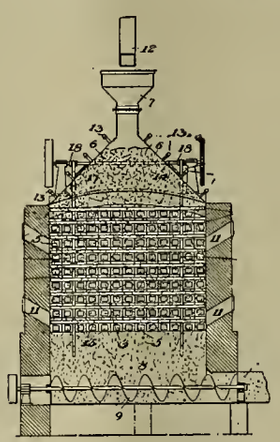
Guide for inserting blasting cap into flexible sheath, guide comprising tapering spring arms adapted to be inserted into sheath and affording between them passage for cap.

ORE CONCENTRATOR.—No. 745,860; E. W. Keeler, New York, N. Y.



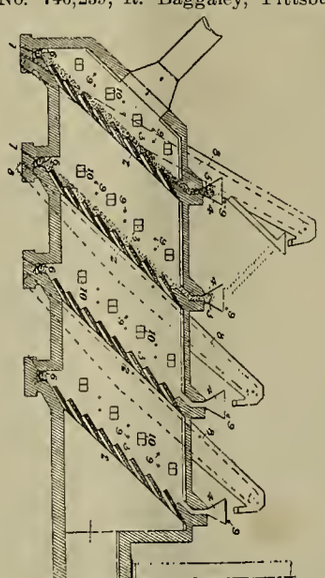
Ore concentrator, comprising vessel for containing concentrates, plurality of chutes provided with side passages leading into vessel, plates coated with mercury and disposed within chutes, conical member, plurality of radially disposed channels mounted upon conical member and connected with chutes, and means for discharging ores and water upon conical member.

APPARATUS FOR REMOVING IMPURITIES FROM FURNACE GASES.—No. 746,261; R. Baggaley, Pittsburg, Pa.



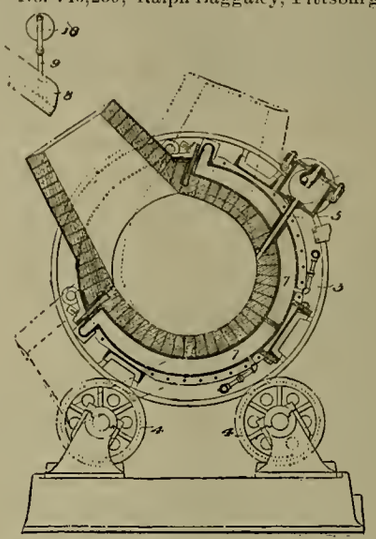
Apparatus for removing impurities from gases, comprising charcoal screen interposed in path of gases, moving mechanism adapted to remove impregnated charcoal from base of screen, means for feeding fresh material to screen to replace portions removed, and cutter mechanism arranged to dislodge deposited impurities from the walls of apparatus.

PROCESS OF RECOVERING VALUES FROM SMELTER GASES.—No. 746,259; R. Baggaley, Pittsburg, Pa.



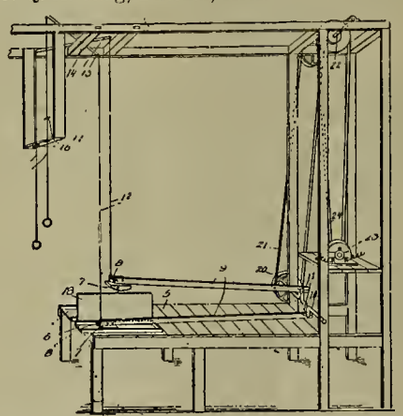
Method of recovering valuable dust from smelter gases, which consists in precipitating same upon filtering material such as ore, matte or converter slag, containing metallic values fit for reduction or smelting with precipitated dust, whereby values contained in both filtering material and precipitated dust may be recovered together.

METHOD OF RECOVERING VALUES FROM SILICEOUS ORES.—No. 746,260; Ralph Baggaley, Pittsburg, Pa.



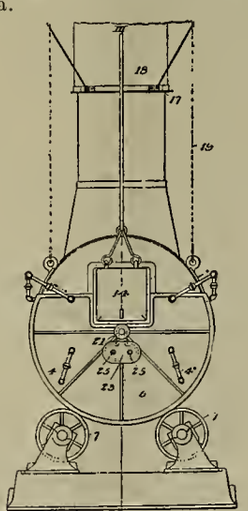
Method of recovering values from value-bearing siliceous ores, introducing into copper converter such ore in solid lumps or particles, adding molten matte to converter, bessemerizing same, and fusing ore, whereby values are recovered and gangue of ore is utilized as flux.

ASSAYER'S PULVERIZING APPARATUS.—No. 746,104; J. Q. A. King, Phœnix, Ariz.



Ore pulverizing apparatus, consisting of flat surfaced bucking board, muller resting by gravity upon board, motor, crank shaft driven by motor and located in same or nearly horizontal plane with board, and pitman freely joined to crank and rigid with muller, and serving to impart both reciprocating and rocking motion to muller.

REFINING COPPER.—No. 746,246; Ralph Baggaley, Pittsburg, Pa.



In the process of refining copper, forcing through copper when molten, and after oxidation and removal of its impurities, reducing gas generated independently of heat of copper and prior to its introduction thereinto.

Mining Summary.

SPECIALLY COMPILED AND REPORTED FOR THE MINING AND SCIENTIFIC PRESS.

ALASKA.

The Fjeld M. Co. group on the Tanana has been bonded to B. F. Millard for $1,000,000, says the Valdez News.

The gold sbipments through Dawson from the American Yukon during the open season of navigation in 1902 and 1903, given in ounces, are shown by the comptroller's records at Dawson as follows:

	1903.	1902.
April	94	....
May	200	....
June	3,387	1,384
July	1,741	1,562
August	1,692	4,078
September	6,247	8,832
Totals	13.361	15,856

These gold shipments from the American side passed through the Canadian territory under special permit, which exempts them from the Canadian royalty of 2½%. They are chiefly from Forty-Mile, but include considerable sums from Rampart, Circle, Koyukuk and other scattering places on the lower Yukon. A large proportion of the gold from the American Yukon goes to the States by way of St. Michael.

The gold output of Alaska for 1903 may exceed that of 1902, though the gold yield last year was $8,283,408. The increase in the gold and silver product of Alaska for 1902 amounted to $1,400,254 over tbe product of 1901. The increase in gold alone amounted to $1,351,181, the Nome district having shown an increase of $430,182 over 1901. Last year the Douglas and Unga Islands quartz mines produced $2,577,883 worth of gold, and the rest of Alaska, exclusive of these mines and the mines of Nome, produced $1,259,238. Quartz mining in southeastern Alaska is increasing and new properties will be in operation next year.

ARIZONA.

Cochise County.

Work is progressing on the Copper Queen smelter being built at Douglas. An elevated railway 1400 feet long has been completed. Three mixing pits, each 700 feet in length, are ready for use with an electric trolley line for each. A mile of 3-foot blasts and flue dust pipe is on tbe ground and being hoisted into position, says the Douglas Dispatch. The engines are all in position in the power house, representing 9000 H. P. Three thousand sacks of cement were used in tbe foundation of the power house. Thirteen engines are in position, and the traveling crane is up. The brick chimney is 170 feet high, and the 200-foot stack, which will be built of half-inch boiler iron, has been started. The main building of the Copper Queen smelter is 396 feet long.

Graham County.

P. F. Crowley, workiug the Antietam mine at Metcalf, reports that he is running a crosscut at the 140-foot level, and has cut the vein for 15 feet, showing ore that averages 10% copper. The values are in chalcopyrite and glance.

W. Wallace, superintendent of the San Jose group, near Metcalf, says he has five men employed, and work is progressing. W. B. Thompson is the owner.

A. S. Rosecrans, manager of the Standard C. Co., near Clifton, reports that the aerial tramway is completed and was put in operation this week. During construction of the tramway the output of tbe mine was reduced, as the pack train was used in carrying the timbers for the tramway. The ore will be taken from bins at the mine and conveyed to bins on the railway track.

In Lone Star district, near Clifton, Superintendent J. F. Webber of the Federal M. Co. of New York, reports work progressing on the Federal's twenty-seven claims, and he is shipping ore to El Paso, Tex. It assays 20% copper with gold and silver values. A concentrator is proposed. Above 1000 tons of ore are on the dump, assaying 11% copper. On the Great Eastern claim there is a 48-foot shaft. On the San Juan a shaft is down 130 feet. A cross cut caught tbe ore body, at 100 feet.

Maricopa County.

(Special Correspondence).--Reports from Buckeye say the Gila Gold Lode M. Co. has made a rich strike of ore in a shaft being sunk on one of its claims in the White Tank mountains, north of Buckeye.——Manager Hewins reports development work in progress at the Pike's Peak mine, west of Frog Tanks. A body of high-grade ore has heen cut.——At the Relief mine, near Phœnix, a stamp mill will he built.

Men are at work at the Ryland mine, near Morristown, and more men will he added. The Arizona M. & D. Co. recently bought this silver-lead property.

Phœnix, Dec. 13.

(Special Correspondenco).--J. E. Maddox has put on more men at his mine in the White Tank mountains, west of Phœnix.——The Ben Hur mine, in Cave Creek district, will put on more men. This is a low-grade proposition and a cyanide plant will he built.——W. Dunn is putting on more men. They will sink the shaft 200 feet deeper and then run drift from shaft along the ledge. This mine is in the White Tank mountains, near Buckeye, 35 miles west of Phœnix.

G. Francis bas men at work on his group near Morristown, and is shipping ore to the smelter at Wickenburg.

Development work is in progress at the Angel mine, near Wickenburg. Tbe company has bought several additional claims.——The Arizona Granite Co. will put men to work in the quarry south of Phœnix. Machinery for working the product will be put in.——The Hercules Co. will resume work on their group near Morristown this week.——The Mormon Girl mill at Cave Creek will he put in operation next week.

The La Gloria M. Co. is shipping copper ore to the smelter, and the output of the mine will be douhled when a tunnel on one of the claims is completed. The camp is in the White Tank mountains.——H. J. Bennett of Phœnix is developing a gold and copper property south of the Hercules camp, near Morristown. Ore from one of the claims is said to carry platinum values.——Work will be resumed at the Union mine, north of Phœnix, next week.

Pbœnix, Dec. 13.

A 10-stamp mill is heing built on the C. T. Kenna property (the Sun Cloud mine), 45 miles southwest of Congress, Yavapai county. The mill will he a concentrating plant.

Mohave County.

(Special Correspondence). — The McGuire mine, 3½ miles west of Kingman, on the Santa Fe Railroad, has heen bonded for $25,000, and a 50-ton cyanide plant will be huilt.

The Gold Roads mine at Acme is working 125 men. Posey & Bailey of Los Angeles, Cal., principal owners, are sinking from the 300-foot level to the 400-foot. The property is equipped with a 150-ton cyanide plant, which is treating 125 tons daily.——The Lucky Boy mine is shipping two cars (thirty-four tons) per week of high-grade ore to El Paso, Texas. The ore is packed from the mine to Chloride, 5 miles. —— A strike is reported in the Azalia mine, which is reported giving returns from the smelter of $850 per ton, being 27 ounces gold and 615 ounces silver. The ledge shows tellurides. This mine is 1½ mile south of the Dempsey & O'Dea, in Pilgrim mining district, 10 miles west of Chloride. Three men are at work in the tunnel and four men working the assessments on the group of eleven claims. T. E. Cary, N. E. Pettit and J. W. Brown of Kingman are owners.

It is reported tbe Moffat & Root White Hills M. Co. of Denver, Colo., will start up the mill.——The Minnesota M. Co. is developing its ore bodies and intend starting their mill Jan. 1. There are fifteen men at work running drifts and opening up the ore.——The McKesson mines, 1½ mile north of White Hills, has been taken over by C. W. Raymond of San Francisco, Cal., for Minneapolis, Minn., men, and reduction works of sixty tons capacity are proposed.

Kingman, Dec. 14.

Pinal County.

(Special Correspondence). — Russell & Arthur are working their claims near Superior. High-grade ore has heen found and more men will he put to work.

Superior, Dec. 13.

(Special Correspondence).—G. Schade has been developing his claims near Kelvin and will arrastra the ore obtained. ——The Copper Butte M. Co. will resume work this week. Their elaims are 7 miles from Kelvin. In the spring the Phœnix & Eastern Railroad will be completed to within 2 miles of the group.——Several promising elaims have heen located near Walnut Springs.

L. D. McClure has bought a group of gold claims in the Butte district. The ore carries values in gold and is free-milling. Development work will be increased and a stamp mill built.——Manganese ore has been found near the Silver King mine.

Florence, Dec. 13.

Sinking has heen resumed in the Arizona-Pacific double compartment shaft at Camp Woolley, near Florence, with three eight-hour shifts, and will he continued to a depth of 500 feet.

T. Kavanaugh, superintendent of the Troy Manhattan mine at Troy, says the Alice tunnel on the Troy group is in 1300 feet and is being driven at the rate of 60 feet a week. The distance yet to reach the Alice vein is 560 feet, and the tunnel will cut the lead at depth of 780 feet on the incline of the vein. It will drain the Alice and adjoining claims and furnish an outlet for ores to the company's smelter site on the Gila river.

The double compartment working shaft sunk on tbe Superior & Arizona mine, near Florence, to cut the vein at a depth of 125 feet, has cut a vein for 20 feet. The vein has a dip of 45°. The vein material carries considerable oxide of iron.

Yavapai County.

The Baumann C. Co. will resume work on development of its group near Mayer next week. It has been idle for a year. The shaft on the Swiss Girl will he continued to depth of 500 feet, says Manager J. Baumann.

The smelter of the United Verde is again in operation, after a temporary shutdown due to shortage of coke. Work on additional coke bins for the U. V. Co., at Jerome Junction, is progressing.

The Prescott Courier says the Empire mine and mill at Groom Creek will start up in January.

At Mayer the buildings of the Rigby R. Co. reduction plant are completed. Concrete foundations for the machinery are being put in.

D. N. Jenkins, at Mayer, has started up work on his Cinderella group. Some development work has been done. The ore carries values in silver, gold, copper and lead.

CALIFORNIA.

Amador County.

Operations at the Sand Pile mine near Forest Home are temporarily suspended, pending replacing the gasoline engine that furnishes power to hoist the sand to the tanks, as it broke down last week. D. Fricot, the owner, says the average daily treatment of the auriferous sands is 240 tons, and the yield is 80% to 90% of the assay value. The pile of tailings from the Plymouth mills covers several acres and carries $1 per ton in gold. Treatment costs under 50 cents per ton.

Last week F. & A. Eudey bought the Pleming property, adjoining the Zeila mine on the north, near Jackson. It is intended to combine the Pleming and Eudey ranches, covering a tract of land along the east or Zeila lode, and operate the same for mineral values.

The Sutter Creek Miners' Union on the 16th inst. declared the strike off at the South Eureka mine. The three men who were discharged will not be taken back. One of tbe engineers belonging to the Western Federation was called out shortly after tho strike was declared Nov. 16. He will not be employed again, says Superintendent Moore, as they will have hut two engineers hereafter. Superintendent Moore will take back the men as fast as places are found for them. The mine has heen kept free from water by the two engineers who remained at work.

Butte County.

(Special Correspondenco).—The mill at the Southern Cross is running steadily and it is reported more men will be put to work the first of the year to open up other mines which the Edel M. Co. has bought, near Enterprise.

The Cortez G. M. Co. is driving their tunnel ahead to open up the ore shoot. ——D. R. Widmer, who has bought the Schoff mine on Sucker Run, will begin this week driving a tunnel 2000 feet long. This tunnel will cut three ledges, and if they are found to prospect as well as they do on the surface, a stamp mill will be built.

Enterprise, Dec. 16.

Calaveras County.

The Tom Smith mine, near Sheep Ranch, has resumed operations. The tunnel is being driven ahead. A. Poe is superintendent.

The injunction papers were served on the 16th inst. on the striking miners of the Royal Con. mine at Hodson, and an attempt will be made to open up the mine with men brought in from tbe outside. One hundred and sixty strikers and sympathizers are camped about the mine. They maintain a picket line around the property and have allowed no one to pass the line except the mine officials. The mine has a guard of five watchmen armed with rifles. The engineers have remained on duty and the pumps are running. If the strikers disobey the court order warrants for their arrest for contempt of court will follow.

Del Norte County.

The National M. Co. of Tacoma, Wash., has bought the Sanger group of copper claims. The Sanger group consists of 700 acres of mineral land covering thirty-five copper claims a few miles south of Waldo, Or., and the Oregon-California line. Values in gold are also carried with the copper. I. A. Town, S. J. Pritchard, C. Kreis and G. P. Larsen of Tacoma, Wash., are the principal stockholders. ——The National Co. has put men to work on the group for development during the winter. The company proposes building a 500-ton smelter, the surveying of a townsite and the building of an electric line to connect the mines with the California & Oregon Coast road that is to he built from Grants Pass to Eureka.

At the Cleopatra group of copper claims, on Diamond creek, near the Sanger claims, south of Waldo, Or., twelve men are at work, says Manager Crawford of Grants Pass, Or. The Cleopatra group will be further developed, proceeding hy three tunnels, two of which have been driven in 570 feet, and are drifting on the ledge. They propose to put in a smelter.

El Dorado County.

Operations have heen resumed on the Ida Mitchell mine at Placerville, with D. H. Jackson as superintendent. Development work will be increased before putting up a mill.

Inyo County.

The Buckeye M. & S. Co. of Mansfield, O., operating mines in the Fish Springs hills, near Bishop, reports work progressing, opening up the ore bodies. A. A. Casler is superintendent.

Kern County.

Development work is progressing on the Queen Esther mine at Mojave and in addition to other improvements there is a cyanide plant on the ground, with a capacity for handling 100 tons of ore a day. There are 2000 feet of underground works. The ore body averages 10 feet in width, with values said to he $6 a ton in gold and silver.

At McKittrick, H. B. Guthrie & Co., operating south of the McKittrick extension, struck oil last week at depth of 1200 feet. The land is outside of the established proven helt at McKittrick.

J. M. Wright of Bakersfield, president of the Peerless and Fulton Oil Cos., will resumo drilling operations on his holdings adjoining the properties of the Bay City, the California Con. Crude and the Chanslor-Canfield Cos.

Mono County.

The Standard mine is closed down temporarily. The dam at Green Creek is leaking and it is being repaired.

The Monte Cristo M. Co., composed of Carson City, Nev., men, has bonded a group of claims 4 miles south of Sweetwater. A test run of ten tons of ore from the property has been made. An 8-stamp mill will be put up.

There are forty men employed by the Crystal Lake G. M. Co. at Lundy. Supplies for tbe winter are in.

Nevada County.

Work is progressing on the 20-stamp mill at the Canfield mine, at Blue Tent. Superintendent Grabam says it will be ready to start in January.

Superintendent C. H. Mallen has had the second electric pump set up on the 1000-foot level of the Brunswick mine at Grass Valley, and is raising water from that level. It will continue until the 1250-foot level is reached, which is the bottom of the mine.

Superintendent J. L. Bryson has forty-five men at work at the El Oro (Yuba) mine at Maybert. Work is progressing on the aerial tramway for conveying ore from the Mayflower mine, 2500 feet southwest from the El Oro mine, at an elevation of 1100 feet. The main carrying steel cable is 1¼ inches in diameter, and the rope on which the buckets return is ⅝ of an inch. The hauling rope is § of an inch. There will be twelve buckets, each carrying 400 pounds, which will be filled and dumped automatically. These stretches of rope are supported between the terminals hy five towers 30 feet in height, and it is thought the line will be completed by next week. The Mayflower mine and El Oro are both being reopened. Two air compressors are set up at the mill and a 3-inch pipe line conveys air to the Mayflower, a distance of 2500 feet. All machinery is run by water power, which is obtained from the Yuha river by means of flumes, one giving head of 40 feet for milling purposes, while the other has a head of 100 feet and runs the compressor. The 15-stamp mill is being overhauled. Ten stamps will be added in the spring.

At the Orleans mine, near Grass Valley, a ledge 16 inches wide has been opened, says Superintendent Brockington, at the 400-foot level on the north side. The rock is well mineralized and free milling. The mill is in full operation.

It is stated work will be resumed at the Merrimac mine, near Town Talk, near Nevada City, which has been idle for several years.

Superintendent White of the New York-Grass Valley M. Co., operating near Grass Valley, reports cleaning up last week 700 ounces of amalgam from a sixteen-days' run of the roller mill. The shaft is down 650 feet, and being sunk on the vein. Drifts east and west are being run at the 500-foot and the 600-foot level.

At Meadow Lake, in eastern Nevada

county, at the Crystal Lake mine, men will be kept at work during the winter. The 10-stamp mill will not be used until spring. The mine workings are down 140 feet. C. Raymond is superintendent. At present there are 3 feet of snow on the road leading to Meadow Lake.

Placer County.

E. K. Hawkins, superintendent of the Holmes L. Co., says the lime works on Bear river, 3 miles from Colfax, are nearing completion. The company is building two continuous burning kilns, with a capacity of from 100 to 125 barrels of lime daily. The company has surveyed for an aerial tramway to convey the lime from the kilns to the top of the hill above the works—a distance of 2800 feet. The elevation from the kilns to the end of the tramway is 605 feet. The tramway will intersect the wagon road near the Big Oak mine, and from there the lime will be hauled by teams to Colfax. Electricity will be used as motive power on the tramway. A storage house for the lime will be built at the works with a capacity of 100 tons.

Plumas County.

H. L. Archer of Minneapolis, Minn., manager of the Colonial M. Co.'s interes s in California, says work is progressiog on the company's mines on Mill creek, south of Quincy. A hoistiog plant has been put up on the gravel deposit, which the company will work through a shaft 50 feet deep. A tuonol has b en driven 600 feet into the Homestake quartz mine, being run on the ledge. At present the backs are 400 feet high. The company is also running a tunnel on th · Mountain Chief. Archer says he expects to have a 10-stamp mill ready for operation in the spring. Men are cutting a ditch to convey the water for power purposes.

The Premium mine, near the Kingdon ranch, at Indian Valley, is being developed by A. E. Wood & Co. of San Francisco. A. E. Westover is superintendent. The Premium is on the eastern gold belt.

Riverside County.

Preparations are said to he under way for the reopeniog of the tin mines (formorly called the Temescal mines) on the San Jacinto estate, 7 miles southeast of Corona. In 1891, considerable money was expended in putting up buildings, metallurgical works and other surface improvements, but comparatively little development work done underground. The Americao Tin M. Co. are operators.

Sierra Cuunty.

(Special Correspoodence).—Manager L. H. Carver, of the Mountain mine, near Sierra City, reports the men have cleared out the lower tunnel (No. 3), exposing a shoot of ore 500 feet in length. The vein fills the tunnel, and is 10 feet wide in places. Assays are reported showiog an average of $4 per ton. The mill is expected to be in operation next month.

Sierra City, Dec. 16.

San Bernardino County.

The Giant Ledge M. Co. is working sixteen men on its group of mines in New York mountain, near Manvel.——The Old Bullion mine in Copper Camp, near Needles, has men at work under P. Monaghan of Oro Grande. The mine was a former silver producer.

San Mateo County.

At Half Moon Bay the Fountain Oil Co. reports a strike of oil last week in their well. The oil is flowing over the casing.——The Duchess Oil Co. will begin drilling work next month.

Santa Barbara County.

Santa· Barbara reports say that extremely high tides last week wrought considerable damage at Summerland, on the coast, 6 miles east of Santa Barbara, where several hundred oil wells have been drilled well out on the beach. A number of wharvos owned by oil companies were damaged by heavy seas, and sections of some were carried away.

Shasta County.

F. H. Dakin of San Francisco is sole owner of the Newcomb Uncle Sam mine, having bought the one-half interest. The mine will be reopened. The ore body is blocked out and the mine is kept in repair.

Siskiyou County.

The Scott & Co. quartz mine at Indian creek, near Fort Jones, has its mill in operation with power from the Siskiyou Electric Power Co.——A. C. Brokaw, on Indian creek, is opening up the Golden Eagle mine, on which he has a steam plant for hoisting and operating the machine drills. As soon as he gets the shafts and crosscuts completed, he intends putting up a mill and a compressor plant.

The hydraulic mines in Quartz valley, near Fort Jones, are being worked with plenty of water to keep the giants and elevators supplied, says the Yreka Journal.

The San Francisco Co., which bought the Mott river claim on the Klamath, above Oak Bar, will opon the same, retaiuing M. Mott as superintendent. It will be worked by sinking open cuts in river to bedrock of channel, using dorricks oporated by water wheels in raising gravel.

Trinity County.

(Special Correspondonce).—Tho Brown Bear mine will shut down for the winter; ten leasers will keep on, however. This is tho first timo in twenty-five years that so little has been done at the Brown Bear in the winter time. Active operations will be resumed April 1.

The Lappio mine in the samo vicinity will also close for the wiuter.

Deadwood, Dec. 16.

At Trinity Center L. M. Mossmer of San Francisco has bought the Stoddard undivided half interests in the Viola Bello, Summit, Highland Chief, Annie Lucy and Transit quartz mines on Squirrel gulch, in Trinity Center mining district: also all of same interests in the waters of Cedar creek and Squirrel gulch, says the Searchlight.

Tho Trinity County Hydraulic G. M. and M. Co. has been iocorporated at Eureka, Humboldt county, to operate mines at New River. W. H. Ball of San Francisco, G. D. Johnson, W. M. Crown, F. J. Reid and W. J. McNamara of Eureka,, are incorporators.

The Dandy Con. quartz mine at Minorsville is showing up. Van Ness Bros. are principal owners. No. 2 tunnel, which is beiog run, shows a vein 3 feet in width, carrying $10 a ton in freo gold.

Tuulumne Couoty.

The Tuolumne mine, near Columbia, on Wet gulch, is being worked again, operations being resumed last week, with M. Pago as superintendent. Developmeot work coosists of two tunnels—one 1700 feet long and the other 600 feet. A 5-stamp mill is on the mine.

The Prudbomme M. Co. has bought the Clever Valley quartz mine (being the north extension of the Prudhomme mine), near Arastraville, and the Prudhomme south extension. The Prudhomme M. Co. has been reorganized under name of the Prudhomme G. M. & M. Co.

R. B. Lane has bought the F. E. Lane half interest in the Fairoaks quartz mine, a one-fourth interest in the Riverside, on the north fork of the Tuolumne river, near Carters, and a one-fourth interest in the Vista de Oro mine.——J. A. McMahon has bought the Fairoaks quartz mine, near Soulsbyville; and R. B. Lane has bought the Palo Alto quartz mine, on north fork of Tuolumne river, near Carters, and adjoining the Riverside mine, owned by R. B. Lane.

The Confidence mine at Confidence, which it was the intention of the company to shut down indefinitely, will he in full operation in the spring, says the Sonora Independent. The mine will he kept clear of water during the winter.

The mill at the Mapes mine, near Yankee Hill, near Columhia, started up last week.

A. Carter has put men to work on the Blue Eagle claim, wbich he has under bond at Jawbone, near Groveland. A tunnel to cut the vein will be run.

The Big Casino Co.'s tramway is completed. The mine and mill are running steadily.

The John Royal and Star mines, near Columbia, are again in operation, and work will be resumed at the Mountain Lily. Progress is being made sinking the new shaft at Altadena.——The shaft at the Golden Eagle mine is being unwatered, preparatory to resuming drifting and stoping.——Men are at work putting up the additional five stamps at the Vine Springs mine.

The attempt by the management to reopen the Black Oak mine, near Soulshyville, has been abandoned because of tbe insistent demands of the union. The owners will not accede to the demands of the uuion miners to operate tbe property with white men exclusively. Several Chinese were employed as ore sorters and canvas sweepers up to Nov. 9 and were paid $1.75 a day, and the demand was to supplant them with white men at $2.50 a day. The owners say that white men could not he obtained to perform the disagreeahle work at any price.

COLORADO.

(Special Correspondence).—During the past week a decided improvement in business is reported hy the mining machinery and supply houses of Denver. The strike situation is adjusting itself over the State. The coal famine which threatened the entire State is ahout over. In the northern fields the miners are agaiu at work, while in the southern fields the companies are operating with non-union men. An outhreak occurred near Trinidad last week in which two Italian strikers were killed. The sheriff of the county seems able to handle the rioters without the aid of the militia. Reports from Telluride show the mines are getting under headway again. No further disturbances are reported from Cripple Creek district, it being under martial law.

Denver, Dec. 4.

Bauldor County.

Near Ward the Modoc mine, which has been closed down for four years, has been bonded and leased to Q. R. Heriod and H. Cowie, of Denver. Tbe mine will be reopened. The Modoc is equipped with a 30-stamp mill and hoisting plant. The mine is ¾ mile north of Ward and is worked through a shaft 350 feet deep. Thore aro four principal drifts which have heon run from 350 to 800 feet. Tho ore is sulphide and free milling and the veins are 30 feet in width.

At Magnolia tho Nelly Bly mill has been overhaulod and will resume operations this week. The mill will use the cyanide process.

At Salina at the Belle mine, Superintendeut E. T. Wehber says at the 400-foot point on the lower tunnel a station has heen cut out, a 100 H. P. boiler, 8x10 hoist, pump aod compressor plant have been set up there. Ore is heing takeu out which carries calaverite and free gold.

Chaffee County.

At Winfield, in the northwestern part of tho county, 20 miles from a railroad, the Bankers' M. & M. Co., of which E. A. Stahler of Allontown, Pa., is manager, is shipping ore which is giving returns of $5 gold, 310 ouocos silver per ton, 9½% lead and 2% copper. Stahler is also intercsted in the Belmont group in the same section.

At the Latchaw mine, on Mount Princeton, near Buena Vista, the machinery is in place and operatioos hegun. The tunnel will he driven another 1500 feet to catch the Dandy Butler vein. The tunnel face is in 1500 feet. The machinery is run by electricity. A trolley lino has been run into the tunnel so that the cars will be handled in trains.

The Copper King mine, owned principally by W. E. Mason of Chicago, Ill., and E. E. Briggs of Salida, and located in Turret district, is showing high-grade copper ore. The ore shows free copper and the vein is 12 feet wide. It dips into the mountain at a sharp angle and was cut by a vertical shaft at depth of 80 feet. Men have eut the station preparatory to driving the drifts at the 80-foot level. Superinteodent E. E. Briggs says preparations are being made to huild a leaebing plant. A 50-ton concentrating mill is under construction on the Vivandiere mine, near the Copper King.

Clear Creek Couoty.

The Hansbrough tunnel, which will develop Democrat mountain near Georgetown, will open up the Clift lode, says Manager B. F. Kelley.

It is reported the Lebanon mines near Georgetown, after an idleness of twenty years, will resume operations next month.

The Indiana G. & S. M. & M. Co., operating on McClellan mountain near Georgetown, is making arrangements to increase work during the winter. Manager Stephens will drive the tunoel an additional 100 feet on the Indiana lode. Later, another tunnel will he driven farther down the mountain, to eut the vein at greater depth.

The Southern M., M. & D. Co. will start operations on its group on the northern slope of McClellan mountain, near Georgetown.

Coster County.

The Bassick mine at Silver Cliff is in full operation. It is reported the Bassick mill will be improved and its capacity increased hy addition of machinery.

Fremont County.

The Union mill of the United States R. & R. Co. at Florence, whieb has been idle since the strike in Cripple Creek district was declared, resumed operations this week. This mill will operate at its full capacity of 500 tons of ore per day.

Gilpin County.

The Mountz & Palmer mill, near Central City, is running steadily. The ore is coming mostly from their Mackey mine, but some custom ores are also being handled. Tbe mill is doing both amalgamation and concentration, says Manager L. J. Mountz.

The Nevada Con. G. M. & M. Co., near Central City, is preparing to put in a 100-ton addition to its concentrating plant. The addition will necessitate another building 90x140 feet, whioh will be equipped with Blake crusher, four jigs, two sets of rolls, two Huntington mills, five concentrating tables, together with screens, pumps, elevators, etc. As the ore of the King and otber mines operated hy this company carry as high as 20% in zinc values, there will he an electric zinc separator. The equipment will consist of two engines, one of 15 H. P· and one of 30 H. P., and a 115 H. P. boiler. The company will also put in an electric plant for lighting its mines and milling plant.

The Electric Spark G. M. Co., operating the Shamrock mine, near Russell Gulch, under lease and bond, is shipping smelting ores and concentrates. Superintendent G. Rogers says the company will sink the shaft another lift, besides doing other development work. Omaha, Neb., parties are interested.

Sinking operations bave heen resumed at the Cook mine, near Central City, with three eight-hour shifts, tho shaft being down 1240 feet. It is intended to sink at least 200 feet deeper. Thore are thirty uien at work on leases in different parts of the workings, and ores of milling grade are being sbipped, particularly from the Bohtail tunnel. O. B. Thompson is manager and W. H. Davis superintendont.

Gunnison County.

The New Era M. Co., B. T. Brooks of Denver manager, has bought the Occidental and Oversight lodes at Camp Ideal and will start development work this week.

Tho Raymond Con. M. Co. has bought the Gold Bricks mine on Ohio crcek, near Pitkin. Tbe company owns the Raymond, Cyrus, Humboldt, Alexander, Dawn of Day, Midnight aod Monte Carlo. Back of the Gold Bricks the Raymond Co. this fall put in a plant of machinery on the Raymond and unwatered the workings, and at the bottom of tho shaft has opened a shoot of ore 250 feet in length, with a pay streak on tho foot wall 22 inches wide that gives average of 3 ounces gold, 22 ounces silver and 14% lead, while there are 3 feet of concentrating ore that runs $15 per ton. After the value of the property was demonstrated tbe pumps were pulled and negotiations opened for the Gold Bricks, which is said to hold the key to the openiug of the drainage tunnel on Ohio crcek. The tunnel has been startcd and will be 2100 feet long, cutting four known veins at deptbs ranging from 800 to 1200 feet. Buildings are going up at the opening on Ohio creek and foundations are being laid for plant of machinery, including a duplex compressor, electric light, etc.

Hinsdale County.

The Lellie M. Co., operating near Lake City, will put ou more men.

Lake County.

Wells & Doran, lessees on the Silent Friend mine, on Littlo Ellen hill, Leadville, are shipping oxidized ore from the 350-foot level.

The California Gulch M. Co. mine, near Leadville, bas resumed operations under lease to R. O'Neill. There is a plant of machinery on the surface, the shaft boing equipped with a cage.

Mineral County.

The Big Kanawba L. Co. last week granted a sub-lease on the Uuited mines, near Creede, to C. W. Roe, H. H. Tomkins and C. A. Weber. The lease includes all that part of the mine south of the main working shaft, and above the seventh level, and the ore will be taken out through the New Discovery sbaft. A heavier hoisting plant is beiug put in place. This block of ground is said to contain bodies of concentrating ore. Roe owos a mill on the property, and has finished milling 10,000 tons of ore that was hoisted to the surface before the main shaft was connected with tbe Nelson tunnel. The leasers expect to be ready to start the mill Jan. 1.

Park County.

Development on the Dolly Varden mine on Mount Bross, near Alma, a former producer of silver, is reported to have opened up last week a large body of ore, showing average of 600 ounces of silver per ton. Work has been resumed on the Moose mine, also on Mount Bross, and development is showing good indications. A. Hall is part owner of the Dolly Varden.

Summit County.

The Quardary Mountaiu M. and M. Co. expects to have its concentrating mill near Brockenridge running by Jan. 1st. The 7-foot thick blanket vein of the Monte Cristo vein, the principal one of the group that is at present being developed, is reported improving. The ores are lead-silver.

H. S. Whitehead, superintendent of the Providence-Colorado M. and M. Co., near Breckenridge, which has secured the use of the Jessie's 40-stamp rapid-drop mill for test runs on the body of concentrating ore cut by the 190-foot shaft, has started milling. It is expected the mill, with coarse screens in the batteries, and with the ten tables adjusted for heavy concentrating ore, will make a grade of conceotrates which will run $100 per ton in gold, silver and lead. The mine is on the eastern slope of Gibson hill.

Teller County.

F. Strong has a three years' lease on the Victor mine on Bull hill, Cripple Creek, and work will be started tbis week. The shaft is down to a depth of 1400 feet.

Lessees R. P. Russell and J. Sharp, who have a lease on the Colorado Boss No. 3

claim, at Cripple Creek, have opened up the body of ore and have begun shipments. Sharp is also lessee of the Morning Star claim. They are operating on the 330-foot level, some distance from the shaft in the south end of the Boss, and are working two machine drills in the ore, but will increase the number. The vein is running 12 inches in width, averaging $30 per ton.

The Matoa G. M. Co., owning holdings on Gold hill, Cripple Creek, has work under way on the Halfmoon claim. There are fourteen men at work and sinking the shaft is in progress, being down 850 feet. It is intended to go to the 1000-foot level unless interrupted by water; after which lateral work will be started. Stations will be cut at 900 and 1000 feet.

The Vindicator mine at Victor is again in full operation and producing fifty tons of ore per day with two shifts employed, says Superintendent Trevarro. Ore is being broken down on the four lower levels not bothered with water (including the tenth level). No attempt is being made to unwater below the tenth level as yet. The El Paso drainage tunnel is expected to drain the Vindicator when the water course between the El Paso and Elkton mines is cut. There are 200 feet of water in the Vindicator and the Lillie adjoining has 500 feet, but the latter shaft is 300 feet deeper than the Vindicator.

The washing machine on the American Eagle dump, Cripple Creek, is in full operation. Lately only screenings have been handled, and from returns received the ore runs three ounces gold per ton. There is a large amount of rock in this dump.

The Findley mine, on Bull hill, is closed down and will continue so until January 15th, due to putting in a new plant of machinery. Men are at work building a foundation for the hoist. This mine was practically closed down during the greater portion of last month, as its total production was 250 tons of ore, while the shipments generally amount to 750 to 1000 tons per month. The ore is said to average $25 per ton.

The Cripple Creek Times says the superintendents and managers of the mines state that they are full-handed with men, and have no room for any more. Every superintendent in the camp is receiving numerous applications for work daily. Quite a number of miners are being enrolled to be sent to Telluride. There is a surplus of all kinds of workmen in the camp, with the exception of machine drill men, though all the superintendents state they have plenty of machine operators. It is estimated that there are between 2800 and 2900 men at work on the properties which are under the ban of the Western Federation of Miners. This number, with the men employed on the Portland and Midget mines, brings the total up to nearly the number of men prior to the strike.

The military authorities have refused service of release papers in the habeas corpus case of Victor Poole, the union miner being held in the "bull pen," maintaining the right of the Governor to declare martial law. Application has been made to the State Supreme Court for a writ of habeas corpus.

During the month of November eleven shipments were made by Lessee Granfield from the C. K. & N. Co. mine on Beacon hill, Cripple Creek, a total of 431 tons. The average was $45 in gold per ton. The shaft has been sunk to level of the Cripple Creek drainage tunnel and a crosscut is advancing from the shaft at that point to meet a lateral underway from the El Paso. The completion of this crosscut will permit of further sinking. In addition, a drift has been started in another direction from the bottom of the shaft to open the ore shoot.

Operations will be resumed Jan. 1 on the Hull City placer mine at Independence. A. E. Carlton has a lease and will start with forty men. This producer has been idle for several months. There are several ore shoots opened up.

GEORGIA.

Lumpkin County.

Dahlonega reports say another vein of gold ore, with a thickness of 18 inches, has been cut on the Jumbo mine. On going down on this vein it has widened to 3 feet. The vein runs through the property and can be cheaply worked, being a downgrade from the open cuts to the millsite.

IDAHO.

Blaine County.

The Quincy Junior M. Co. has been incorporated at Salt Lake City, Utah, by H. J. Hoyt and F. A. Nimes of Muskegon, Mich., F. M. Cook, C. Hernsheim, H. P. Henderson, W. V. Rice, J. Farrell, W. W. Armstrong and W. A. Wilson, with general offices in Salt Lake. They will operate near Haley. W. V. Rice, of Salt Lake City, is president.

Boise County.

L. Bunch, of Garden Valley, owner of the Big Bend placers, on the Payette river, 12 miles up stream from Garden Valley, says a tunnel will be driven to divert the Payette river. At the Big Bend placers, a ridge juts out into the river, causing the stream in passing around it to form a horseshoe. It is proposed to pierce this mountain by a tunnel through which will be diverted the waters of the Payette river. The tunnel will be 14x16 feet in the clear and 800 feet long. The flow of water through the bore will expose 2½ miles of river bed, which will be worked. The Hidden Treasure Placer M. Co., Ltd., has been incorporated to carry out the work.

The Liberty Placer M Co. has been organized at Idaho City by H. L. Fisher, F. M. Gay, A. & S. Small and F. Long. The company owns an area of placer ground 2 miles below Idaho City, on the south side of More creek. A dam, 159 feet long and 10 feet high, will be built in the canyon below Warm Springs and from the dam a flume 900 feet long, 6 feet wide and 5 feet deep, will be constructed, which will give a pressure of 14 feet. A turbine wheel will be put in which will develop 200 H. P. to run a pump to lift 700 miner's inches of water and give a pressure, for mining purposes, of 100 feet. Work will begin on the dam January 1st. The ground near the creek has been tested and is reported to average 30 cents per cubic yard. With 700 inches of water and a pressure of 100 feet, the company expects to work 1000 yards per day.

Idaho County.

(Special Correspondence).—The Thunder Mountain M. Co., owning the Pickwick group of seven claims at the foot of Rainbow mountain, on Sugar creek, adjoining the Rio Grande group, has opened two veins of ore the past season. One of these is 60 feet wide and the other is 63 feet wide, each assaying an average of $4 gold. One tunnel has been run on the south vein for 95 feet, which will be continued 300 feet farther this winter. The Fairview Extension G. M. Co. owns one quartz claim adjoining the Fairview and thirty acres of placer ground on Rainbow creek. A tunnel has been run 280 feet, cutting the Fairview vein. The ore is free milling and carries values of $4.50 per ton in gold. Both these companies are under management of C. J. Perkins of Cripple Creek, Colo.

The Gold Ridge M. & M. Co. is operating a group of six full claims and a fraction (the Fairview), on the eastern slope of Rainbow mountain, adjoining Roosevelt. Developments are 300 feet of tunnel on Fairview No. 3 and 450 feet of tunnel and 50 feet of winze on Fairview No. 2, with open cuts and shallow shafts. A vein 40 feet wide is showing, of which 28 feet is said to give an average of $10 per ton. A working tunnel of 1000 feet is being driven to cut the ore body 500 feet below the surface, and is in 550 feet, being driven at rate of 2 feet a day with two shifts. A. Urdehl is superintendent.—The Divide Creek Tunnel Co., R. A. Hendricks and F. H. Barnett, of Boise City, principal owners, has a group of seven claims on Porphyry ridge, between Coney and Divide creeks, 2 miles southeast from Roosevelt. A tunnel on the Georgia Holt claim has been driven 75 feet in white and blue quartz-porphyry showing sulphides. J. Pierson is superintendent. The Thunder Mountain Gold Reefs M. & D. Co., of Kansas City, Mo., Superintendent W. E. Jewell, owns several groups of claims in the porphyry belt of Thunder mountain, also the Mayflower mine at Warren. The Monumental-Buffalo group of four claims on the west side of Monumental creek, 4 miles south of Roosevelt, have received the most development. A tunnel was driven 220 feet in Four-mile creek ridge and cut six veins from 2 to 11 feet wide, carrying gold values. A lower tunnel was started at right angles to the upper one, to strike the contact between the porphyry and the diorite, and is 350 feet above the creek. It is in 155 feet. At this tunnel the company has quarters for men, supplies, tools, etc. On the Chelan group of two claims on Porphyry ridge, bought by this company, a tunnel has been run. The other claims owned by the company have been sufficiently developed to show ore. This company, like others, has been unsuccessful in securing transportation for its supplies and tools for the winter work. The limited number of pack trains were unable to bring in but a small part of the freight offered, even at ten cents per pound (which was the prevailing price during the latter part of the season).

The Brant M. & M. Co. of Kansas City, Mo., G. Brant president and superintendent, is operating the Cambridge group of six claims at the head of the southwest fork of Monumental creek, 7 miles south of Roosevelt. This company also owns a group on Little Indian creek, from which a shipment of ore sent to Kansas City, Mo., and treated by cyanide, gave returns of $28 per ton in gold.

The Lucky Boy contact is a group of five claims, owned and operated by E. Schwerd on Blue Cap, an eastern spur of Rainbow mountain. Surface cuts have exposed the lead for distance of 2800 feet, and 38 feet wide. A crosscut tunnel, in 40 feet, started to tap the lead 140 feet below surface at 200 feet in. The open cuts show values of $8 per ton for 11 feet of the vein.

Roosevelt, Dec. 11.

Ten additional stamps for the Jumbo M. Co. at Buffalo Hump are being taken in via Stites, says Manager F. Brown. He expects to have them dropping on ore next month. The Jumbo company has fourteen stamps operating, although the new building is fitted for thirty stamps. When the full thirty stamps are up the company will take out the light battery of four stamps in the old mill and set them up on the Del Rio.

Shoshone County.

The Idaho Con. M. Co. of Washington has filed a suit in the district court at Wallace against the Golden Chest M. Co., claiming damages of $20,000 for ores alleged to have been unlawfully extracted. The two companies own adjoining claims near Murray. The complaint states that the tunnel of the Golden Chest Co. has entered the grounds of the plaintiff, and that in extending the tunnel it has been driven on a vein of ore within the ground of the Idaho Con. Co.

Manager Spalding of the Monarch M. Co., near Murray, says they have struck a flow of water at 2900 feet in the tunnel. Measurements showed that the machine drill hole which tapped the water was discharging 9000 gallons of water an hour.

Washington County.

A. G. Stephens, of the Carter White Lead Co., says he has bonds on forty claims in Heath district near Weiser, and has put men at work on several of the claims. On account of snow, he will wait till spring to take in machinery. In one of the claims Stevens says he has nickel-bearing ore. He also has gold and copper ore. Negotiations are under way for a smelter at Weiser.

MICHIGAN.

Houghton County.

Construction work at the Wolverine mine at Kearsarge is nearly ended, says the News. The third boiler at No. 4 shaft being set up is necessitated by the increased depth.

The Wyandot mine drift on the lode, near Winona, which has been opened by crosscut from the exploratory shaft, is in 70 feet, showing the lode widening. It shows width of 3 feet, carrying satisfactory copper values.

The condition of the lode in the South Kearsarge openings of the Osceola mine at Opechee, south of Calumet, is said to be satisfactory. There are forty drills in operation against twenty-five six months ago.

Keweenaw County.

The November mill product of the Phœnix mine, at Phœnix, amounted to 95,700 pounds of mineral; mass copper weighed 22,240 pounds; total, 118,030 pounds, on an average treatment of 142 tons of rock per day, or 1.72%. Arrangements are being made to run the mill continuously on both shifts, thus doubling the output and giving a product of 100 tons of copper monthly on 300 tons of rock treated daily.

At the Ahmeek mine, near Allouez, a temporary rock house is being made for No. 1 shaft, and rock shipments will be started next month to one head at the Tamarack mill as a test of the lode.

Ontonagon County.

The management of the Victoria M. Co., at Victoria, is arranging to put in an air compressor, to be operated by the water power near the mine.

No. 3 shaft at the Adventure mine, near Mass City, has reached the eighth level. The mine is operating twenty drills, fourteen on stoping and the remainder on drifting. Approximately, 360 tons of selected rock are being shipped to the mill daily, says the News. Operations are being confined principally to the Knowlton lode, and this is reported showing well on the bottom drift at the seventh level.

MONTANA.

Beaverhead County.

The holdings of the Tombstone M. Co. of Butte, in Vipond district, Beaverhead county, is under lease to N. F. Way, V. Jennings and W. Martin, who are working it. It consists of mining claims and a 10-stamp mill. The lessees have been working on the vein at the 100-foot level, but are unwatering the other 100 feet. The ore averages $5 per ton.

Deer Lodge County.

Gold-bearing quartz ore is reported by J. R. Boarman of Anaconda opened up in the Gold Coin mine, west of Silver Lake. Development work will be increased.

The West Stewart mine, near Anaconda, owned by W. A. Clark, which has been shut down for repairs, is again in operation. The number of men at work will be increased Jan. 1st, at which time a new hoisting engine will be put in operation. The shaft will be sunk an additional 200 feet. Self-dumping skips will be used.

Fergus County.

The mill of the Chicago-Montana G. M. Co., in Whisky Gulch section of the Judith range, near Lewistown, is again in operation, after a shutdown of a year. The ore supply for the mill will be taken from the Whisky Gulch and Big Six groups, owned by the Chicago-Montana Co. The tramway to the Big Six group has been completed, says C. T. Durell, manager. The Whisky Gulch mill has a daily capacity of twenty tons, with cyanide equipment. The company has seventy men on the payroll.

Jefferson County.

The Pittsburg C. M. Co., which bought the Golden Currie group of iron claims, near Elkhorn, is preparing to work them this winter. An air compressor has been set up and men will be put to work. The Northern Pacific is running a spur from their Elkhorn branch to the mine and will haul the ore to the smelter of the company at Butte. The vein is 24 feet wide and the ore an iron sulphide, which will be used by the company for fluxing.

Madison County.

The workings of the Watseka mines, near Rochester, have been unwatered and the mill started up. The properties are controlled by McCune & Hoge of Salt Lake City, Utah.

The stamps in the Grant mill at Virginia City are dropping. The mill will be run on sulphide ores altogether until the cyanide plant is in running order. L. D. McCall is manager.

Missoula County.

Manager Daxon of Wallace, Idaho, of the Tarbox lead-silver mine, near Saltese, says the shaft is at the 400-foot level and he has crosscut to the ledge. They are drifting on the vein, which runs high in lead. Gray copper has been found on the 400-foot level. The company will increase the capacity of the mill to be built in the spring to 150 tons. The cost of flume for water power and the mill will aggregate $20,000.

Ravalli County.

The Three Mile placer ground, 4 miles below Stevensville, has been sold to Eastern men. The placer ground transferred covers 300 acres and extends along Three Mile creek a distance of 3½ miles. The price is stated at $60,000, and they have begun work on improvements to get water on the ground for hydraulicking.

Silver Bow County.

The Minnie Healy copper mine case is again before the State Supreme Court in another phase, this time on an application for an injunction to prevent F. A. Heinze working the property, pending a final adjudication as to ownership of the mine. Affidavits prepared by the Amalgamated C. Co. interests charge Heinze with already having extracted $400,000 of ore and they allege that if he is not restrained from further operations he will in a great measure exhaust the ore bodies of the Minnie Healy.

NEVADA.

Esmeralda County.

The Belmont mine at Tonopah reports shipping ore which runs $200 a ton. Last week a 4-foot ledge was cut by the north crosscut from the east drift on the 814-foot level, 400 feet from the Desert Queen shaft. It is said the face of the drift averaged $80. It is intended to make air connection on the 814-foot level with the North Star shaft. The distance from the north line of the Belmont ground to the North Star shaft is 160 feet, and the connection will give ventilation in the lower workings of the Belmont.

White Pine County.

The Wide West M. Co., near Cherry Creek, is stoping ore in the main tunnel and drifting in the upper. The lower tunnel to tap the ledge at depth has been started.

The Riepe and Weber mining interests in Sawmill canyon, near Ely, have been bonded to Clements, Whipple and Tucker, for $1,000, and the other claims in the district have also been bonded for $48,000.

NEW MEXICO.

Grant County.

The mill of the National G. & S. Co., at Stein's Pass, is completed, but it can not be started until a supply of water has been developed. The company is sinking its main shaft.

Colfax County.

The mines of the Raton Coal & Coke Co., at Van Houton, are in full operation.

The miners who had struck upon the call issued by the United Coal Miners' officials have all been replaced, and there are 200 men at work getting out 1000 tons of coal per day.

Santa Fe County.

S. H. Farley, manager of the Interstate M. Co., is developing the company's group near Golden, in southern Santa Fe county. A strike of graphite has been made by him.——J. M. Lucas is taking ore from his mine on the Ortiz grant and will treat it in his mill in Tuerto gulch.

The Santa Fe G. & C. Co. has let a contract to run a tunnel 150 feet in the old copper workings at San Pedro.——W. M. Woody has men at work on the San Lazarus group, near Golden.

Sierra County.

The McVey and Pallar group of six claims in Wicks Gulch, near Hillsboro, have been sold to the Black Peak G. M. Co. The company will resume work on the group. When a depth of 150 feet has been reached a steam hoist will be set up.

Socorro County.

Seventy tons of ore are being treated daily by the mill of the Mogollon G. & C. Co. at Cooney, producing six tons of high grade concentrates. The crusher, which has a capacity of 200 tons, will be in running order by Jan. 1st. Additional vanners are being set up and the mill capacity will be increased to 100 tons a day. The vein has widened in some of the stopes to 30 feet. In drifting under the creek, a body of gold-silver ore was struck. The ore is reported to contain elongated argentite crystals.

The Rosedale mine and mill at Rosedale, are in full operation, since putting in new mortars and additional machinery. ——W. Edwards, manager of the Baking Powder mine in Rosedale district, has put men to work.

OREGON.

Baker County.

At the Midway mine, near Sumpter. Superintendent S. G. Williams says work at the Midway is progressing, the 150 level having been reached, a station cut out and a crosscut started for the lode, which is 40 feet from the shaft.

Full operations are resuming at the Baisley-Elkhorn mine, Rock Creek district, near Sumptor. The crosscut, which has total length of 5000 feet, has been driven 100 feet. The water power plant on Pine creek, which will furnish power for the 16-drill compressor, near the mouth of the tunnel, and also the mill 10,000 feet farther up the canyon, are ready. The mine has been unwatered and three levels in the shaft put in condition for work. E. J. Fields is manager of the property for the Beaver Company and has men at work. More will be added.

Engines and milling machinery are on the ground for the Geiser-Hendryx Co., near Sumpter. The mill is of the Chilian roller type, of thirty tons daily capacity. The engines and boilers are for the Victor mine six-drill compressor.

Excavations for the Golden Wizard mill, near Sumpter, have been completed. This battery pit is 40x4 and 10 feet deep, in solid rock. Timber is on the ground. Superintendent McPhee says carpenters will be set to work this week.

Curry County.

The Coast Range C. Co. of Roseburg has bonded its sixteen claims on the Illinois river to F. A. Kribs for $150,000 and prospecting on the claims will begin this week.

Douglas County.

The Red Bean mine, in southern Douglas county, bonded last spring to T. B. Scott of Chicago, Ill., has reverted to its former owners, Riggs, Flamm & Evaos of Grants Pass. A cash payment of $5000 was made and 200 feet of tunneling done.

Grant County.

The Dixie Meadows concentrator has been completed and will be put in operation this week. The capacity is 100 tons. The vein is of milling ore, averaging 40 feet wide. The management has cut a raise of 140 feet between the middle and lower tunnels in ore.

L. Walker, A. Mohr et al. of Sumpter are preparing to develop their coal lands in the John Day region.

V. C. Belknap of Sumpter, manager of the Dixie Meadows G. M. Co., near Prairie City, says the machinery has been set up and the 100-ton concentrator put in operation. There are thirty men at work. In the mine men are drifting on the ore body, crosscutting, opening up stopes between upper and lower workings and stoping out ore. He says it has been ascertained that the concentrates can be treated on the ground by cyanide process, and they will put in a cyanide plant. The sawmill is cutting lumber for the buildings.

The Gold Values, Lucky Strike and Forget-Me-Not claims, near Alamo, have been sold to the Big Producer M. Co. for $9000. The property adjoins the Big Producer.

Jackson County.

J. Blazier of Portland has bought several hundred acres covering a placer gravel channel along Elliott Creek, in Upper Applegate district, near Applegate, and is preparing to work by hydraulicking.

The Cemeot mine, on the divide between the right and left forks of Jackson creek, near Jacksonville, has been leased by J. Fielder and L. Lytle. The lessees are operating a No. 1 giant from a 6-inch pipe that receives water from the Joe Black ditch fed from Cantrall gulch. The ground has to be blasted loose before using the water. —— Piping started last week at the Antonio mine on Forest creek, says Superintendent R. McGill. A No. 1 giant is used, working under a pressure of 210 feet. This mine is in an old channel of Forest creek and there is a 15-foot bank to cut off to get at the gravel.

Josephine County.

F. H. Osgood of Seattle, Wash., has bonded the Hammersley mine near Grants Pass and will increase development. He is also operating the Osgood placers on Illinois river. The Hammersley mine has been idle for several years.

The Comstock M. & M. Co., under management of J. M. Layman, is making shipments of ore from mines near Grants Pass. The ledges run 3 feet in width with assay values of $20.

The Galice Con. M. Co. last week began operations in working their placer grounds on Galice creek, near Grant's Pass, and will have three hydraulic mines in operation on Galice creek. The consolidated company is in control of nearly all the former placer mines on Galice creek, making available placer diggings covering 600 acres. The building of reservoir dams at the head of the two forks of Galice creek, the widening and extending of ditches, and the laying of 1000 feet additional of piping enables the Galice Con Co. to have three giants at work, and is in position to mine twelve hours per day, even during the summer months, says the Telegram. The company has ground and water to operate ten separate hydraulic mines. There is ground on both the upper and lower creek that has not been prospected, as it has been too high to be reached by the available water; but now high-line ditches reach every part. Ground is being moved that prospects 25 cents a yard.

Malheur County.

J. T. House, of Ontario, operating in Big Bend mining district, 18 miles from Ontario, on the Snake river, says the Moraine M. Co. has been operating a dredger for the past four months. The production has averaged twenty cents a yard from the gravel that is run through the dredger. The dredger handles 2000 yards of gravel per day.

Union County.

The Whirlwind Gold Mining & Exploration Co has been incorporated at Portland, with E. S. McComas as manager, to develop molybdenite prospects on the headwaters of the Imnaha river, 65 miles from Union. The ore also carries 2% copper and 3½% arsenic.

SOUTH CAROLINA.

Cherokee County.

(Special Correspondence).—Manager S. S. Ross, operating the tin mines at Gaffney, is shipping tin concentrates to Hayle, Cornwall, Eng. The first carload of twenty-five tons was shipped via New York on Nov. 27th, in sacks—100 pounds per sack. The ore is cassiterite. Arrangements are being made to put in additional machinery and to further open up the ore body.

Gaffney, Dec. 10.

SOUTH DAKOTA.

Custer County.

F. McLaughlin, manager of the Mile High M. Co., operating near Custer, says he is putting men to work and will resume development work. The company's holdings consist of a group of claims 9 miles northwest of Custer, near the North Star, Roosevelt & Interstate Co.'s holdings. He will continue the 100-foot shaft to depth of 300 feet and explore the veins at that depth. A hoist will be put in.

Lawrence County.

T. A. Harding, secretary of the Pluma M. Co., operating near Deadwood, in his report to the stockholders, says the company has increased its holdings from 43 to 105 acres of ground. A good water supply has been developed and a 40-stamp mill built, also a tramway connecting the mine with the mill. It has done 2800 feet of tunneling and shaft work, besides cutting several stations, retimbering working tunnels, excavating for enlargement of the mill and improving the Hawkeye mill. A cyanide plant will be added.

The Branch Mint M. & M. Co. at Galena is building a 180-ton cyanide mill in the lower end of the camp. Machinery is on the ground and is being set up, but it is not expected all arrangements will be completed at the mines and mill until next May, says J. D. Hardin, president and manager.

UTAH.

Beaver County.

S. E. Potts has a lease on the Boston mine, in Star district, near Milford.

The superintendent of the Erie M. Co., near Milford, says the drift on the 250-foot level had opened into decomposed granite, containing an ore body carrying native copper.

B. S. Woodward, president and manager of the South Granite M. Co., owning a group of seven claims east of Milford, says operations are being resumed. Considerable work has been done on the ground and ore opened up. The main tunnel has been driven 400 feet toward the ledge which it will cut at depth.

Carbon County.

Vice-president Kramer of the Utah Fuel Co. says any miner who wants to work for the Utah F. Co. must choose between the company and the Miners' Union, as they will not take back any striker so long as he is unwilling to surrender his union card. The Utah Fuel Co. controls the coal mines at Sunnyside, Winter Quarters, Schofield and Castle Gate. The company officials claim the output of the mines has nearly reached its normal figures. —— The company's payrolls for month of October showed that the 239 miners working at Winter Quarters averaged $71.85 each. At Clear Creek, 276 miners averaged $65.94 each, being a less amount than during other months on account of new track scales being put in at that point instead of weighing the coal at Scofield. This made a scarcity of mine cars for the time, and lessened the output. At Sunnyside, taking No. 1 mine alone, 229 miners averaged $67.66; and at this camp there is a large floating population. At Castle Gate 296 miners averaged $69.26 for the month. The working days were twenty-seven days at four of the camps, twenty-six days at one camp, and thirteen days at Somerset. None of the mines are operated on Sunday, and the agitators have failed, says the Deseret News, to explain in their schedules that the usual average of working days for the miners is about eighteen, entirely governed by themselves, and that where there are twenty-five working days in a month, miners generally work twenty to twenty-two days. Men lay off from various causes, some of them only earning $10 or $12 during October for that reason. The miners are paid by the ton of 2240 pounds. It was 80 and 95 cents, according to the character of the work, before the raise of Nov. 1st, but now 90 cents and $1. The management states that where (for example) 250 men are working regularly, the payroll will be found to include 290 men. At Castle Gate one miner earned $135.44, and another $130.47, and it is not unusual for regularly working miners to be credited on the payroll with $80, $90 and $100. Outside laborers now get 27½ cents per hour, or $2.20 for eight hours, as against 20 cents per hour for nine hours previously; trappers, boys, are getting $1.10, a 10-cent raise; roller men get $3.00 instead of $2.75; blacksmiths $3.46 for eight hours against $3.15 previously; and carpenters $3.30 instead of $3.00; engineers received $125, and firemen $75.——Men, mostly Americans, from outside points are being put on daily, to fill the strikers' places (the strikers are largely foreigners).

Juab County.

It is reported the Godiva M. Co., owning a group on Godiva mountain, at Eureka, will resume operations next month. J. Q. Packard is president.

The annual report of the Gemini M. Co. of Eureka shows 13,500 tons of ore sold, and dividends of $200,000 paid. J. Q. Packard is president and E. W. Packard vice-president and manager. It is intended, says Manager Packard, to resume sinking the shaft, which is down 1600 feet, under Superintendent J. McChrystal, as soon as the additional battery of boilers with 600 H. P. is installed.

Piute County.

M. F. Murray of Salt Lake City reports a strike made in the Log Cabin mine, near Marysvale. The strike was made in Log Cabin tunnel, 375 feet from the month. The ore is mixed with talc and carries values in gold and silver.

Salt Lake County.

Oil well machinery for the Guffey and Gailey oil wells north of Salt Lake City is on the ground at Farmington, and drilling operations will be started. The first well will be near the old gas wells.

Eastern oil operators last week bought 10,000 acres of land on the shores of Great Salt Lake, near Salt Lake City, and will open up oil prospects. S. T. French of Chicago, Ill., W. C. Bigger of Ohio and A. J. Wallace of Butler, Pa., are officers of the company. The land adjoins that leased by Guffey & Gailey of Pittsburg, Pa. The price paid was $50,000 cash.

The Winnemuck mill at Bingham has been overhauled and its capacity is being increased. It is expected to be ready to run on the Ohio C. Co. ore by Jan. 1. It will treat from 125 to 150 tons daily.

The Ellis Fume Arresting & Ore Reduction Co. of Salt Lake City has been incorporated, with H. R. Ellis, E. F. Fredcothall, E. A. Wall and W. S. McCornick as officers, to treat ores by arresting and recovering the valuable contents in fumes, gas and smoke.

Summit County.

The incline shaft at the Scottish Chief mine at Park City is down 500 feet, and drifting will begin.

The masonry work is completed, and the frame work is going up for the new tailings mill of the Daly-West mine at Park City. Superintendent Sherman expects the plant will be in operation by March 1st. The plant will work only the tailings of the present mill, and by a series of tanks and tables will furnish concentrates that are expected to net the company $50,000 a year. The capacity of the plant will be 400 tons a day, and six men—two on a shift—will be required to operate it.

President Kearns has contracted for the entire output of the Kearns-Keith mines and mill at Park City, including ore and concentrates, to be forwarded to the furnaces of the American S. & R. Co. The mill was put in operation last week by Manager M. J. Daily.

Utah County.

S. B. Brillhart, who, with Boston men, is developing ozocerite deposits at Soldier Summit, reports work going ahead. They are operating at Colton.

The Summit Placer Co., which has also hydrocarbon deposits at Soldier Summit, has been prospecting its ledges with a view to sinking a working shaft and opening up several ledges in which ozocerite occurs.

Washington County.

The Utah & Eastern M. Co., operating the Dixie mines and smelter near St. George, will provide it with better means for transportation of ore between the mine and furnaces, and will build a gravity tramway. It will be 2200 feet in length, and the railway will be 1¼ mile. Mules will be used on the railroad. At present the ore is hauled by teams.

WASHINGTON.

Chelan County.

Chelan reports say, at Doubtful lake, near Cascade pass, the tunnel on the Quien Sahe mine, owned by the Cascade Con. M. & S. Co., is in 230 feet, and has a pay streak for that distance averaging 18 inches of galena. The Boston, 2 miles from the Quien Sabe, is improving. An ore shoot averaging 3 feet in width of galena is being opened up. Two tunnels, one 80 feet and the other 60 feet, have been run.

Ferry County.

(Special Correspondence).—During the summer months from 5000 to 7000 tons were shipped from Republic per month. Now the amount is about 4000. While good is anticipated by the introduction of the new cyanide process, a new smelter, located at some convenient point to Republic, is a necessity, as the mines will be handicapped until such a plant is in operation. There are fifteen mines developed to depths of from 260 to 650 feet. The veins are from 3 to 30 feet in width. More than 50,000 tons of ore have been mined and shipped the present year, and yet the ore reserves are nearly double what they were at the beginning of 1903. Two lines of railroad afford ample transportation facilities. The ores of this camp are not, strictly speaking, smelting ores, but at the Belcher camp, a few miles distant, there are veins of iron, copper and gold ores, a splendid blend for smelting.

The Quilp mine is shipping sixty tons daily to the Tacoma smelter. The principal part of the work in the mine is being carried on at the 500-foot level.

The Mountain Lion has shipped 200 tons per day for some months, but has been compelled to curtail its output about 50% on account of orders from the smelters to do so.

The Knob Hill is shipping two cars per week. Men are engaged developing the property between the 250 and 150 levels, and on the 250-foot level.

Republic, Dec. 15.

E. H. Hanford, of Seattle, is working men on the Mountain View group near Park City, near Republic. They have driven a tunnel 250 feet and expect to tap the Teague vein at 200 feet farther. They have a 5-foot vein which dips toward the mouth of the tunnel and carries values in gold, silver, copper and lead.

R. Purcell, operating at Park City, near Republic, says he has been tunneling to

cut his vein. The tunnel is in 60 feet and has 100 feet farther to run to tap the vein at depth of 60 feet. It will drain the mine and admit of further development of the vein.

Pierce County.

Olympia reports say at depth of 1300 feet below the surface, the Great Western Coal Co. has struck a promising body of lignite coal, which is as hard and smooth as anthracite. Shipments have begun. The owners have made a shipment for official test in the United States Navy, to the Port Orchard navy yard.

WYOMING.

Bighorn County.

The Bonanza Oil & Dev. Co. has struck a flow of oil and gas in its well in the Bonanza fields, south of Basin, at a depth of 250 feet. Drilling will be continued to a depth of 1000 feet. The Bonanza Co. is made up of Omaha, Neb., Basin and Cheyenne men.

Fremont County.

The Carisa mine at South Pass is reported sold to Ewing et al., of Salt Lake City, Utah, for $200,000. Development work will be increased. The Carisa was a former gold producer.

Natrona County.

The Belgo-American Drilling Trust has bought the entire holdings of the Pennsylvania Oil Co. in Wyoming, including the refinery at Casper. The Shannon properties are also included in the deal. Development work on all these holdings is progressing.

FOREIGN.

AFRICA.

Soudan.

Nitrate of soda deposits are claimed to exist extending over all the west of the Sahara desert from Adar to the coast of the Atlantic and south of Morocco.

AUSTRALIA.

New South Wales.

Ashestos is heing mined at the Ashestos mine on Jones Creek, near Gundagai, which is heing reopened by Victoria men.

Western Australia.

Two additions to the list of Murchison gold producers last month were the Cue G. M. & Ex. Co. and Murchison Associated Co. The Cue G. M. & Ex. Co. has its 20-stamp battery crushing rock from the Kinsella lease, the ore averaging 20s per ton. It is expected 2500 tons per month will he handled.——The Murchison Associated has its battery in operation. Two shafts are heing sunk to a depth of 500 feet, when levels will be driven to connect them and the ore blocked out.

The Mines Department reports a total of 3935 stamps dropping in the camps of Western Australia, including: East Coolgardie district (Kalgoorlie), 570 stamps; Coolgardie, 366; Mt. Malcolm, 251; East Murchison, 230, and Broad Arrow district, 220.

BRITISH COLUMBIA.

Boundary District.

Oporations at the Cariboo mine, at Camp McKinney, have been temporarily suspended, and in the meantime it is expected the plant for treating the ore will be increased.

The additional steam shovel ordered by the management of the Granby mines at Phœuix has heen put at work at the No. 1 level, where No. 1 shovel is at work. The new shovel is larger than No. 1, having a hucket capacity of 1500 tons daily. With the C. P. R. steam shovel, this makes three of these machines employed in shoveling ore in the Granby mines. Repairs having been completed to the two 30-drill air compressors, hoth are in operation.

East Kootenay District.

The car famine at Fernie and Michel has been relieved hy the C. P. R., and the coke surplus has heen moved. This will enahle the Crow's Nest Coal Co. to increaso its output.

Rossland District.

Manager Thompson of the Kootenay mine, at Rossland, says his company will build a mill to reduce low-grade iron ores during the coming year.——The Velvet mine will put in a system of concentration. The product of the mine is said to be pyrite, capable of being reduced by the pyritic smeltiug system to a concentrate in the form of matte.

The hoist at the White Bear mine, at Rossland, is being set up, after which it is expected the mine will start shipments. The Spokane Falls & Northern R. R. has laid a spur to the mine. With this hoist the White Bear can continue development to the 1500-foot level.

Slocan District.

As soon as rawhiding starts, the Reco, Blue Bird and Sovereign mines will join the list of Sandon shippors.——The Hope mine, at Sandon, has opened up an ore body showing 8 feet thick in the face, and has heen drifted on 40 feet. Ore is heing shipped.

West Kootenay District.

The reorganization of the Northwestern Dev. Syndicate has been completed at Calumet, Mich., and E. Ulseth is president, with J. Herman, I. Frimodig, W. F. James, J. C. Light, A. R. Rosenherger, F. Roehm, W. London, W. Cleaves and J. Vertim directors. A. R. Rosenherger is manager and says operations will he resumed.

R. K. Floeter and J. A. Darragh have an option on the Homestead group, on Mohawk creek, in the Fish creek helt, near Ferguson.

C. Ehlers, with Rossland men, is reported to have taken up the Beauflot (Buffalo) group at Second Crossing, in Poplar Creek section, on a $45,000 hond.

CANADA.

Alberta.

The Anglo-French syndicate, J. J. Fleutot manager, has hought for $125,000 the Proctor-Fishburn coal lands at Blairmore, near the British Columbia line. Other coal land deals in the Crow's Nest Pass district are reported undor way.

KLONDIKE.

H. E. Porter of Whitehorse reports finding a natural flowing petroleum seepage on the left limit of Bullion creek, 1200 feet from the creek, near Whitehorse.—— A. R. Gordon and P. F. Hogan located a coal vein in Sheep creek, which outcrops and parallels the creek for ½ a mile.

MEXICO.

Chihuahua.

The reduction plant on the Lluvia de Oro mine, near San Andres del Rio, is reported treating fifty tons of ore daily. The management has plans under way for huilding a railroad from the mines to the port of Topolohampo, the southern terminus of the Kansas City, Mexican & Orient road, which is huilding.

Work will he resumed on the Columbia mine, owned hy the Federal C. Co., at Terrazas, this month.

Coahuila.

A smelter will he huilt in Torreon hy the American-Mexico M. & D. Co., says W. S. Dillon of Chicago, Ill., of the company.

Jalisco.

Machinery for the reduction plant, with hoilers, air compressors, drills, etc., is on the ground for the Amparo group, near Etzatlan. Dovelopment work is heing increased to open up the ore bodies, says Superintendent G. J. Graham.

Mexico.

Ore from the Santa Rosalia mine, located in Temascaltepec district, 80 kilometers west from San Juan de las Huertas, is heing shipped to the Guadalupe smelter at Sultepec to determine method of treatment. The company proposes to build its own plant. The property is heing developed through two tunnels and is opening up ore which assays $100 per ton, says Manager B. T. Davis.

At El Oro mine, at El Oro, progress is heing made on the fouudations for the 100-stamp mill. Among the features that will characterize the mill will he helt conveyors for handling the material in the cyanide department, Krupp harrel mills for regrinding the pulp hefore treatment in the cyanide tanks and the placing of all pumps used in the plant in one house.

Michoacan.

Chicago, Ill., men who recently hought the Santiago y Anexas group at Tlalpujahua will huild a 100-ton stamp mill and increase development work. There are 150 men employed, cleaning out the tunnels, shafts and retimbering.

At Tlalpujahua, at the Dos Estrellas mine, the crushing capacity of the 1250-pound stamps in the new plant is reported so much greater than had been figured that the cyanide plant is unahle to treat the output of the full eighty stamps. The output from fifty stamps is all that it can handle, and until eight additional cyanide tanks are put in fifty stamps only will he kept dropping. Development work in the two tunnels, in sinking the two shafts to tap the latter, etc., is progressing. Belt conveyors will be put in to carry the ore from the workings to the crushers.

Oaxaca.

The Dona Carmen M. Co. expects to hegin work on its Dona Carmen group in Ejutla district, 5 kilometers south of San Martin, by Jan. 1st. The group consists of four properties, and on two of them considerahle development work has been done. On the La Providencia a tunnel in 80 feet shows up a hody of ore carrying gold, silver and copper which is said to assay $60 gold.

Sinaloa.

E. T. LeClair et al. of Milwaukee, Wis., operating a group of gold and silver claims at Choix, are preparing to put in additional machinery and increase development work.

Sonora.

V. Aguilar has hought the Amarillas mine, an antigua, 18 miles east from Posa station, and is unwatering the workings, preparatory to prospecting the property.

The Greene Con. C. Co. is planning to build a custom smelter at Cananea in addition to its seven private plants there. The Con. C. Co. is producing 50,000,000 pounds of copper a year with its smelters at Cananea from ore taken entirely from the company's mines.

Tamaulipas.

The Mexican National Oil & Dev. Co. is being reorganized hy California men, says R. Benevendo of the company, who holds leases on 500,000 acres of prospective oil land on the coast 36 miles south of Matamoros. The company will bore for oil on the Chapa tract.

Zacatecas.

The Santa Rita M. Co. will huild a 100-ton smelter at its mines at Nieves, says J. A. Carpenter of Torrington, Conn., president.

The Asturiana y Anexas group, 3 kilometers south of Zacatecas, in the district of Mexico, is heing developed through twenty shafts and one tunnel. The ore carries silver and a little gold, assaying $80.

Personal.

F. L. SMITH of Denver, Colo., is in New York on husiness.

W. M. FERRY, of Salt Lake City, is examining mines in Idaho.

W. S. GAGE has returned to San Francisco, Cal., from a trip East.

ARTHUR C. NAHL is now with the Progresso M. Co., La Paz, Baja Cal.

J. C. WILKINSON, of Salt Lake City' Utah, is in Omaha, Neb., on business.

J. GREEN of Boise, Idaho, interested in Idaho mines, is in San Francisco, Cal.

L. D. SIVYER of Spokane, Wash., is examining copper mines at Globe, Ariz.

W. A. MCKINLEY, an electrical engineer of Sonora Cal., is in San Francisco, Cal.

JUAN FELIX BRANDES of Denver, Colo., is in New York City on mining husiness.

W. F. MITCHELL of Salt Lake City, Utah, is in San Francisco, Cal., on mining business.

J. F. YERINGTON of Carson City, Nev., interested in Nevada mines, is in San Francisco, Cal.

A. POE is superintendent of the Tom Smith mine, near Sheep Ranch, Calaveras Co., Cal.

G. D. HAZARD of Denver, Colo., has returned from Chicago, Ill., and other Eastern points.

J. H. HARN is superintendent of La Fortuna group of mines at Silver King, Pinal county, Ariz.

G. SURR of Los Angeles, Cal., has gone to Searchlight, Nev., as assayer for the Cyrus Nohle mines.

S. G. WILLIAMS is superintendent of the Midway mine, near Sumpter, Or., vice L. Walker, resigned.

G. MCM. ROSS, a mining superintendent of Virginia City, Nev., is in San Francisco, Cal., on husiness.

G. Z. EDWARDS returned last week to Salt Lake City, Utah, from an examination of mines in Nevada.

J. H. WEBER goes East from San Francisco, Cal., in the interest of the Bohemia, Or., mining district.

J. J. CRAWFORD, E. M., has returned to San Francisco, Cal., from the Gwin mine, Calaveras county, Cal.

W. G. FILER of the Western Exploration Co. returned to Salt Lake City, Utah, last week from Idaho.

A. MALTMAN is superintendent of the Murchie mine, near Nevada City, Cal., vice J. C. Camphell, resigned.

E. RAUTMAN of Prescott, Ariz., president of the Bunker Hill M. Co., is in St. Louis, Mo., on mining husiness.

S. B. BRILLHART, operating ozocerite mines at Soldier Summit, Utah county, Utah, is in the East on husiness.

MANAGER O. C. JACKLING of the Utah C. Co. returned last week to Salt Lake City, Utah, from Colorado.

W. P. HAMMON, engaged in gold dredger mini g near Oroville, Cal., is in San Francisco, Cal., on husiness.

L. MARKS, part owner of the Laverona mines near Terrazas, Chihuahua, Mexico, is in England on mining business.

F. MCLAUGHLIN, manager of the Mile High M. Co., operating near Custer, S. D., returned last week from a trip East.

CHAS. DOBLER, superintendent of Brown Bear, Deadwood, Cal., will he in San Francisco, Cal., till April 1, 1904.

L. H. CARVER, E. M., of San Francisco, Cal., has gone to Sierra City, Cal., to start operations at the Mountain mine.

P. PORTER, manager of the Keystone group of mines at Cortez, Eureka county, Nev., is in camp from Salt Lake City, Utah.

J. A. MEIGHAN, superintendent of the Mt. Jefferson mine at Groveland, Tuolumne county, Cal., is in San Francisco, Cal.

F. B. WILSON, president of the Ruhy G. & C. Co., is at their mines near Guaymas, Sonora, Mexico, from Nogales, Ariz.

C. E. LOOSE of Salt Lake City, Utah, manager of the Grand Central M. Co., returned last week from a trip to California.

L. SANDER of Liege, Belgium, of the Belgian and Rhenish smelters, is in Leadville, Colo., looking over the zinc mining situation.

F. H. JACKSON of Los Angeles, Cal., manager of the Colton cement works, has returned to Los Angeles from San Francisco, Cal.

C. N. TIBBITTS, assistant general manager of the Mine & Smelter Supply Co., has returned to Denver, Colo., from El Paso, Texas.

JOHN ROSS, JR., superintendent of the Wildman-Mahoney mine, Sutter Creek, Cal., has gone to Siskiyou county, Cal., to examine mining property.

M. T. YERKES, president of the Yerkes M. Co., operating El Cajon de Amarillas mine, in Altar district, Sonora, Mexico, is at the mine from Philadelphia, Pa.

M. H. LIPMAN of Hailey, Blaine Co., Idaho, manager of the Lipman Tunnel Co., returned there last week from a husiness trip to Boise City, Idaho.

L. WALKER has resigned as superintendent of the Midway mine, near Sumpter, Or., and will manage a group of coal prospects in the John Day region.

A. MCKEOWEN of Berkeley, Cal., will leave next week for Mexico, as assistant mineralogist and sampler at the Esperanza mine, near Cocospera, Sonora.

H. L. ARCHER of Minneapolis, Minn., manager of the Colonial M. Co. interests in California, has returned from a trip to San Francisco and Plumas county, Cal.

J. C. CAMPBELL has resigned as superintendent of the Murchie mine, near Nevada City, Cal., to devote his time to reopening the Mountaineer mino, also near Nevada City.

H. C. ROLFE, president of the Calumet & Yaqui C. Co., which is developing copper properties near Soyopa, Sonora, Mexico, has estahlished his headquarters at La Colorada, Sonora.

W. F. SNYDER AND P. L. KIMBERLY of the Western Exploration Co. returned to Salt Lake City, Utah, last week, from their San Francisco, Cal., trip, and Kimherly has gone East.

J. F. GILES, president of the Sierra M. Co., operating at the Del Monte mine, returned last week to Groveland, Tuolumne Co., Cal., from a two weeks' stay in the southern part of the State.

CHAS. W. RAYMOND has returned to San Francisco, Cal., from an examination of mining property in White Hills mining district, Arizona. This work was done for Minnesota men, and will result in development work thereon.

THE following engineers of the U. S. Reclamation Service are in Washington, D. C., for the winter, preparing reports of the field work of the past season: Cyrus C. Bahh, in charge of St. Mary's project, Montana; John T. Whistler, district engineer, Oregon; Charles H. Fitch, district engineer, South Dakota; Jeremiah Ahern, engineer Wyoming work; Frank E. Weymouth, engineer South Dakota work.

Books Received.

"Care and Handling of Electric Plants," is the title of a neat little volume, by N. H. Schneider. It is devoted to practical information for those who are called upon to operate a commercial or military electric plant, without having had previous experience. The volume also contains much of valuo to the engineer. One particular feature is its treatment of incandescent lamps. It contains 66 illustrations, with 116 pages. Bound in red morocco. Price, $1.00. Spon & Chamberlain, 123 Liberty street, New York City.

Obituary.

J. BECK, a pioneer miner of Madera county, Cal., owning a group of claims in the "Minarets," died on the 8th inst. at Madera, Cal., death resulting from a general breaking down due to old age.

JAMES O'KEEFE, a pioneer mining man of Hinsdale county, Colo., died Nov. 30 at Lake City, Colo. He was formerly connected with the Crooke smelter and also the Ute & Ulay Co. Deceased was 55 years old.

N. S. LEWIS, a pioneer miner of Nevada, died at Searchlight, Lincoln county, Nev., on the 3rd inst., the result of a stroke of apoplexy. Deceased was 73 years of age; and forty years ago he located the Wall Street group of mines at El Dorado, near Searchlight.

J. B. MCARTHUR, formerly of Rossland, B. C., and a mining operator throughout the Kootenays, died at Toronto, Canada, on the 7th inst. Deceased was 54 years of age. For the past ten years he has been connected with mining interests in the Kootenays, British Columbia, and was at one time part owner in the Rambler-Cariboo mine.

J. KINNIKIN, a pioneer miner of the Comstock, died at Virginia City, Nev., on the 9th inst. from asthma and miners' consumption. Deceased was formerly employed in the Yellow Jacket mine. At the last election he was chosen Recorder and Auditor. He was a native of St. Louis, Mo., aged 43 years, and leaves a wife and five children.

Catalogues Received.

"Hardware Specialties" is finely illustrative of special brands of tools supplied by the Pacific Hardware & Steel Co. of San Francisco, Cal.

"Power Problems" is an edition de luxe of a series of unusually fine illustrations portraying the economic systems of power transmission placed by the Power Installation Co. of Buffalo, N. Y., Geo. F. Wescott vice-president and general manager. There is no description—just the pictures, which talk for themselves. On alternate pages are snappy little trade maxims, which keep one turning the leaves to read them; each one a text in itself. The publication is a unique one and commendable.

A new line of air compressors is described in Bulletin L-509, issued by the Laidlaw-Dunn-Gordon Co., 114 Liberty street, New York City. Those compressors are fitted with Meyer steam-valve gears, permitting of an adjustable cut off. The air ends are arranged both with poppet inlet and outlet valves and with mechanically operated inlet and poppet outlet valves, the valves in either case being placed in the head of the cylinder, permitting the body to be effectively water-jacketed. The frames of the compressors are specially heavy. The capacities listed range from 468 to 2220 cubic feet of free air per minute, and the air pressures from 80 to 100 pounds per square inch. This pamphlet will be sent upon request to those interested.

Commercial Paragraphs.

THE Fraser & Chalmers Co., Ltd., of London, have obtained the South African agency for the sale of the Kinkead mill.

FAIRBANKS, MORSE & CO., through their Denver, Colo., house, have sold and shipped a number of gasoline hoisting plants the past week.

REDFIELD DRILL CO., Denver, Colo., has shipped one of their hand power rock drills to B. K. Walker, Como, Colo.; one to Bethmann & Jack, Greer, Idaho; one to N. T. Johnson, Burke, Idaho.

THE Mine & Smelter Supply Co., Denver, Colo., recently sold two 8-drill "Cincinnati" air compressors, one going to Boulder, Colo., and the other to South Dakota. They also report an increase in the Wilfley table business.

THE Rogers Engineering Co. has established offices and salesrooms at 109-111 New Montgomery street, San Francisco, Cal., as Pacific Coast agents for the Model gasoline (stationary, pumping and hoisting) engines, and the Buffalo gasoline marine engines; and as manufacturers of the Stimson patent steam and gasoline motors and power drag saws, the Rogers concentrating tables; and as builders of mining, milling and smelting machinery.

THE American Steam Gauge & Valve Mfg. Co. have again been compelled to seek new quarters, owing to the increase of their business, and are at present removing their entire plant and offices from Bismarck St., Roxbury district, to the large brick buildings, 208-220 Camden St., Boston, Mass. The buildings have floor space of 85,000 square feet. The Mowry & Phillips foundry department will also be removed from south Boston and every branch of the business consolidated at the Camden St. factory. The new plant will afford them more than double the present capacity, and will be employed in producing their valves, gauges and indicators, also special metals and foundry work in the Mowry & Phillips department.

THE Hendrie & Bolthoff Mfg. & Supply Co., Denver, Colo., have just shipped one of their new first motion hoists to the Copper Queen mine, Bisbee, A. T. The Gum Tree mine, Idaho Springs, Colo., is installing a new Bolthoff first motion hoist furnished by the Hendrie & Bolthoff Mfg. & Supply Co. The Mayflower mine, Telluride, Colo., is putting in a Hendrie & Bolthoff Mfg. & Supply Co. double drum electric hoist. A first motion hoist, also furnished by the Hendrie & Bolthoff Mfg. & Supply Co., is being installed at the Leyden Coal mine, near Denver, and an air compressor and complete equipment has been shipped to the Raymond Con. M. Co., Gunnison county, Colo., by the Hendrie & Bolthoff Mfg. & Supply Co.

THE Lagonda Mfg. Co. of Springfield, Ohio, manufacturers of tube cleaners and boiler-room and steam specialties, have established an Eastern office at 123 Liberty St., New York City. This will be in charge of Mr. H. A. Freeman, who has been connected with the Lagonda people for some time. The demand for their goods, especially in the East, having grown so steadily, it has been found necessary to establish headquarters there, where machines could be kept in stock, and from which information could be promptly furnished. Mr. Freeman has extended acquaintance among the engineers and steam users in the Eastern territory, and will be glad to meet any of his old friends or any who may be interested in the machines he represents.

The Colorado Company Wins.

Verdict Against California King Gold Mines Co. for $40,000.

[From the Los Angeles, Cal., Herald, Dec. 10, 1903.]

The stubbornly contested case which has been on trial for the last five weeks before Judge M. T. Allen and a jury in Department 6 of the Superior Court resulted, yesterday morning, in a verdict for the plaintiff for $40,000, the full amount sued for.

The Colorado Iron Works Company of Denver, manufacturers of mining machinery, brought suit against the California King Gold Mines Company to collect a balance claimed to be due on the contract price of a crushing and cyanide plant erected by the Iron Works Company for defendant, at Picacho, Cal., above Yuma, on the Colorado river. The contract price was $150,000, on which only $110,000 was said to have been paid.

The California King Company claimed that the Colorado company had not completed its contract, that the capacity of the mill was not up to the guaranty of 1000 tons per day, that the workmanship was poor, and that there had been delay in the work, by reason of which the defendant claimed it should not pay the balance of contract price and in addition claimed $100,000 damages.

The verdict of the jury is a complete vindication of the Colorado Iron Works and of its New York manager, S. W. Traylor, who designed the mill and made the contract sued on. The plaintiff is given all it asked and the defendant's claim for damages is ignored.

The Colorado Iron Works Company has been engaged in the manufacture of smelters and mining and milling machinery, at Denver, for the last thirty years. It has built some of the largest and most successful plants in the country. Its president is John W. Nesmith, one of the pioneer citizens of Colorado. In addition to its main office in Denver, it maintains an office in New York City, under the management of S. W. Traylor, and has recently opened an office in this city, in the O. T. Johnson building, under the management of H. R. Ayres.

Andrew W. Gillette of Denver, the general counsel for the Iron Works Company, and Judge H. C. Dillon of this city were the successful attorneys for the plaintiff in the cause just concluded. The defendant company was ably represented by Hon. John D. Works, late Judge of the California Supreme Court, and by Hon. Bradner W. Lee. Ex-U. S Senators Stephen W. Dorsey and R. T. Pettigrew, the latter being vice-president and managing director of the California King Company, figured prominently in the trial.

Whether the judgment will be paid or appealed to the Supreme Court remains to be seen. The defendant reserved the usual exception and gave notice of an appeal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

NON-REFILLABLE BOTTLE.—No. 745,566. Dec. 1, 1903. I. N. Burke, Butcher Ranch, Cal.; one-half assigned to E. C. Kavanaugh, Forest Hill, Cal. This invention consists of a bottle having a substantially cylindrical neck opening, of a valve casing seated in said opening, the external periphery of said casing and the internal periphery of said neck correspondingly grooved, and a transversely corrugated bandspring engaging in said grooves to lock the casing permanently in the bottle, said casing inclosing a valve chamber, and a valve and valve seat having non-registering ports.

REFLECTOR ATTACHMENTS FOR OVENS.—No. 746,203. Dec. 8, 1903. W. C. Trowbridge, San Francisco, Cal. This invention relates to improvements in attachments for gas stoves and the like whereby the condition of the flame may be easily ascertained without the necessity of stooping or bending in order to look into the chamber in which the burner is usually inclosed. A plurality of reflectors may be employed if desired and are so located as to be protected from heat by the constant indraft.

RACKING BUNGS.—No. 746,386. Dec. 8, 1903. C. L. Schalitz, San Francisco, Cal. This invention is designed for the filling of casks and the like and the transfer of the liquid to a subsequent cask or casks without the attention of an operator. It consists of an integral casting having a closed top and internal chamber, and a partition integral with and depending from the inner side of the top and terminating at substantially the bottom of the casting and dividing one side of the chamber from the other, said casting having an opening in each side wall near the top, one of said openings serving as an inlet and the other as an outlet.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific Coast inventors:

FOR THE WEEK ENDING DECEMBER 8, 1903.

746,273.—CUTOUT—Borein & Desimone, Oakland, Cal.
746,033.—WAFFLE IRON—Q. Crane, San Diego, Cal.
746,811.—COOLING BOARD—A. H. Emigh, Santa Barbara, Cal.
746,054.—HINGE—A. F. Enquist, S. F.
746,627.—STAMP AFFIXER—S. Farmer, Portland, Or.
746,507.—THRESHER FEEDER—J. F. Henner, Haines, Or.
746,089.—SEPARATOR—R. W. Jessup, S. F.
746,104.—PULVERIZER—J. Q. A. King, Phœnix, Ariz.
746,343.—ENGINE—G. A. Krohn, Coarse Gold, Cal.
746,344.—PUMP—G. A. Krohn, Coarse Gold, Cal.
746,365.—BICYCLE LOCK—W. T. McNary, San Jose, Cal.
746,135.—HITCHING DEVICE—F. Obiols, Winnemucca, Nev.
746,369.—MANUFACTURE OF STARCH—A. A. Osborn, S. F.
746,384.—SQUARE—T. P. Roy, Seattle, Wash.
746,386.—RACKING BUNG—C. L. Schalitz, S. F.
746,387.—COILING PIPE—C. L. Schalitz, S. F.
746,192.—VEHICLE BRACE—N. B. Stone, Outlook, Wash.
746,193.—PUZZLE—N. B. Stone, Outlook, Wash.
746,203.—REFLECTOR FOR OVENS—W. C. Trowbridge, S. F.
746,607.—BUGGY TOP SUPPORT—W. H. Tully, Wilbur, Wash.
746,411.—STRUCTURAL ELEMENT—O. A. Turner, Los Angeles, Cal.

Latest Market Reports.

SAN FRANCISCO, December 18, 1903.

METALS.

SILVER.—Per oz., Troy: London, 27½d (standard ounce, 925 fine); New York, bar silver, 55⅝c, refined (1000 fine): San Francisco, 55⅝c; Mexican dollars, 43@45c San Francisco, 42c New York.

COPPER.—New York: Standard, $12.50; Lake, 1 to 3 casks, $12.50; Electrolytic, 1 to 3 casks, $12.25; Casting, 1 to 3 casks, $12.25; San Francisco: $15.00. Mill copper plates, $17.00; bars, 18@24c. London: £57 5d spot per ton.

Copper has shown a decided decline for several weeks past. At one time during this period it was thought the price would advance by reason of the closing of the Amalgamated mines at Butte, Mont., but as the shutdown was only temporary it affected the market only slightly. The exports of Chile copper to England during 1903 have been heavier than in past years. In 1901 this amounted to 23,138 tons, which decreased to 21,109 tons in 1902. In the first eight months of 1903 the shipments reached 19,475 tons, with charters to Nov. 30 of 7900 more, making a total for the first eleven months of the year of 27,375 tons. The total output for the year was nearly 30,000 tons. The total stock reported in London Dec. 1, 1903, was 6368 tons. To be added to this is copper afloat in vessels from Chile and Australia, 6375 tons, making a total visible supply in England, Dec. 1, of 12,743 tons.

Following are the figures of the German consumption of foreign copper for the months January-October, 1903, compared with the same period of 1902 and 1901:

	1903.	1902.	1901.
Imports, tons	70,958	68,815	54,531
Exports, tons	8,477	7,516	8,322
Consumption, tons	62,481	61,299	46,209

LEAD.—New York, $4.37½; Salt Lake City, $3.50; St. Louis, $4.00; San Francisco, $4.50, carload lots; 4¾c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5¾c: pig, $4.75. London: £11 6s 3d ₱ long ton.

SPELTER.—New York, $5.25; St. Louis, $5.10; London, £21 7s ₱ ton; San Francisco, ton lots, 6¾c; 100-lb. lots, 7c.

TIN.—New York, pig, $27.75 @ 27.80; San Francisco, ton lots, 30c; 500 lbs., 28½c; 200 lbs., 30½c; less, 31c; bar tin, ₱ lb., 30@32c. London, £127 10s.

PLATINUM.—San Francisco, crude, $18.00 ₱ oz.; New York, ingot, $19.00 ₱ Troy oz. Platinum ware, 75 @ 82c ₱ gram.

QUICKSILVER.—New York, $46.50@47.00, large lots; London, £8 7s 6d; San Francisco, local, $44@44.50 ₱ flask of 76½ lbs.; Denver, $48.00. Export, $42.00@42.50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 31½c: Eclipse, 35c.

SOLDER.—Half-and-half, 100-lb. lots, 18.75c: San Francisco, Plumbers', 100-lb. lots, 15.75c.

ZINC.—Metallic, chemically pure, ₱ lb., 50c; dust, ₱ lb., 10c; sulphate, ₱ lb., .04c.

NICKEL.—New York, 50@60c ₱ lb.; ton lots, 40@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30@34c.

LUMBER.—(Retail): Pine, ordinary sizes, $24.00@25.00; extra sizes higher; redwood, $28.00@30.00; lath, 4 feet, $4.50 @5.00; pickets, $21.00; shingles, $2.50 for No. 1 and $2.25 for No. 2; shakes, $13.50 for split and $15.00 for sawed; rustic, $28.00 @35.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, $3.35; Cut, $3.55; 10d to 16d, Wire, $3.45; Cut, $3.35; 8d Wire, $3.50; Cut, $3.50; 6d and 7d, Wire, $3.60; Cut, $3.60; 4 and 5d, Wire, $3.70; Cut, $3.70; 3d, Wire, $3.85; Cut, $3.85; 2d, Wire, $4.10; Cut, $4.10. Special rates for carload lots.

LIME.—Santa Cruz, $1.60 country, $1.75 city ₱ bbl.

CEMENT.—Imported, $2.50@2.75 ₱ bbl.; California carload lots, $2.25 f. o. b. at works; small lots, $2.50 ₱ bbl. in sacks, 4 sacks to bbl.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, $15.00 @15.35; gray forge, $12.35; San Francisco, bar, 3c ₱ lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $23.00@23.00; open hearth billets, $23.00 @23.00; San Francisco, bar, 7c to 12c ₱ lb.

GENERAL SUPPLIES.

COAL.—San Francisco, coast, yard prices: Wellington, $8.00; Seattle, $6.50; Coos Bay, $5.50; Southfield, $8.00. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8.00; Cumberland, $13.00; Cannel, $8.50; Welsh Anthracite, $13.00; Rock Springs, $11.50, long ton; Colorado Anthracite, $14.00. Coke, $10.50 per ton in hulk, $13.00 in sacks; Sunnyside, $11.50, long ton.

OILS.—Linseed, boiled, hhl., 45c; cs., 50c; raw, bbl., 43c; cs., 48c; Lucol oil boiled, hhl., 44c; cs., 49c; raw, hhl., 42c; cs., 47c. Kerosone—Pearl, per gal., 22c; Astral, 22c; Star, 22c; Extra Star, 26c; Eocene, 25c; Elaine, 28c; Water White, in hulk, 15½c; Mineral Seal, iron bbls., 19c; wooden bbls., 21½c; cs., 25c; Mineral Sperm, cs., 26½c.; Deodorized Stove Gasoline, hulk, 17c; do., cs., 23½c; 86° Gasoline, bulk, 21c; do., cs., 27½c: 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13c; do., in cs., 19½c; Lard Oil, E W. S., hbl., 85c; cs., 90c; Neats-foot Oil, pure, hbl., 75c; cs., 80c; Sperm, crude, 50@55c; Natural White, 70c; Bleached, do., 75c; Whale Oil, cs., 50@55c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2.00 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c ₱ set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 23@24c ₱ lb.; carloads, 23@23½c; in tins, 30c; soda ash, $2.00 ₱ 100 lbs.; hyposulphite of soda, 3@3½c per lb.; caustic soda, in drums, 3@3¼c ₱ lb.; Cal. s. soda, bbls., $1.20@1.40 ₱ 100 lbs.; sks., $1.05; chlorate of potash, 12@13c; nitrate of potasb, hbls., 10c; caustic potash, 10c in 40-lb. tins; roll sulphur, 2½@2¾c; powdered sulphur, 2@3c; flour sulphur, French, 3½@3¾c; alum, $2.00@2.25; California refined, 1¾@2c; sulphide of iron, 8c ₱ lb.; copper sulphate, 5¼@5¾c; chloride of lime, spot, $2.50@2.75; sulphuric acid, in carboys, 66% B, 1¾@2c ₱ lb.; nitric acid, carboys, 8c ₱ lb.

BONE ASH.—Extra No. 1, 5@6c ₱ lb. No. 1, 4@5c.

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6½c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails, ½c ₱ lb. above keg price; in 1 and 5-lb tin cans, 100 lbs. per case, ½c. per lb. above keg price. Dry Lead—In hhls., 1 ton and over, 6½c; do. in kegs, 7c.

RED LEAD.—500 lbs. and over at one purchase, ₱ lb., 6½c; less than 500 lbs., 7c.

LITHARGE.—Pure, in 25-lb. bags, 8@9c ₱ lb.

BORAX.—Concentrated, 6@7c ₱ lb; pow-

dered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

MANGANESE.—Pure, ℔ lb., 60c.

SODIUM.—Metal, ℔ lb., $1.00.

BISMUTH.—Subnitrate, ℔ lb., $1.75.

MERCURY.—Bichloride, ℔ lb., 90c.

MOLYBDENUM.—$2.00 ℔ lb.

CHROMIUM.—90% and over, ℔ lb., $1.00.

PHOSPHORUS.—American, ℔ lb., 75c.

SILVER.—Chloride, ℔ oz., 90c@$1.00; nitrate, 55c.

ALUMINUM.—No. 1., 99%, small lots, 37c ℔ lb.; 100 lbs., 35c; 1000 lbs, 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

URANIUM.—Oxide, ℔ lb., $3.50.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

WANTED.

Second-Hand Lathe,

NOT MORE THAN 3 FEET BETWEEN CENTERS. Address, giving description of lathe, also condition—and drill press and machinist's tools, if had—J. O. ROLLINS, Tuolumne, Cal.

PYRITES,

WITH A HIGH PERCENTAGE OF SULPHUR. Write, giving full particulars, to West. Chem. Co., 3214 Twenty-fifth St., San Francisco.

ASSESSMENT NOTICES.

MAYDAY GOLD MINING COMPANY.—LOCATION of principal place of business, San Francisco, California; location of works, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of November, 1903, an assessment (No. 1) of three cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, at Heald's Business College, No. 24 Post street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 14th day of December, 1903, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 18th day of January, 1904, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

EDWARD H. STEARNS, Secretary.

Office of the Company, Heald's Business College, No. 24 Post street, San Francisco, California.

POSTPONEMENT.

The day of delinquency in the above assessment has been postponed to January 11th, 1904, and the day of sale to Wednesday, February 17th, 1904.

By order of the Board of Directors.

EDWARD H. STEARNS, Secretary.

Office of the Company, Heald's Business College, No. 24 Post street, San Francisco, California.

TANANA MINING COMPANY—LOCATION OF principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of December, 1903, an assessmeot (No. 7) of four (4) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at his office, Rooms 404-405 of the Call Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 18th day of January, 1904, will he delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 29th day of February, 1904, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

EDWARD H. STEARNS, Secretary.

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SITUATIONS WANTED.

A COMPETENT MILLMAN OF 10 YEARS' EXperience would like to take charge of a mill in any part of the country, understanding cyaniding thoroughly. Wife would like to take charge of boarding house at same place. Address W. G., care of Mining and Scientific Press.

A PRACTICAL MINING MAN DESIRES TO associate himself with a reliable company. Has had twenty years experience, during which time he has worked regular shifts in every department in mill and mine; the past six years has held position of Superintendent and Manager of property working 250 men.

Practical—not theoretical—knowledge of construction and operation of mills, aerial and surface tramways, power transmission, installation of boilers and machinery, shaft sinking, mine timbering, assaying, etc. References from present and former employers.

Address "Resolute," care Mining and Scientific Press, San Francisco, Cal.

CAPABLE BUSINESS MAN WISHES CONnection with an estate or company having land or mining interests, and office in San Francisco. Now holds responsible position with wealthy concern; d. sires to change next year to a business offering opportunities for advancement to executive position. Speaks German. Full investigation courted. Confidential correspondence solicited. Address "Effort," care of Mining and Scientific Press.

ENGINEER DESIRES POSITION AS SUPERintendent of mining. Best experience obtained in Idaho, Butte, Utah and Colorado. Excellent references. Address T. Worth Bowen, Butte, Mont.

EXPERIENCED SUPERINTENDENT, ENGIneer, Metallurgist; technically and liberally educated; 15 years handling men and machinery of smelters, mills and mines. See testimonials. Address Prof. Stickney, Mountain View, Cal.

EXPERIENCED MILLMAN WISHES POSItion. Address Box 202, Enterprise, Cal.

MANAGER LARGE GOLD MINING AND milling company in Arizona desires to change his location and obtain similar position with desirable company elsewhere. Best of references from present employers. Address I. C., this office.

MANAGER OR SUPERINTENDENT. ADvertiser has had twenty years experience in Mexico, California and Colorado in mine operating and mill management. Fully conversant with the installation of power plants, aerial tramways, erection and running mills, shaft sinking, mine timbering, diamond drill work, etc. Understands the management of men as well as machinery, and can obtain first-class results.

Seven years of successful work in present locality. Desire a change. Disengaged January 1, 1904. Highest references as to ability, responsibility, practical and technical knowledge.

Address "Industry," care Mining and Scientific Press, San Francisco, Cal.

MANY TIMES DURING THE PAST TWENTY years I have been engaged in reconstructing mills to make possible a closer saving; in alteriog aerial tramways to cheapen transportation; in changing mining methods to make possible cheap ore extraction.

Have you any trouble about your plant? Do you contemplate changing or enlarging your works? Is the extraction of ore costing you too much? With my working knowledge and experience I can overcome your difficulties. Permanent situation with first-class metal mining company preferred. No objection to foreign country. Highest references as to ability, honesty and responsibility. Address "Dividend," care Mining and Scientific Press, San Francisco, Cal.

MINING ENGINEER AND METALLURGIST, graduate of German University, with large experience in the treatment of refractory gold ores by all processes, desires position with good company. Cyaniding and treatment of slimes a specialty. Age 33. Excellent references. Address N. W. 43, care of Mining and Scientific Press.

MINING ENGINEER AND METALLURGIST, with sixteen years of practical experience as superintendent, manager and consulting engineer of mines and mills, desires position on or after January 1st. Speaks Spanish fluently. Address P. O. Box 77, Durango, Mex.

POSITION WANTED BY NEW YORK ELECtrical engineer with Pacific Coast company. Experienced in construction work and selling. A position where he can work into the selling end preferred. References from company with which he is now connected. Address G. P., this office.

SUPERINTENDENT IS OPEN FOR POSITION to develop gold or copper properties; experienced miner; can make underground maps and models, also do the assaying; speaks Spanish; good references from past companies. Address "Develop," care this office.

SUPERINTENDENT, COMPETENT ASSAYER, Chemist and Surveyor. Special experience in development work; free or base ores; millman. Equipment complete. Address "Seattle," this office.

WANTED—POSITION AS SUPERINTENDENT or assistant of copper mines and smelters; competent all round man, good assayer, analyst and draughtsman; can handle labor; speaks Spanish. Address "Smelter," care this office.

WANTED—POSITION BY A MAN WHO HAS had 15 years experience in mining; 8 years as Superintendent. Speaks Spanish. Address "M," this office.

WANTED—POSITION AS ASSAYER, BOOKkeeper and Stenographer with mining company or firm in mining town. Wistrand, Oakland, Cal.

HELP WANTED.

A GOOD OPENING IS OFFERED TO A MAN OF engineering knowledge, with a large concern manufacturing power transmitting and conveying machinery, and which desires to reach the mining industry. Address Mining and Scientific Press, 1115 Monadnock Bldg., Chicago.

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Dredger for Sale.

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1 Set 10x20 McFarlane.
1 Set 12x12 F. M. Davis, Geared.
3 No. 2 Sample Grinders.
2 No. 2 Sample Grinders.

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2—9x15 Blake.
1—6x15 Forsyth.
2—7x11 Dodge.
1—7x10 Blake.
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1—4x7 Blake.
1—4x6 Dodge.

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2—8x12 ft. Bruckner Roasters.
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MINING AND SCIENTIFIC PRESS

Whole No. 2266.—VOLUME LXXXVII. Number 26. SAN FRANCISCO, CAL., SATURDAY, DECEMBER 26, 1903. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Sampling and Averaging Ores.

A great deal has been said and written about the sampling of mines under examination, but little has been said of the samples taken in the daily routine of a working mine. Every careful superintendent has samples taken daily in a systematic manner. The necessity for this has long since become apparent. In former days, when general results were all that were sought or expected, samples were taken more as a matter of curiosity than with a definite object in view. The most satisfactory way to work a mine is to produce an outpnt which shall vary as little as possible from month to month, but as nearly every mine has its rich and poor spots and streaks, an even output is only secured by careful sampling, and the selection of ore from those places which will in the aggregate yield a nearly uniform result. Many a manager has learned the unwisdom of making a "big run" one month, and being obliged to send ont a poor one the succeeding month. One manager telegraphed the discovery of phenomenally rich ore in one of the stopes of the mine, and supplemented it by writing a glowing letter about it. This mine was on a paying basis, but a few weeks later he was reminded of the rich find by receiving a letter from the head office, in which caustic comment was made on the fact that, notwithstauding the reported "rich strike," there had been no noticeable increase in the bullion outpnt. The strike had proved to be only a hatfnl of rich ore, and had no material influence on the monthly clean up. A judicious admixture of rich and low-grade ore is advisable, as it makes things run more smoothly, and this can only be done by taking careful daily samples of the ore faces being stoped. It is not suggested that rich ore be mixed with that too low grade to pay a profit, but to so select the low-grade and high-grade ores as to outpnt about the same amonnt mouthly. This gives stockholders confidence in their mining shares as an investment.

In the taking of daily samples the person taking them should carefully mark each sample with a tag bearing snch informatiou as will make it possible to return to the same place at any time later and secnre another sample in the immediate vicinity. This is of course impossible in a stope where all the ore is being removed, but applies more particularly to drifts, raises, winzes, shafts in ore, and development work in ore generally. It is no uncommon thing, in looking over an assay book in which have been recorded the samples taken in a drift, to find entries something like the following:

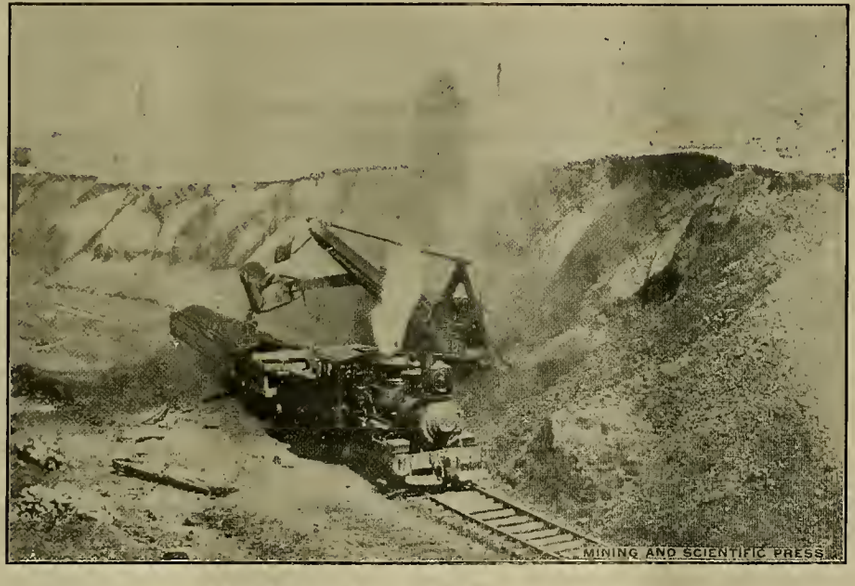
"421. Dec. 2nd—2 feet right side south drift 500 level, $7.40 gold, 2 oz. silver."

Six months later no one can find with any degree of certainty within 30 to 50 feet of the point representing the face of that particular drift on Dec. 2. A tag bearing the inscription: "No. 421. Dec. 2nd, '03—106 feet from main crosscut south drift 500 level, 2 feet right side of vein, $7.40 gold, 2 oz. silver," would make it possible to return to this place at any time thereafter, until the ore over the point where this sample was taken has been stoped. This spot can be found again by this means and other samples taken from the vicinity if desired.

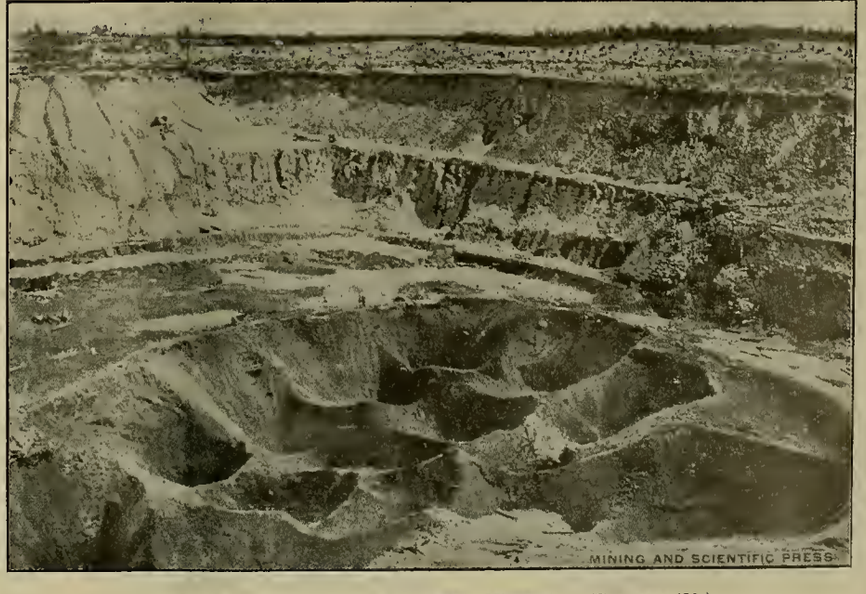
This is merely snggestive, and indicates the necessity of making mine records in such a manner that they will not be of momentary use only. The taking of mine samples by the foreman shift boss, or the assayer, or by any other persou, should be carried on with as much care as though the mine were under rigid examination by expert engineers, and in a well regulated mine this is usually required. A sample, so called, which does not actually represent as nearly as possible the ore as it occurs in the face, or back, or wherever it may be taken, is worthless, and an extravagant waste of time and materials.



Benching in the Mountain Iron Mines, Minnesota, With Steam Shovel. (See page 420.)



Steam Shovel at Work in Iron Mine. (See page 420.)



Mill Holes in Open Cut, Fayal Mine, Minnesota. (See page 420.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market Street, San Francisco, Cal.
Telephone, Davis 771.

ANNUAL SUBSCRIPTION.

United States, Mexico and Canada.....$3 00
All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

BRANCH OFFICES:

NEW YORK CITY, 720 Park Row Bldg. BOSTON, 27 School St.
CHICAGO, 1115 Monadnock Block. DENVER, 606 Mack Block.

J. F. HALLORAN.....Publisher

SAN FRANCISCO, DECEMBER 26, 1903.

TABLE OF CONTENTS.

ILLUSTRATIONS: Page

Benching in the Mountain Iron Mines, Minnesota, With Steam Shovel.....414
Steam Shovel at Work in Iron Mine.....414
Mill Holes in Open Cut, Fayal Mine, Minnesota.....414
Open Cut Mount Morgan Mine, Australia, Showing Square Sets in Old Underground Stopes.....420
Kinks in Ropes.....419
Steam Shovel in Cut Granby Mine, Phœnix, B. C.....421
The Price Patent California Pump.....421
Gas Engine Launch "Flyer".....423
Marine Gas Engine in Launch "Flyer".....423
Pneumatic Tools.....424

EDITORIAL:

Sampling and Averaging Ores.....414
Pleasant Christmas and Prosperous New Year.....415
Mining and Scientific Progress.....415
Mining Outlook for 1904.....415
Order of the General Land Office Revoked.....415
Government Aid to Mining.....415
The Idaho State Mining Association.....415
"Mining Directories".....415
Science in Prospecting.....416
An Increasing Industrial Feature of 1903.....416
Value of Opinion of Expert Geologists.....416
Result of Optimism.....416
Writing to a Mining Journal for Information.....416
The Building of the Panama Canal.....416
To Develop a Mining Property.....419
Taking Out Mining Certificates in Western Australia.....416
Recent Decision of the Supreme Court of California.....416

MINING SUMMARY.....426-427-428-429-430

LATEST MARKET REPORTS.....431

MISCELLANEOUS:

Concentrates.....417-418
Kinks in Ropes.....419
Development and Operation of a Mine.....420
High Duty Pumping Machinery.....421
Ore Deposits Near Igneous Contacts.....422
The Assaying of Silver-Gold Bullion.....423
Marine Gas Engine Launch.....423
Pneumatic Tools.....424
Assay of Tin in Tailings and Slimes.....424
Treatment of Telluride Ores at Kalgoorlie, Western Australia.....425
Personal.....431
Commercial Paragraphs.....431
Books Received.....431
Obituary.....431
New Patents.....431

FOR the forty-fourth time the MINING AND SCIENTIFIC PRESS wishes its readers the world over a pleasant Christmas and a prosperous New Year.

MINING and scientific progress has been made manifest in many ways during 1903, and in the multitude of industrial upheavals and the strife which goes with all progress is mingled much that makes for advancement. The newspapers have been filled with the rights and wrongs of labor and the folly of labor leaders in the misuse of new-found power; daily, likewise, has been chronicled the mistakes and mishaps of organized capital, but these things can be left to the inevitable rule of the natural law of the business world, the eternal law of compensation. There always have been squabbles and for some generations yet they will continue; the civilizing effect of science has a tremendous influence upon every form of industry, and as the years come it is being more generally realized that scientific methods of work in the mine, the mill, the workshop and elsewhere will stand pre-eminent. Time was when political and financial problems demanded the world's attention for their solution. It is now being recognized that scientific progress is more important than any other one thing. It was the cyanide process that made the South African war. A notable improvement in smelting methods; a more economical way of gold extraction; a popularization of the idea embodied in wireless telegraphy; a radical improvement in the design of a locomotive boiler; the development of light without heat; a marked diminution in the cost of long-distance electrical transmission; any one of these would be of more far-reaching result than warriors or legislators could devise. Science leads: the world waits on scientific progress, and in a few generations technical schools will be as munificently endowed by public appropriations as are now armies and navies. Time was when trade followed the flag; now it follows brains, and according as people generally discover that scientific progress pays greater dividends than any other form of human activity, all that goes to aid thereby will be advanced. The engineer is the biggest man of the twentieth century and will grow gigantic.

Mining Outlook for 1904.

With the close of the year 1903 the mining industry in the United States may be said to be in a prosperous condition, though the trials of the past year have been numerous and severe in some districts. This has mostly been due to labor disturbances. These have been confined to no one State or region. Colorado, Arizona, California, Nevada, Montana and Utah have been the States chiefly affected. Miners' unions have had usually a peaceful and prosperous existence in the mining regions of the West for many years, and it is only within the past three or four years that they have shown a disposition to depart from methods in securing their desires which would meet with the moral support of the people generally. About four years ago the miners of the Cœur d'Alene district, Idaho, in an effort to gain their point, destroyed the Bunker Hill and Sullivan mill at Wardner. Since then this sort of thing has become to be recognized as a weapon of the lawless element, to be employed when other means fail. That arson and murder are not approved by the people of the Western mining States as a method to securing desired ends is shown by the fact that in several States it has been necessary to call out the militia to protect property.

That the better class of union miners also disapprove of such measures is evidenced by recent events. In Cripple Creek district, Colorado, the mine managers have shown their ability to secure all the men they require, who are not members of the Western Federation, or who have left it, when the proper protection is afforded the men who are peacefully disposed, and only desire an opportunity to earn an honest living at their chosen calling. In southeastern Arizona a similar result is reported in the copper regions, and in Utah the militia is protecting the property of the coal companies and the lives of men desiring to work, and it is not unlikely the result there will be the same as it has been at Cripple Creek. It is true that the trouble at Cripple Creek and Telluride, as well as in the Colorado and Utah coal mines, is still unsettled, and in Yavapai county, Ariz., trouble continually in progress the last six months, is still unsettled, but the outlook for the future is not unpromising. In California there have been several strikes in various districts. In the southern part of the State, and in southern Nevada, the miners gained nothing; in Amador and Calaveras counties the miners gained their demands made last fall, but a new difficulty, which promises complications, has recently occurred in Calaveras county. Aside from these several districts scattered throughout the country, the industry has gone on prosperously, with a hopeful outlook for the coming year.

It is evident that the better class of miners, those who have houses and property of their own—the result of their industry and frugality—do not care to jeopardize their homes for the sake of uncertain gain, and a season of idleness with the possible excitement of a "brush" with the militia. In a number of instances it is known that prospective strikes have been averted by the clear-sightedness of this better element of the organized miners in districts where they have worked peacefully and contentedly for years, and where there was no thought of strike or trouble of any kind until the arrival in their midst of the professional agitator. The influence of these wiser heads is spreading, and the outlook for 1904 in the mining industry is more promising than it has been for several months past.

SOME time since the general land office suspended all entries of lieu lands. It is now stated that this order has been revoked and entries are again possible. The publicity given to the wholesale appropriation by syndicates of valuable lands on which is growing forests of timber, and some of which land is said to be valuable for mineral as well as for timber, resulted in temporarily withdrawing these lands from entry, but the embargo has now been removed, which suggests that the officials of the land department at Washington have made inquiry and that they now feel competent to judiciously handle the proposition. The whole matter seems a fit subject for congressional investigation, and possibly a change in the land laws if that be found advisable.

Government Aid to Mining.

The necessity for larger schemes than are possible to small mines or individual miners has been recognized in such cases as the retention of debris and the furnishing of sufficient water, etc. A gigantic plan embracing the latter is in operation under governmental control after having been constructed by Government funds in Western Australia, where what is considered the biggest pumping scheme in the world is affording the miners in that region relief from a former water famine. The system now in operation is capable of pumping 5,000,000 gallons water daily a distance of 387 miles from a reservoir at Helena to the terminal reservoir at Bula Buling. This involves carrying the water through 30-inch pipes a distance of 380 miles, there being twenty relay pumping stations, in which are operated sixty-five separate pumping engines. This supplies the Kalgoorlie and Coolgardie region, and while it was long recognized that the richness of many great gold mining properties there justified such action as has been taken, the enormous attendant expense deterred private capital from undertaking so huge a scheme. The entire first cost—over $14,000,000—has been borne by the Government, which also assumes the annual expense entailed by the work of pumping and keeping up the plant, which necessitates heavy charges for the use of the water made so precious at such a distance from the source of supply. Reckoning on a daily use by miners and others of 2,500,000 gallons, it is calculated that the interest, sinking fund, maintenance and working expenses will aggregate about $1,500,000 per year, and to meet this there is a charge to the consumer of $1.50 per 1000 gallons. This is a heavy tax on the mining industry, but is cheerfully met, for even at that rate it is found profitable to operate properties that otherwise must remain idle. The possibility of securing the necessary water is also aiding in the further development of the district, and it is now figured that when the demand is up to the capacity of supply the cost per 1000 gallons can be reduced to $1. The possibility of irrigation and thus lessening the cost of food supplies is also reported promising. The scheme has met much opposition and considerable criticism, but while it is true that as a general proposition the paternal idea of government is not to be unduly encouraged, yet, in such cases as that cited, where the cost is too much for any one mining company, and it is not feasible to combine in mutual enterprise for common profit, Government must take hold of the project or a vast region be allowed to go undeveloped. The progress of the work has been described herein, and from its inception to its present practical operation it is interesting from an engineering standpoint.

THE Idaho State Mining Association has been organized, with headquarters at Boise. It starts off with a membership of over sixty men, nearly all of whom are mine owners and operators, mining engineers, etc. The purposes for which the Association has been organized are to aid in the development of the mineral resources of that State; to assist in promoting the progress of technical and practical knowledge of mining in the State of Idaho; and to secure judicious mining legislation. Only those actively or financially interested in mining in that State are eligible to active membership and office. The management of the affairs of the Association is in an executive committee. This Association has been organized along lines similar to the State Associations of other mining States, having in the main similar objects. Rightly run, these associations can be of advantage to the industry and promote its best interests.

THE "mining directories" and "lists of mining companies" so sedulously advertised are in the main of no essential value some time after compilation. Repeated expensive trials have shown the futility of any attempt to prepare a permanent record of that kind that is of much value. The subscription lists of a live journal devoted to the interests it represents are of infinitely more value to the progressive advertiser than any "directory" or "list" necessarily can be, for no matter how carefully the latter are prepared they soon lose whatever little value they at first possessed.

Science in Prospecting.

That many valuable mines have been discovered by the class of men known among experienced miners as "tenderfeet" cannot be gainsaid, but many more have been found by men who are known as "prospectors," men who form a distinct class in the great army of miners. The prospector is seldom satisfied to work for wages, preferring to take his chances in the unequal battle with nature. His calling is distinctly an art—a science. A man may be a scholar and student of many sciences, but unless he has had the training "in the field," as a prospector he is likely to prove a dismal failure. The prospector is usually optimistic, as he must needs be, for his disappointments outnumber the realizations of his hopes. The man who is not of sanguine temperament will probably soon give up the task of wooing fortune among the rocky hills, in a wilderness. The real prospector, however, lives in the future. If disappointed to-day he lies down in his blankets at night hoping for and expecting success to-morrow. His eye scans every rock, every mineral stain. He is on the lookout constantly for "indications." These include everything that his long study of his art has taught him to regard as a favorable possibility. A prospector panning gravel in a new gulch was asked "any gold?" "No," was the cheery reply, "but plenty of iron rock and rubies." This to him was an indication of the probability of finding gold in that gulch and perhaps in the next panful of dirt. The reason for this was that the gold accompanied other minerals of high specific gravity. The prospector did not reason it out along this line, but his experience had taught him that when he did find gold in that section "iron rock and rubies" (garnets) were also always present. By many experiences of this sort he learns his craft, and he is not to be turned easily aside in his belief, for he has the "courage of his convictions" and is willing to follow them to disaster if may be, figuratively speaking, for nothing but absolute failure will convince him he was wrong, and even then he has a "notion" to try it again. In his quest he finds a piece of float. He will systematically trace it to its source if the richness of the rock warrants it. He will dig test pits by the dozen, and some hillsides have been "coyoted" into a labyrinth of passages in the search for a rich vein, the float of which has been discovered below on the hillside. Too often his knowledge of geology is limited to the field of his own experience and he misinterprets what he sees, but on the practical side he is all right, and will follow his "indications" unerringly to a conclusion of some sort. If the find proves too small or too low grade or is in any way unsuited to his fancy he moves to another place, pursuing his calling untiringly and often successfully. The mining industry owes much to the prospector, and he has been a factor in the development of the great West, which few who do not know him, and who are unfamiliar with what he has done for the world, can realize.

THE creation of power, the supply of working energy, on the North American continent, has been an increasing industrial feature of 1903. Most prominent are the daily 500,000 H. P. being developed at Niagara Falls, N. Y., at a stated cost of $25 per horse power per year, and the extension of electrical power in California and Mexico. In California wheels are now driven by electric power transmitted from the creative dynamos 240 miles distant, this being but an indication of the potential possibilities of the future. The economy of such electric power, East or West, as compared with coal, is too manifest to need extended note, though the extremely low figure cited in New York State, and the fact that California has demonstrated that a central source of electric supply can cover with commercial success a circle of nearly 500 miles diameter, is tremendously suggestive.

THE opinion of expert geologists has come to be recognized as of great value among mining men, and large investments are sometimes made on their statements relative to the economic possibilities of certain districts. In view of this fact the mining geologist shoulders a grave responsibility when he ventures an opinion as to the value or worthlessness of any particular stratum or kind of rock in a mining district, and he should have the best of reasons upon which to found such statement.

Result of Optimism.

A mine cannot be considered developed when it simply has one tunnel or a single shaft in the vein or ore body. Not infrequently mines are equipped with a large and expensive milling or reduction plant long before development has proceeded to a point which will keep the mills or smelters supplied with ore and, too often where this is done, the subsequent development fails to find enough ore to keep a much smaller plant in operation than that provided. This is not the experience of the early mining days alone, but it is a condition too often observed now when there is less excuse for such optimistic estimates of ore reserves prior to development of the property. A case in point would seem to be that of the Majestic Copper Co., near Milford, Beaver county, Utah, where an extensive reduction plant has recently been completed. Now it is announced that the works are closed down pending the further development of the mine, with a view to ascertaining whether there is ore sufficient to keep the works in operation. This is not an isolated case; there are others of like condition.

An instance is afforded in a case wherein what is known as the "smelter trust" at Santa Barbara, Mexico, the combine is credited with having built a 450-ton plant, divided into three units, when they did not have water enough to run more than one unit more than two-thirds of the time. Then they had a chance to buy a water right close by with sufficient water in it to run things, but, while negotiations were going on, President Towne, of the Montezuma Lead Co., adjoining them, got in and bought the property for its valuable water right. Did space permit, other instances might be cited, not in an invidious or carping way, but to illustrate that while anyone and everyone is liable to make a mistake, and be oversanguine or too hasty, yet the tendency of the times in these days of mining and scientific progress should cause adequate surface appliances to follow and not precede the other manifest requirements of the enterprise.

IT is little use to write to a mining journal for opinion of a certain mining investment after the questioner has made the investment, expecting indorsement and approval while asking for information. Where doubt or disbelief exists it were better to find out the truth before the purchase. In a general way, it is always well to use the same caution and prudence that one should exercise in any purchase of anything. Mining is a business, just like any other business, and a most profitable one, rightly run; there is risk and chance, as in all lines, no more, no less, and an investor should use the same degree of business judgment in a proposed mining investment that he would in any other proposition where he considers the investment of money with expectation of profit. To do this he naturally wants to know something about the locality, the kind of proposition it is, freights, development work, kind and degree, mining and milling facilities, wages and twenty other items. Most of all, he needs to be reasonably sure of the men with whom he deals, and not be too credulous as to assurances and promises. Usually the truth is good enough and the facts need no exaggeration, but it sometimes happens that a man with a mine to sell has said so many extra good things about it that he finally gets to believe them himself. But the time to find out about such mistaken assertions is before, and not after, the purchase of an interest therein. It is well to bear in mind that all the "greed" is not on the side of the seller. It is the ignorant greed of the buyer that occasions opportunity for nine-tenths of the fraud possible in mine stock transactions. No one can expect to get something for nothing, and, whoever does, cannot justly complain on being disappointed.

THE building of the Panama canal is interesting from many standpoints. Now that Panama is an independent government, and the United States is about to push this long-deferred work, after the financiering of the $200,000,000 that first and last will be required, comes the engineering and furnishing of machinery and appliances. The supplying of the mechanical devices will, of course, be an American matter, and already prominent machinery manufacturers are doing some preliminary work in that regard. The building of the Chicago drainage canal showed how economical and efficient labor-saving devices could be utilized in such work. The steam shovel; the cantilever crane; dynamite; railway material of all kinds, electric and steam; air compressors; pneumatic tools; drills; cable-ways; wire rope tramways; belt conveyors; are among the more prominent and immediate requirements connected with that great enterprise.

THE fact that a stock company organizes to develop a mining property and advertises its stock is sometimes unfairly considered as in some way reflecting on the solvency of the scheme or the merit of the enterprise. "If," say objectors, "the property is so good a thing why do you want to sell stock? Why not keep it all yourselves?" But this matter of mining stock corporation is just the same as in any other case where money is required to do that which no one can compass singly. So railways are built, so great enterprises are permitted to be of public benefit and private gain. As well inveigh against the creation of a line of steamships started through corporate effort, or a great manufacturing establishment, founded by co-operative capital, which is what all solvent corporations are. Many a deserving mining property — itself the nucleus of a profitable town—remains unproductive and undeveloped because its owner has but a thousand dollars. Were 100 men to contribute that amount there would be enough to make the mine; for mines are made, as are railroads, steamships, manufacturing establishments, and in the same way, by aggregation of small capital. The Pennsylvania railroad will spend $60,000,000 next year on betterments; this because it is owned by 3724 different men and women. No one of these 3724 could do what that road finds necessary to do to develop its property to its utmost earning capacity, but jointly they can tunnel New York bay, as in the same way the S. P. Co. will tunnel the Sierras. The day of little things is still with little people and that day will forever abide. But there are big things for big minds in mining, as well as in all other profitable ways of making good clean money, and one of these ways is the plan long since discovered of putting the many small sums together to make the required sum. And it should not be necessary for any honestly officered and good-intentioned mining company to make any apology for doing what every big thing in the business world requires should be done. Nor is such explanation or apology needed. Such explanation would be unnecessary to those who are capable of appreciating it and useless to those who are not.

AN attempt to have the Australian Parliament pass a law requiring mine managers in Western Australia to take out certificates, is opposed by the Chamber of Mines at Coolgardie, on the grounds that those with influence have experienced no difficulty in securing managers' certificates in other provinces where the law requires them, citing instances where men have been issued certificates as mine managers who have never been underground in their lives. There is much that is farcical in these managers' certificates. An instance is known where a mine manager of world-wide experience could not secure a certificate in New South Wales, Australia, because he had not had the management of a mine in that province for five years prior to the passage of a certain local law without submitting to an examination by a board of examiners, who pass upon his fitness for the position, no regard being paid to his experience and success gained elsewhere, while another man passes the examination technically with no practical experience whatever.

THE recent decision of the Supreme Court of California, to the effect that the owner of an artesian well is only entitled to the water that can be usefully employed on the land where the well is situated, has already commenced to bear fruit. A suit has been begun in San Bernardino county to enjoin a water company from pumping water from an artesian well. The plaintiff claims that at one time he had an abundant flow of water in his wells, but since defendant corporation began pumping the wells on their lands plaintiff's wells have ceased flowing. Other suits of similar character are in contemplation by other parties.

CONCENTRATES.

THE essential in the argument is not to prove that you are right, but to prove that which is right.

UNDER an absolute pressure of 125 pounds per square inch, regardless of friction, 45,441 pounds of steam would flow through a 3-inch pipe in one hour.

WHERE a weight of twenty-five pounds is let drop 6 feet on the head of a spike, driving it ¾ of an inch into a plank, the force of the blow in pounds is 2400.

A CUBIC FOOT of air at 60° F., barometer at 30 inches, weighs .0765 pound; twelve pounds of air equal 156 cubic feet; air expands $\frac{1}{491}$ of its bulk for every degree of heat added.

THE 2½-inch pipe being 32 feet long, there being one elbow, the pressure being 90 pounds per square inch, there would flow therethrough 715 gallons of water per minute.

IF a vertical pipe 6 inches in diameter and 600 feet long be filled with petroleum, a pressure of 228.63 pounds at the bottom of the pipe will cause the oil to overflow at the top.

RUSSIA produces quicksilver. So far as known, the only productive quicksilver mines last year were those owned by Auerbach & Co., and which yielded what was equivalent to 11,974 flasks.

THROUGH a 3-inch vertical pipe from the bottom of a tank 4 feet 10 inches in height and 6 feet diameter, total head 18 feet, there would flow 3751 pounds of water per minute, developing about 1 H. P.

THE use of kerosene in steam boilers is not recommended. Whatever its action upon boiler scale is considered due to inductive action on the iron, which it induces to unite with oxygen, forming iron oxide.

ANTIMONIAL or hard lead contains from 17% to 27% antimony. There is very little antimony produced at present in the United States, largely because there is no duty on that metal, and the existence of low freight rates, foreign.

THE tank containing 6000 pounds water, at a temperature of 60° F., and to be heated to a temperature of 212° F., would require 910 pounds of steam discharging directly into the water, at a pressure of 100 pounds per square inch.

ROUGHLY ESTIMATED, the depth of the shaft according to barometric reading would be about 1800 feet, as atmospheric pressure increases with shaft depth about 1 inch rise in the barometer for every 900 feet deeper from the surface.

A FLUX that might be used to advantage in treating the calcined slimes in graphite crucibles would consist of: Powdered borax, five parts; soda bicarbonate, two and one-half parts; sand, one part—one part of this flux to be used to two parts of the gold slimes.

THE Secretary of the Interior has more than once affirmed the principle that surface indications of petroleum do not conclusively prove, within the contemplation of the law, that the land carrying them is petroleum bearing, and therefore entitled to classification as mineral.

AT the Chapin iron mine, Michigan, 2000 H. P. is developed by the Quinessec falls. This power is applied to air compressing machinery, and power is transmitted about 3½ miles to the mines through a 24-inch main, where it is distributed by laterals to the shafts and works.

NICKEL STEEL is now made containing 36% nickel. This alloy admits of almost no appreciable expansion, and temperature has little effect upon it, making it extremely valuable for chronometric apparatus and other instruments in which the maximum of accuracy is essential.

THE largest gas engine in operation is one built at Seraing, Belgium, a 1200 H. P. tandem gas blowing engine. The gas cylinders are 51 inches diameter; the blowing cylinder is 73 inches diameter; stroke 55 inches; speed 80 revolutions per minute; weight of flywheel 33 tons; total weight 237 tons.

THE minerals of the soda group are not of common occurrence. They are gallalite, hauynite, noselite and lazurite. In composition these minerals are like garnet which they also resemble in crystalline form. They occur with volcanic and intrusive rocks, and are usually present in phonolite, and rocks of that character.

GUN METAL is no longer used for ordnance, but the alloy is in common use for general art work. Brass castings usually contain more or less scrap brass—that is generally made up of copper 70%, lead 4%, tin 4%, scrap, 18%. The lead gives it a good color, makes it easy to machine and greatly reduces the cost.

WHEN the crank is on either dead center all the space between the piston and the steam valve is called the cylinder clearance, and the space only between the piston and the cylinder head is called the piston clearance. Cylinder clearance must be taken into account when figuring out the mean effective pressure.

A PUMP may be driven by compressed air as well as by steam. Special precautions are necessary to prevent the exhaust from clogging by collection of ice, due to rapid expansion of the air. This is accomplished by having an exhaust of large area or by allowing a stream of water to fall upon the pipe near the end of the exhaust.

THE lake described as being in the solid granite in upper Clear Creek county, Colo., is probably of glacial origin. Such lakes are not uncommon in high altitudes. Glacial lakes are of several types. Some are basins scooped out of solid rock, others have formed in valleys where a terminal moraine has caused a dam to be thrown across the valley.

A ROCK STRATUM may maintain its size and character over a large area, but usually there is more or less change in both character of the rock and its thickness in a distance of several miles. Thus a stratum of hard, firm quartzite at one locality may become either thicker or thinner several miles distant and may be there an unaltered sandstone.

THE symbols used to denote cyanide of potassium are KCN or KCy. The first letter indicates potassium, for which the Greek word is kalium. CN is a compound radical of two elements, carbon and nitrogen, but is often written "Cy" for convenience. HCN, or HCy, is hydrocyanic or prussic acid, also called hydric-cyanide. It is a very poisonous gas.

THE mica from Hawthorne, Nev., is muscovite. Owing to surface decomposition it is not a merchantable article, but it may improve in quality with depth. Sheets 2x2 inches and even smaller are valuable if of good quality. The smaller sheets are used in electrical work. Mica is found throughout the regions of granitic rocks, but there are few mines which can be worked at a profit.

THE Idaho specimen contains alumina, as could any "specimen" picked at random from any clay bank, but not in sufficient quantity to render its extraction profitable or (commercially) possible. The chief source of American aluminum is bauxite; its chief user, the Pittsburg Reduction Co. About 20,000 tons were produced in the United States this year, and about an equal amount imported.

WASTE broken in the lowest levels of a mine during development may be utilized for filling in stopes on higher levels by providing a rock bin at the shaft, at a point above the station where it is desired to draw the rock into cars for delivery to stopes on the levels below. In the case of inclined shaft the rock bin may be cut in the foot wall side of the shaft, and a gangway cut underneath it for the passage of cars.

THE atmospheric pressure at sea level under ordinary conditions is 14.72 pounds per square inch. At 5000 feet altitude it is 12.27 pounds; at 10,000 feet altitude it has decreased to 10.26 pounds, and at 16,000 feet it is 7.98 pounds, or only a little over one-half of the normal pressure at sea level. Air compressors are affected by this change in pressure of free air. At an elevation of 15,000 feet, a compressor only develops about 57% of that at sea level.

AERIAL wire rope "tramways" should prove as commercially profitable in Chile, Peru and Bolivia as they have in other mountainous countries. In the countries mentioned experience has shown that the cost of transport in francs per ton is 0.06 with canals; 0.10 with steam railways; 0.11 with electric railways; .012 to 0.10 with aerial ropeways; .035 with level roads; .06 on roads with steep grades; .09 on mules; 1 on horses, and 10 by human power.

REGARDING the approximate pressure of two columns of water, 6 inches and 8 inches diameter and 50 feet high, it is to be noted that a column of water at 60° F., 1 inch square and 1 foot high, weighs .433 pound, and, consequently a column 50 feet high would weigh 21.65 pounds, which would be the pressure per square inch in either pipe. The total pressure would be as much greater in the 8-inch pipe as compared with that in the 6-inch pipe, as the area of an 8-inch circle is greater than the area of a 6-inch circle.

THE distribution of tellurides containing gold is now known to be world wide. The most noted districts now producing this class of gold ores are the Cripple Creek region of Colorado, the telluride districts of the Black Hills of South Dakota, and the mines of Western Australia. In more limited amount they occur in California gold mines, in New Zealand (north island), South Africa, in Transylvania, numerous districts of Colorado, in Chile, in Hungary, Sweden, Germany, India, and several other Asiatic countries.

WHILE it must be conceded that there is such a thing as secondary enrichment in the distribution and deposition of ores, yet it is not clear that the existence of a barren zone in a mine can be used as constant argument that such strata or formations have by leaching occasioned a deeper zone of paying ore, made paying by secondary enrichment. The argument and deduction is ingenious, but not convincing nor conclusive. At best, it is but a hypothesis, and, however plausible, might cause loss to its many believers.

PORTLAND CEMENT WORK which is to be painted should be thoroughly hardened and dry. It is advisable to let the work stand for a year before oil paints are applied. The durability of the paint will be assured by first brushing over the surface with dilute sulphuric acid—one part of acid to 100 parts of water—and allowed to dry before painting. A preparatory coating for oil paint is a solution of common water glass in three or four parts of water. Two applications of this, followed by a washing with water, and then another application of water glass, will be found effective.

BARIUM CHLORIDE is the barium compound most commonly employed in the laboratory, and may be formed by dissolving the carbonato of barium in diluted hydro-chloric acid, and evaporating the solution. On cooling the chloride is deposited in tabular crystals. On a commercial scale it is usually made by fusing heavy spar (barium sulphate) with calcium chloride, in a reverberatory furnace. The mass is rapidly extracted with hot water which leaves the calcium sulphate undissolved, the clear solution of barium chloride being decanted and evaporated to dryness.

WOLFRAMITE, hubnerite and scheelite contain sufficient tungstic acid to be commercially profitable as tungsten ores. Scheelite is reported in considerable quantity 14 miles from Calionte, Kern county, Cal.—a tungstate of calcium carrying 79% tungstic acid. Tungsten is chiefly used in the manufacture of tungsten steel. One method of reducing the ore to tungsten oxide is by fusion with soda, leaching out the soluble tungstate of soda and adding an acid, which precipitates the oxides subsequently separated by filter presses. The supply is limited, but is commensurate with the demand.

REGARDING relative tonnage and width of furnace in copper matte blast operations, the quality of the ore would necessarily be an important factor in determining the economical working. An extremely narrow furnace would be 35 inches wide at the tuyeres; an extremely wide one, 56 inches. A furnace 35x122 inches at the tuyeres would have 29.68 square feet hearth area. A 44x100 inch furnace would have 30.5 square feet hearth area at the tuyeres, and would give about seven tons smelted per square foot of hearth, averaging 215 tons per twenty-four hours. This size would require nineteen ounces blast; a 56-inch furnace twenty-seven ounces blast pressure.

IN the erection of electrical generators, small belted machines up to 10 or 15 K. W. are often set on the floor when it is solid, with no further foundation. For larger machines a foundation should be furnished of brick laid in cement, or better still, of solid concrete, with a cement and sand cap, or surfacing. The depth ranges from 2 to 5 feet for small and moderate sizes, varying with the character of soil, as well as size of machine. Foundations are usually battered, especially in the direction of belt pull. For generators requiring a foundation, it is usual for the manufacturer to furnish the purchaser an outline and foundation blue print, giving necessary information for installation.

IN the case of Wisbon vs. Great Western M. Co. (69 Pac. Rep., 1106), the Supreme Court of the State of Washington held that one who examines a mine and makes a report on same for an owner, under a contract that he shall receive a certain amount therefor if a sale be effected "by and through" the report, can not recover on evidence showing that merely one to whom such report was furnished, with other reports of a similar nature, became the purchaser. In the case stated in the inquiry, it would seem that the testimony of the purchaser, if procurable, would go far toward establishing the fact of the special report in question having favorably influenced the sale.

AT 60 pounds pressure 1 cubic foot of air corresponds to 5.10 cubic feet free air; at 80 pounds pressure to 6.46 cubic feet; at 100 pounds, 7.82. An air compressor at 3000 feet altitude would require 272 H. P., to supply air for twenty-five 2½-inch rock drills in rock of ordinary hardness, the drills 2000 feet from the air compressor. It would require a duplex air compressor with 18-inch steam cylinders; 20-inch air cylinders; 24-inch stroke, 175 strokes per minute. An air drill is assumed to be supplied with air at pressures between 60 and 100 pounds per square inch. The best service is secured when the compressor is working against the pressure for which it was designed by its builders.

PNEUMATIC HAMMERS may be divided into two classes—valve hammers and valveless. In the latter the piston is the hammer and in its movement opens or shuts the inlet or exhaust ports. Valve hammers have a distinct and separately moving valve. The valveless is a short-stroke machine, best fitted for calking and chipping with a possible piston speed of from 10,000 to 15,000 strokes per minute. Valve hammers are well adapted for riveting; the travel of the piston or hammer being longer, the machine works at 1500 or 2000 blows per minute. The blow is heavier than that of the valveless

hammer. The weight of either variety of these pneumatic hammers runs from 3 to 25 pounds.

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While Section 2324, Revised Statutes of the United States, requires that in marking a mining claim the location must be distinctly marked on the ground so that its boundaries can be readily traced, the law does not require that the boundary lines shall be indicated by physical marks nor monuments, nor does it define what kind of marks shall be made, nor on just what part of the ground claimed. Any marking, whether by stakes, mouuments, mounds, written notices—anything that will enable the boundaries to be readily traced—is legally sufficient. The above refers to the boundary lines, but the corners and end centers must be distinctly marked by monuments, mounds or posts as required by law.

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Telluride ores are not amenable to amalgamation, or to the usual methods of concentration, and in treatment by fire processes there are usually heavy losses by volatilization. Assays on telluride ores are not always reliable, and experiments have demonstrated that results vary considerably on the same sample; for this reason special methods are employed in assaying telluride ores. Some assayers prefer the scorification assay for this class of ores. The quantity taken for this assay depends upon the richness of the ore and the size of the scorifiers. Generally $\frac{1}{10}$ or $\frac{1}{20}$ assay ton is taken. For telluride ores $\frac{1}{10}$ assay ton is taken, with 50 grammes of test lead and 0.3 gramme of borax glass. Add a cover of litharge and rescorify the button.

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Hornblende and amphibole are nearly synonymous, the chief difference being that amphibole covers the non-aluminous varieties, including tremolite, actinolite and asbestos. Hornblende embraces the aluminous varieties, including glucophane, a blue hornblende. Tremolite is calcium-magnesium amphibole, white to dark gray in color; actinolite is calcium-magnesium-iron amphibole, color green and grayish green. The cleavage angle of hornblende is 124°. That of pyroxene which chemically resembles hornblende, is 87°. The pyroxenes are divided into aluminous and non-aluminous varieties. Augite belongs to the alumiuous section together with enstatite and bronzite. These are the more common varieties, the non-aluminous species being comparatively rare.

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Calaverite is not affected by concentrated hydrochloric acid, but on heating up to strong fuming with concentrated sulphuric acid, the tellurium goes into solution, coloring the acid crimson and leaving a residue of fine gold. It is decomposed by concentrated nitric acid with the separation of spongy metallic gold, and dissolves in aqua regia, leaving a slight residue of silver chloride. Like other tellurides, calaverite occurs in irregular masses, strings and veins in greenstone schists and other foliated rocks in the veins of quartz, calcite and other carbonates traversing them. In the transition zone it is often found to be covered on exposed faces by a thin layer of mustard gold, while in the oxidized zone all the tellurium has been removed, leaving free gold only.

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By the "20-league zone" in Mexico is meant a strip of land along the international boundary between the United States and Mexico, which has a uniform width of 20 leagues—about 52 American miles. No foreigner can denounce (take up) mining claims within that zone without special permit. When a foreigner has secured such permit, he must present the same within four months of the date of the certificate, in order that the docket relative to the concession sought may be closed. In endeavoring to obtain a concession to mine in Mexico, a rigid observance of all the laws relating to mining in that Republic is advisable. The more valuable the concession the greater the need for care in all matters pertaining to it. The same suggestion applies to taking of mining claims in the United States.

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If a suitable coil of wire which carries an electric current be suspended in such a manner that it is free to revolve, and a magnet be brought near to one side of it, the coil will either be attracted or repelled by it, depending upon which pole of the magnet is presented, and also in which direction through the coil the current of electricity is flowing. In a similar manner, if a magnet be suspended in such a manner as to be free to revolve within a coil of wire carrying a current of electricity, the magnet will revolve either one way or another. This is the principle upon which the electric dynamo and motor is constructed and operated. The current produces motion, and motion will also produce current. The electricity thus produced is taken off by means of brushes and conducted by wires to wherever it is to be utilized.

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The fire assay of copper, as practiced in the Lake Superior region, is only adapted to the assay of ores containing copper free from sulphur. In those ores native copper is the only metal to be considered, though the presence of red or black oxide of copper is not detrimental to the process. In an assay charge of Lake Superior ore there is generally present native copper, upward of 50% titanic iron, silica, iron oxide, and metallic iron from the shoes and dies. As fluxes, bicarbonate of soda, borax, argol, iron oxide, sand and slag from previous assays are used. The mixed charge of ore and flux is fused for about twenty-five to thirty minutes in a wind furnace, the resulting button being nearly pure copper. The success of this method of assaying depends to a great extent upon the experience and skill of the operator.

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Metallic manganese is very little used in either arts or manufactures, is extremely difficult of reduction from its ores, and is only produced in very small quantity for test work in laboratories, etc. It is worth about $20 per pound. Manganese ores of high grade bring prices depending largely upon supply and demand, there being no fixed prices. In California the crude ore as it comes from the mine is worth in San Francisco about $10 per ton. It is ground and disposed of by dealers at about $20 per ton. The ore submitted is pyrolusite (manganese dioxide) and is apparently high grade and free from impurity to a great extent. It is useful as a flux in some smelting operations, also in the manufacture of steel. Manganese concentrates containing 45% to 50% of manganese may be sold to the Illinois Steel Co., Chicago, Ill., providing they can be produced cheap enough.

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The practice of breaking ore by hand by means of hammers, for the purpose of concentrating by hand sorting, is followed to a comparatively limited extent. Formerly it was a popular method at shipping mines. The impression prevails that Mexicans and Chinese make better ore sorters than men of other nations. The theory advanced to explain this is that an American loses too much time in mentally making a distinction between that which is first class, second class, third class ore, etc., while the Mexican and Chinaman work more mechanically, and while possibly not accomplishing more in the way of tonnage than the American, they are usually willing to work at a somewhat lower price, which makes their services comparatively desirable for this class of work. There is a saying among miners that "the more intelligent a man is the poorer ore sorter he is."

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At sixty pounds pressure, a 3-inch rock drill per minute would need at least 150 cubic feet of air. It is always well in such cases as specified by our inquirer to allow 25% in excess of the requirements. At eighty pounds gauge pressure at sea level a 5-inch drill would require 190 cubic feet free air per minute. In this regard it is to be noted that the efficiency of air compressor drill machinery diminishes rapidly with the altitude, as it is proportional to the atmospheric pressure. With the barometer at 30 inches at sea level, the barometric pressure would be in pounds 14.75 per square inch. Assuming the efficiency of the air compressor as 100 at sea level, conditions would be changed at an elevation of 8000 feet. There the barometer would indicate 22.11 inches, with a barometric pressure of 10.87 pounds per square inch, the volumetric efficiency of the compressor being thus but 76% of that at sea level—a loss of 24%.

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To determine the quantity of sulphur in coal, mix thoroughly one gram of finely powdered coal with one gram of calcined magnesia and one-half gram of dried sodium carbonate with a glass rod in a platinum crucible, which is placed in an inclined position on a clay pipe triangle. Apply heat gently with a Bunsen burner, so that only the lower half of the crucible shows a dull red heat, and stir the mixture with a heavy platinum wire, at intervals of five minutes, for an hour. Cool and mix thoroughly one gram ammonium nitrate with charge in the crucible, cover, and heat for ten minutes. Remove mass to a beaker as completely as it can be removed from crucible. Add water to crucible, warm and remove the remainder of charge. If necessary, repeat operation until crucible is clean. Filter the liquids resulting from this process, heat and add barium chloride to solution to precipitate sulphuric acid as barium sulphate. Filter wash filtrate and dry. Heat to ignition and weigh as barium sulphate, deducting the sulphur content from original charge of coal.

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What is known as the Delprat process is the one patented by G. D. Delprat, general manager of the Broken Hill Proprietary Co., Australia, for processes relative to the treatment of residue of ores. In the first process, the sulphide ores, including the products and waste from other metallurgical processes, are finely pulverized and divided. They are then immersed in a bath, and the sulphides rise to the top, and are skimmed off or otherwise removed. No special plant or machinery is necessary for the immersion process; the powdered ore being fed into an inclined launder, makes its way by gravity to an ordinary steam-jacketed pan or vessel, or else into one set above an ordinary furnace. The ore then drops slowly into the bath. The bath consists of a solution of salt cake in water, and of a specific gravity approximating to 1.410. The solution is kept hot, but preferably not allowed to boil. As an alternative the hot bath consists of a solution of sodium sulphate in water, to which is added free sulphuric acid, so that the resultant will approximate to 1.410. As the ore immerses itself in the heated bath, the sulphides disengage themselves from the gangue, rising to the top, whence they may flow away or be skimmed off. The second process consists in the ores being dropped into a heated bath of nitrate of sodium, nitrate of potassium, or nitrate of zinc, dissolved in water, to which is added dilute nitric acid, so that the result will have a specific gravity of 1.410. The sulphides here also rise to the top and then flow away, or are otherwise removed.

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The process of sulphide smelting as practiced in Hungary, as described by Eissler, is as follows: "In treating auriferous iron pyrite contained in a quartz matrix, a flux must be added to melt the quartz; a slag will then be formed and the sulphide of iron will unite with the greater portion of the gold present, forming a heavy regulus, which will settle to the bottom. The stratum of iron sulphide thus formed beneath the surface of the slag and scoriæ produced by the fusion of the earthy and siliceous gangue is technically called matte. If the matte containing the gold is now roasted or oxidized by heating it with free access of air, whereby it is deprived of a further portion of its sulphur, and the product be mixed with a fresh quantity of crude pyrites, and smelted again, a second matte will be obtained, which will contain the gold from the first and second charges of the auriferous ore. This process may be repeated any number of times, until the precious metal has been sufficiently concentrated in the substratum of iron sulphide to admit of its profitable extraction. The last matte, containing the whole of the gold which has accumulated from the successive charges, and brought, therefore, to any required richness, is roasted and fused with metallic lead, litharge, or with a mixture of galena and metallic iron. The gold is taken up by the molten lead from the surface of which the impoverished, undecomposed sulphide and oxides are skimmed off." By this process the gold is obtained in a more concentrated form than if it were smelted directly with lead at first.

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Pyritic smelting differs from ordinary smelting chiefly in the use of the sulphur in the pyrite and other sulphides present in the charge, as fuel, whereas, in the ordinary smelting methods, it is desirable to have most of the ore of the charge oxidized before it enters the furnace, and charcoal or coke are employed as fuel, with sometimes wood as auxiliary. Lead and copper smelting are similar in many respects, though in copper smelting, matte and not metallic copper is usually produced, but this depends to a great extent upon the character of the ore. In lead smelting the ores are reduced to metallic lead, which carries down any precious metals that may be present, and also the copper if any. Hot blast is used in each of these several kinds of smelting, though there appears to be a disagreement among smelters as to the degree of heat most beneficial to the process. It is claimed that experiments have shown that a very hot blast does not pay in proportion to the expense necessary to raise the heat to a high degree. In some instances the heat of the furnace itself is employed to heat the blast, but it is not generally the practice, special stoves for heating the air being employed for the purpose. It is generally the aim of the smelter to have the gases escaping from the top of the charge at a relatively low heat. The gases from copper furnaces are not inflammable, but those of iron furnaces are, and there the furnace heat is utilized in an economical manner. The idea of hot blast in copper smelting was borrowed from the practice of the iron furnaces, and it has been in use in Europe for many years. The idea of heating air of the blast by means of the hot slag from the copper furnaces is said to be more feasible than the employment of furnace gases for this purpose.

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During the year of which this is the closing issue a large number of direct questions have been answered in this page of "Concentrates," the questions themselves being necessarily omitted for want of space, and only the answers furnished; even then in as condensed a form as is consonant with clearness. These questions through the years embrace nearly everything of importance in engineering, mining, metallurgical and general industrial life, and thousands of readers the world over have expressed their satisfaction with the service, which has been a gratuitous one to all readers of this journal. While every reasonable effort is made to secure and furnish prompt and accurate answer to the questions submitted, yet "Concentrates" modestly disclaims the ability to answer all the questions that are daily received. To do that would be manifestly impossible; on the principle that "everybody is wiser than anybody" experts in their several lines have often had those questions submitted to them with request for needed answer, and with uniformly gratifying results. The idea of this page of "Concentrates" first occurred to the writer several years ago when as editor he received many inquiries on matters of practical every-day requirements with the so oft repeated admonition: "Don't publish my name or address; just give the answer," that it seemed strongly indicated that such a department would be a popular feature, and one of great practical value, which it has manifestly become. In further connection with this subject the idea in general has been that such a question as is often asked is precisely the same one that is in the mind or on the tongue of many another one beside, and in answering the inquiry it is not alone the inquirer that is answered, but a host of others who wanted just what that concentrated little paragraph contained. The correctness of this view has been attested on numerous occasions when readers a thousand miles away from the inquirer whose question was answered have written to the effect that that answer was the precise solution to a problem that had come up in their daily work in the mine or mill or smelter or machine shop or engineering practice. Thus the answering of these questions has been a pleasure and a privilege through the years, and as in all other departments of its useful work, it it will be the province and the purpose of this journal to continue in its more or less successful attempts to afford some little assistance in the solution of some of the problems that present themselves in the daily lives of its readers.

Kinks in Ropes.

Written for the MINING AND SCIENTIFIC PRESS by WM. H. KRITZER.

To properly splice a rope or to tie a knot that will not slip is a simple operation, and the writer does not claim anything necessarily new and original in the following article, his intention being to illustrate a simple method of splicing a four-strand manila rope and the manner of tieing some of the common knots and hitches that are used in every-day practice.

In manufacturing rope, the fibers are first spun into a yarn, this yarn being twisted in a direction called "right hand." A number of these yarns—depending on the size of the rope—are then put together and twisted in the opposite direction, or "left hand," into a strand. Three of these strands, for a three-strand, or four for a four-straud, rope are then twisted together, the twist being again in the "right hand" direction. It will be noticed that, when the strand is twisted, it untwists each of the threads, and when the three strands are twisted together into rope it untwists the strands, but again twists up the threads. It is this opposite twist that keeps the rope in its proper form. When force is applied to the end of a rope the tendency is for the rope to untwist and become longer. In untwisting the rope it twists the threads up, until the straiu of the untwisting strands just equals the strains of the threads being twisted tighter.

It is this fact that makes it necessary to take out the "turns" in a new rope—that is, untwist it before it is to be used.

There is the same difference in the strength of various qualities of manila rope as there is in other materials, so the rope should be selected to suit the use it is to be put to.

The amount of work that the rope will do varies greatly, depending not only on the quality of the fiber and the method of laying up the rope, but also on the kind of weather when the rope is used, the blocks or sheaves over which it is run, aud the strain in proportion to the strain put upon the rope. The principal wear comes in practice from defective or badly set sheaves, from excess of load and exposure to storms.

The principle of a knot is that no two parts, which should move in the same direction if the rope were to slip, should lie alongside of and touching each other; with this point kept in mind the reader should have no difficulty in tieing the knots illustrated with a little practice:

Fig. 1.—Bight of a rope.
Fig. 2.—Overhand or simple knot.
Fig. 3.—Figure 8 knot.
Fig. 4.—Double knot.
Fig. 5.—Boat knot.
Fig. 6.—Bowline, first step.
Fig. 7.—Bowline, second step.
Fig. 8.—Bowline, completed.
Fig. 9.—Reef or square knot.
Fig. 10.—Weavers' or sheet bend knot.
Fig. 11.—Sheet bend with a toggle.
Fig. 12.—Carrick Beud.
Fig. 13.—Stevedore knot commenced.
Fig. 14.—Stevedore knot completed.
Fig. 15.—Slip kuot.
Fig. 16.—Flemish loop.
Fig. 17.—Chain knot with toggle.
Fig. 18.—Half hitch.
Fig. 19.—Timber hitch.
Fig. 20.—Clove hitch.

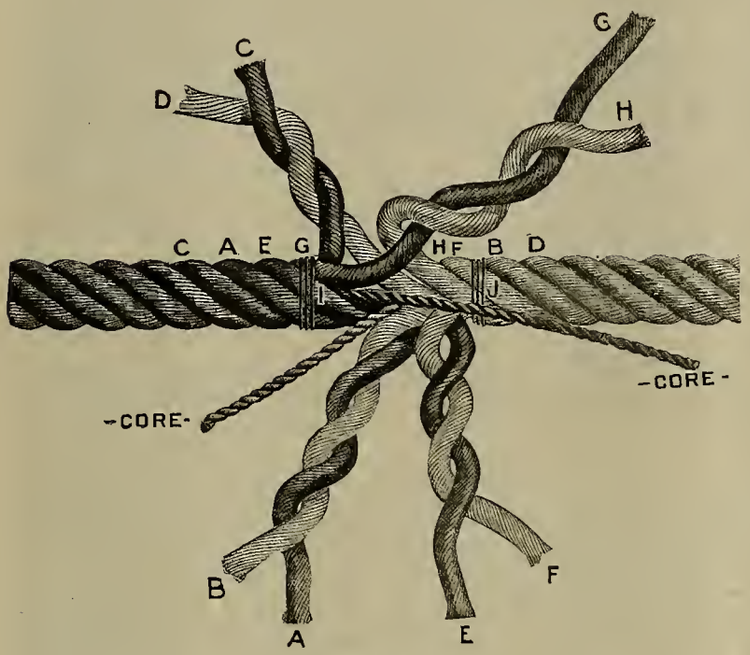


Fig. A.

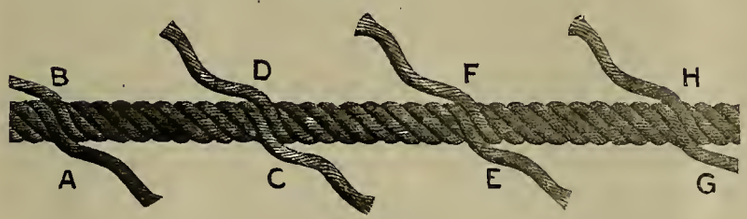


Fig. B.

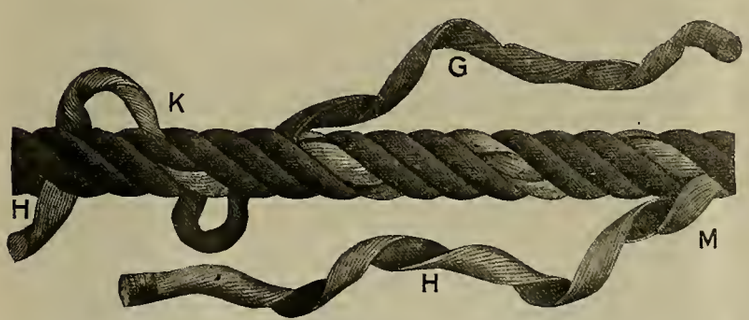


Fig. C.

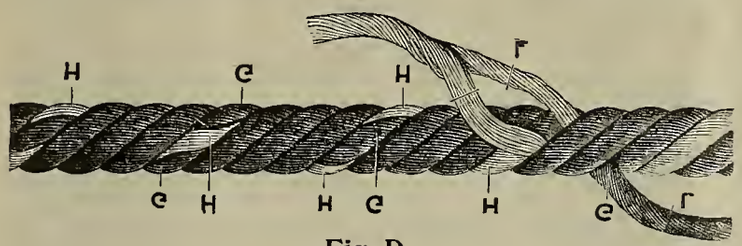


Fig. D.

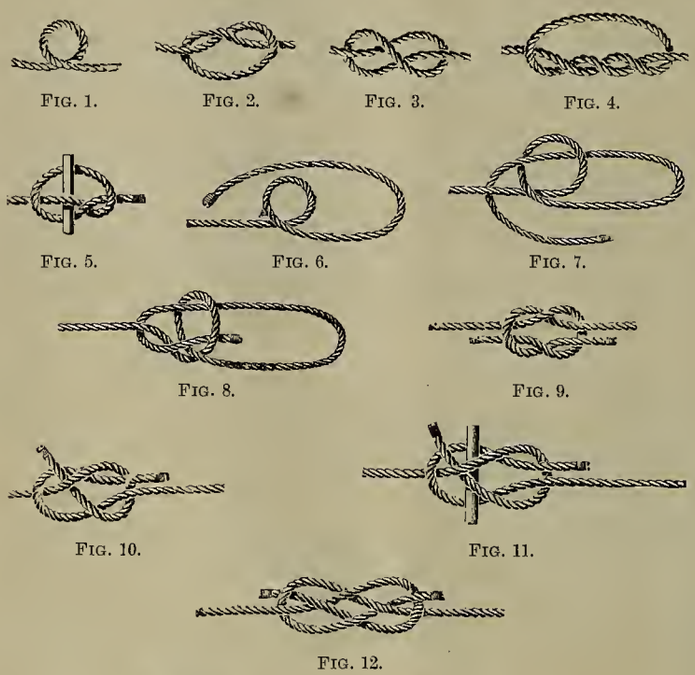


Fig. 21.—Rolling hitch.
Fig. 22.—Timber-hitch and and half-hitch.
Fig. 23.—Blackwall hitch.
Fig. 24.—Round turn and half-hitch.
Fig. 25.—Wall knot commenced.
Fig. 26.—Wall knot completed.
Fig. 27.—Wall knot crown commenced.
Fig. 28.—Wall knot crown completed.

The successive operations for splicing a four-strand manila rope by the method illustrated are as follows:

1. Tie a piece of twiue, I and J, around the rope to be spliced about 6 feet from each end. Then unlay the strands of each end back to the twine.

2. Butt the ropes together and twist each corresponding pair of strands loosely, to keep them from being tangled, as shown in illustration (a).

3. The twine J is now cut, and the strand H uulaid and strand G carefully laid in its place for a distance of 4½ feet from the junction.

4. The strand F is next unlaid about 1½ foot, and strand E laid in its place.

5. The ends of the cores are now cut off so they just meet.

6. Unlay strand A 4½ feet, laying strand B iu its place.

7. Unlay strand C 1½ foot, laying in strand D.

8. Cut all the strands off to a length of about 20 inches, for convenience in manipulation. The rope now assumes the form shown in (b), with the meeting points of the strands 3 feet apart.

Each pair of strands is successively subjected to the followiug operations:

9. From the point of meeting of the strands H and G unlay each one three turus; split both the strand H and the strand G in halves, as far back as they are now unlaid, and the end of each half strand "whipped" with a small piece of twine.

10. The half of the strand G is now laid in three turns, and the half of H is also laid in three turns. The half strands now meet and are tied in a simple knot, K (Fig. e), making the rope at this point its original size.

11. The rope is now opened with a marlin spike, and the half strand of G worked around the half strand of H by passing the end of the half strand G through the rope as shown, drawn taut, and again worked arouud this half strand uutil it reaches the half strand M that was not laid in. This half straud M is now split, and the half strand G drawu through the opening thus made, and then tucked under the two adjacent strands as shown in Fig. d.

12. The other half of the strand H is now wound around the other half of strand G in the same manner. After each pair of strands has been treated in this way the ends are cut off at L, leaving them about 4 inches long. After a few days they will draw into the body of the rope or wear off, so that the locality of the splice can scarcely be detected.

For a three-straud rope the foregoing method is slightly modified. After tying the twines I aud J around the rope about 6 feet from each end, unlay the strands back to the twine, bring the butts together, and twist the correspouding strands loosely together. Now cut twine J and underlay straud H for a distance of 4½ feet from the juuction, and lay in straud G. Unlay strand A 4½ feet, lay in strand B, aud cut all the strands off to a length of about 20 inches, as before explained for convenience in handling. This splice now assumes an appearance similar to Fig. b, with the exception that there are only three meeting points of the strands, and these are 4½ feet apart.

Each pair of strands is now subjected to the series of operations described for four-strand splice in steps 9 to 12 inclusive.

Note: Decrease the length of rope required for making splice as the diameter decreases, as above is for a 1¾-inch rope, and it would not be necessary to have this leugth of splice in a rope of smaller dimensions.

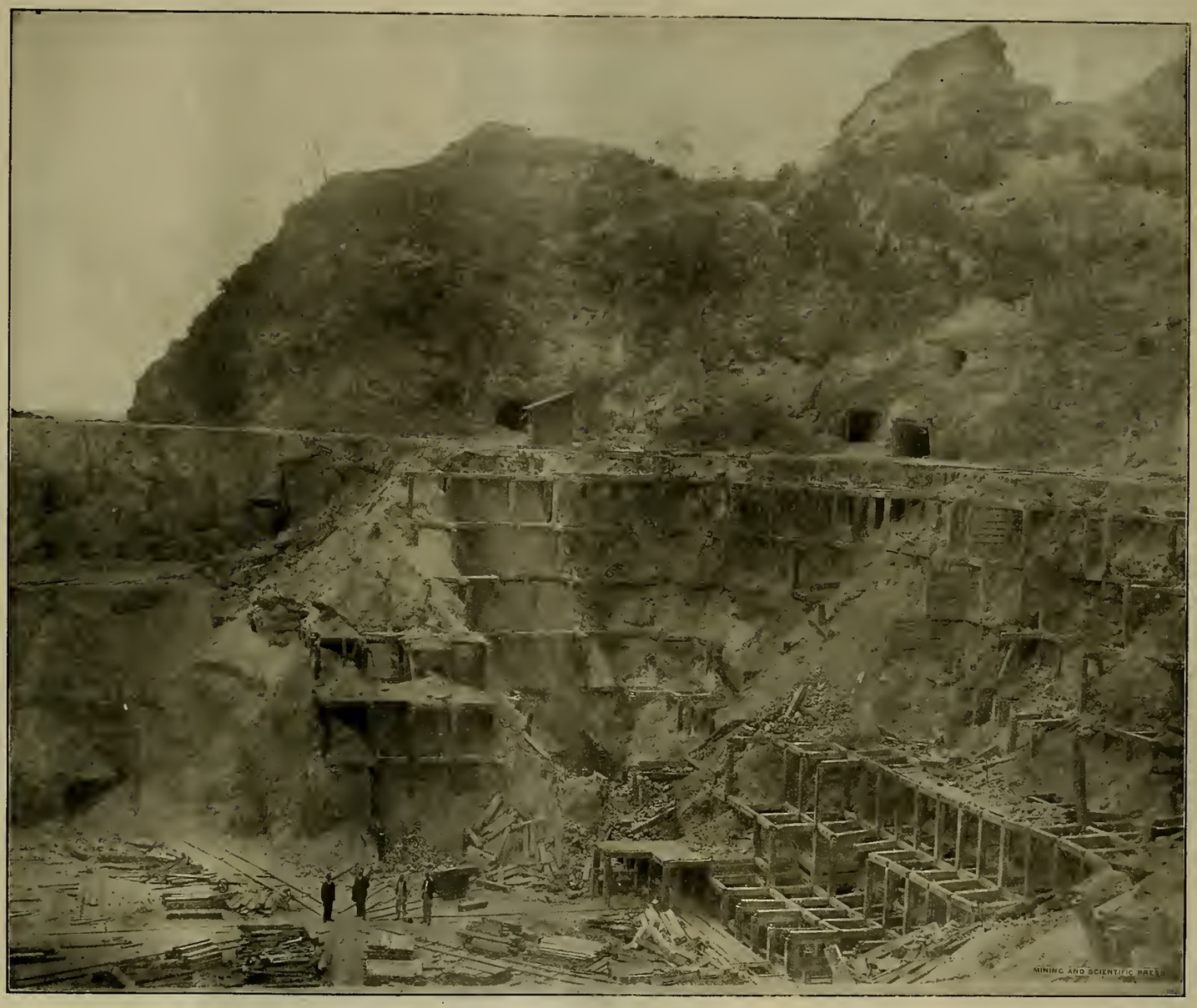
Owing to delay in the mails the report of the Patent Office at Washington failed to arrive in time at this office for the appearance herein of the usual notices of patents, and for the first time in eight years they have been unavoidably omitted.

Development and Operation of a Mine.

Written for the Mining and Scientific Press by W. H. Storms.

In the development of miues it should be the aim to so conduct mining operations that the most economic methods may be employed. In the early history of mining in the Western United States most of the veins mined were of comparatively small width, and were worked without unusual difficulties, in the manner common to that time, but here aud there were found veins so large as to render their working by the ordinary methods theu familiar extremely perilous, and, in some instances, impossible. This was chiefly due to the inability to securely support the walls of the excavations. Timbering with stulls of ordinary length was impossible, aud filling had not yet been resorted to, except incidentally, to get rid of waste. In some instauces timbers were spliced with a view to make stulls of sufficient length to reach from wall to wall. These, in some cases, were supplemented by sprags, which resulted iu constructing in the large stopes a rude, but frail, framework resembling the "square set." The disastrous caves which inevitably followed this method of support, soon made spliced stulls unpopular, aud, in most instances, their use was discontinued.

Until the introduction of the square set system of timbering on the Comstock lode at Virginia City, Nev., it was impossible to safely work ore deposits of great width occurriug in any but massive rocks, which would stand well without support. Mines of this character were successfully opened in limestone, and in some massive eruptive rocks, but as a rule the large veins were not operated extensively. The development of the West, however, resulted in the discovery of a great many large veins. Some of these were too low in grade to admit of profitable exploitation iu the early days, but the Comstock proved a boon to miners everywhere, for the unprecedented richness of some of the bonanzas found in that famous lode made it possible to introduce novel methods, aud



Open Cut Mount Morgan Mine, Australia, Showing Square Sets in Old Underground Stopes.

experiments were constantly being tried. If one failed the mines could well afford it, and other schemes were resorted to. It was a great school of experience, and from the Comstock mines managers went throughout the world and introduced the methods which had proven successful there, and they were found applicable, usually with some modification, to mines elsewhere, until to-day no mine is too large to be successfully worked by some one of the many methods which have been devised since the days of the Comstock and the introduction of the square set



Steam Shovel in Cut Granby Copper Mine, Phœnix, B. C.

method of timbering. As originally placed in the Ophir mine by P. Deidesheimer, the square set was much more elaborate than that system is now. In the Ophir it was a complete and finished system, comprising posts, caps, ties and wall plates, with angle braces, set nearly normal to the wall. The great stope in the Ophir mine—400 feet high—was subsequently filled with waste from the surface. In these modern days the practice varies from that of the early '60s, in that lighter timbers are generally employed, the uicely fitted wall plates are dispeused with, and the angle braces arc rarely seen. In lieu of these extra members in the set, coutemporaneous filling is resorted to, with the result that great ore bodies can be cheaply, expeditiously, completely aud safely extracted. The method by which stoping is generally carried on is usually determined by the character of the walls and of the ore body itself.

In these days large veins are preferred to smaller ones, as the former, if containing sufficient value to be profitably exploited, insure a loug period of successful operation. The selectiou of the system of development must be iufluenced to a great degree by the dip of the vein, and to a still greater extent by the topography of the country aloug the course of the lode. In a flat country cheap surface work is generally precluded, but where the veiu outcrops along a hillside the matter is simplified, and benching or open cut work is not only permissible but advisable.

Benching is a common practice in some regions, but unless the ore deposit is very extensive, and of large superficial area, this method is inadvisable, owing to expense of equipment. Where very large masses occur in a flat country, as is the case in some of the Minnesota iron ranges, this is one of the principal methods by which the ore is mined, but to reduce cost to a minimum where gravity cannot be employed, steam shovels have been introduced to handle a large daily tonnage, and their success is unqualified uuder the existing couditions at those mines. In some of these mines there is an accumulation of surface debris (gravel, soil, trees, etc.) overlying the ore body, and this must first be removed by the shovels, railroad tracks being laid in the pits and kept close to the face. The method of stripping and mining is esseutially the same, and is illustrated in the engraviug on front page. The ore is raised by the shovel aud dumped iuto cars standing on the track.

As the work proceeds downward, the pits may eventually become too deep for successful applicatiou of this method of ore extraction, and then it becomes necessary to siuk a shaft to get beneath the ore, that mining may be continued as inexpeusively as possible. Wheu the shaft has been sunk to a proper depth, levels are laid out, with drifts, crosscuts, etc., and raises are put up at stated intervals, those on the first underground level are extended upward to the open cut. Mining may then proceed almost as cheaply as it did before with the use of steam shovels, and often at a lower cost if too much water is not encouutered. When the development of the mine has reached this stage the method of operating is known as the "mill-hole" system of mining. The illustration, (front page), shows the method of mining by this system. There are several mill-holes shown in the engraving, through which the ore broken in the cut passes downward to ore bins on the level below, from which it is drawn into cars from chutes, and trammed to the shaft, where it is dumped iuto ore pockets beneath the station, and from there is loaded into skips and hoisted to the surface. This is briefly the general method employed in the mill-hole system, as practiced at the iron mines of Minnesota, but the same or a similar system is adapted to veins having a steep dip, such as are fouud iu most of the precious metal and copper mines. These usually occur in a hilly or mouutainous country, and the surrounding conditions are generally very different. It is an interesting fact, however, that the successful application of the steam shovel to irou mining has led to the introduction of mechanical shovels at the Granby copper mines at Phœnix, B. C., where they are said to be doing excellent work. One of the accompanying illustrations is that of a shovel at work in an open cut in the Grauby mine. This company has announced its intention of trying the experiment of operating a mechanical shovel in an underground stope. There is nothing impossible in this, nor is it in any way radically different from the operation of such a shovel in a surfaee eut if the ground stands sufficiently well to admit of cutting large stopes without timbering, for a mechanical shovel requires considerable room for its successful operatiou, aud close timbering would restrict if not prohibit its use underground. It is merely one of the things which show the tendency toward reducing the cost of mining by substituting mechanical devices for manual labor.

In the early history of a mine very often the conditions are not fully understood, and the development is not well planned with a view to the economical future extension and bettermeut of the property. One of the favorite methods has been surface benching in large ore bodies, but benchiug always involves an expeuse for shoveling, which is avoided by the mill-hole system where the rock broken on the sides of the cut passes by gravity to the mill-holes, and thus to the chutes beneath. Several large mines have broken many thousands of tons of ore in terraced benches. Oue of these was the Mount Morgan mine, Queensland, Australia, where the mine was worked almost exclusively by this system in its early history. Another noted instance is the Mount Lyell copper mine in Tasmania, where, in 1900-02, about 1000 tons were mined daily, mostly by the terrace system. At that time there were a series of nine terraces or benches, the total height being about 266 feet. Of these benches, the first three consisted of overburden (debris), and the second and third were also in part overburden, the balance being ore. The total height from the lowest floor of the cut to the summit of the hill upon which the mine is situated, was 320 feet. The excavation was 630x800 feet, which dimensions convey some idea of the magnitude of mining operations at that property. This plan of mining has succeeded that of underground stoping, and in the progress of which the old levels are completely obliterated. The blasts at Mount Lyell are fired at noon and at 5 P. M., at which time from 200 to 300 shots are discharged.

At this mine it was estimated that not less than 3,000,000 tons of overburden were required to be removed. The expense of breaking and removing this vast amount of barreu rock in order to reach the ore underueath, is estimated at approximately $1,500.000, or 50 cents per ton, which is about the cost estimated from the company's reports. The ore bodies extend below the level of the lower bench, and underground exploration is carried on contemporaneously with the open cut system, which suggests that possibly the method at Mount Lyell might be improved under some circumstances, with somewhat of a reduction in cost.

(TO BE CONTINUED.)

High Duty Pumping Machinery.

Herewith is illustrated the Price Patent California Pump, of which the G. W. Price Pump Co., 523 Market St., Sau Francisco, Cal., are inventors, patentees and sole manufaeturers. It will be noted that the base plate and bearings are cast in one piece, with a view to prevent possibility of the bearings getting out of aligument. The bearings are bushed and babbited, and fitted with automatic ring oiliug devices. By adjusting the tension, the pump discharge or the suction elbow cau be easily made to point in any direction at right angles to the shaft. All the parts are iuterchangeable and guaranteed by the manufacturers to fit. They build several styles of pumps, and state that efficiencies on their speeial pumps have run as high as 89%.



The Price Patent California Pump.

Ore Deposits Near Igneous Contacts.*

Written by W. L. Austin.

In Mr. Weed's paper frequent reference is made to the Cananea copper deposits, which are said to have been so vigorously exploited that they produced 14,000,000 pounds of copper in 1901.

The ore bodies which yielded this large quantity of metal are described as a product of contact metamorphism, and in Mr. Weed's genetic classification of such deposits, they receive a place under the subheading, "Deposits impregnating and replacing beds of contact zone." They are considered by Mr. Weed to represent a special type under this head, and are further classified as: "1. Chalcopyrite deposits: (a) Pyrrhotite ores; (b) Magnetite ores, Cananea type."

In condensing much information into a comparatively small space, the presentation of a subject may be so abbreviated as to detract from its clearness. The situation of La Cananea, considering its importance from an economic as well as scientific standpoint, may be worthy of more detailed description. As Mr. Weed remarks, "structural differences are so important and have so marked a bearing, not alone on the theory of their genesis, but also on the working of the deposits and a determination of their value as mines, that they merit a full discussion."

It is my present purpose: (1) to show that it is doubtful whether the copper of La Cananea is mined, except to a limited extent, from contact-metamorphic deposits; (2) to emphasize the importance of the mineral-bearing porphyry in connection with the genesis of the Cananea deposits; and (3) to question the correctness of Mr. Weed's opinion that, in this locality "the deposits should extend downward in depth to the granular rock."

Contact-metamorphic ore deposits are very common in the West and Southwest. Among the better known of those in which copper is the principal economic mineral are those of the Seven Devils district, Idaho; Saline Valley, California; the Planet mine, on Bill Williams Fork, Marble mountain, in the Santa Catalina mountains, and Clifton, Arizona; La Cananea, and the Santo Nino deposits on the Yaqui river, Sonora; Terassas Station, Chihuahua; and La Jibosa mine, Valerdena copper mine, and Sacrificio mountain, Durango. There are many others which I have not personally visited, but concerning which I have received private communications, or have found described in current technical literature.

These may all be classed together as ore deposits occurring at or near the contact of igneous rocks with limestone beds, and owing their existence to the presence of the eruptives.

This general type of deposit is recognizable at first sight; but it is not always with a simple contact that the observer has to deal. Associated with the actual contact ore bodies are mineralized eruptives, fissure veins and replacements in the limestone. Mr. Weed, recognizing the variations displayed by deposits of this description, has proposed a tentative classification, which might be further discussed to advantage.

By reason of the very nature of the genesis of these deposits, there must be much diversity among them. In fact, hardly any two of them are exactly alike. They all have a certain mutual resemblance, and differ radically from any other class; but, unless a broad significance is given to the term contact metamorphism, it will scarcely cover them all, and, in any event, there will be almost as many "types" as deposits.

The selection of the Cananea deposits as typical of contact metamorphism, and the ascription to this type the large production of copper quoted above, seems to me to be ill advised; and the statement that in this instance the primary sulphide ore should continue of unchanged tenor in depth down to a hypothetical contact with granular rock certainly calls for further elucidation.

There are numerous contacts between the limestone and the igneous rocks of the Cananea district; in fact, all the limestone patches are almost surrounded by porphyritic rocks of one kind or another; but neither at any one of the important mines, nor at any other points so far as I know, has a contact between the limestone and a granular igneous rock been observed.

The ore deposits of La Sierra de la Cananea, as hitherto developed, are scattered through the mountains along a northwest-southeast belt for about 8 miles. Puertocito is at the extreme northern end of the belt; the Elisa mine is about the middle; Capote basin (with the Capote, Oversight, Veta Grande and Chivatera mines) are south of the Elisa; and at the southern end is the Cobra Grande mine. The Elenita deposits are really a part of Puertocito. At various points between these main ore bodies are smaller ones.

At Puertocito and Elenita there are masses of garnetiferous minerals with associated copper carbonates and silicates, pyrite, chalcopyrite and bornite; at the Elisa there are irregular bodies of chalcopyrite along a fault fissure in the metamorphosed limestone; at the Oversight and Capote mines there are much larger masses of feldspathic porphyry carrying chalcocite, which have yielded much the greater part of the copper produced in the district. The deposits of Elenita and Puertocito had no part in the large copper production mentioned in Mr. Weed's paper; not until late in April, 1903, was any ore shipped from this part of the belt.

At the present time (April, 1903) the Oversight mine occupies the place of honor among the developed properties, having temporarily exceeded the production of the Capote, which was the first large bonanza found in the district. The first-class ore of the Oversight is a soft, white feldspathic porphyry, heavily mineralized with chalcocite. At the southern end of the mine the surface indications of underlying ore bodies are so slight that one, not very familiar with the characteristics of deposits of this class, would hardly have ventured to predict the discoveries which have been made a few feet below. The porphyry at the top shows no mineralization, no gossan; no "copper stains." The solution which effected the decomposition of the original pyrite carried the iron with them and deposited it elsewhere—a process which can be seen in operation to-day in other parts of the district. In such cases silica and silicates are usually substituted for the minerals removed.

Underneath, there is an ore body of irregular shape, already developed for several hundred feet in depth, and in places several hundred feet wide. It is in reality a continuation of the Capote ore zone—a second great concentration of chalcocite in the porphyry. Its limits as here stated are merely those of the ore rich enough to be shipped; in fact, the chalcocite-bearing rock merges into cupiferous pyrite bodies of very much larger dimensions, but of lower grade. This much is known; but what is the extent of these ore bodies, or how many more of them there may be, has not yet been ascertained. Only the first class and the higher grades of the second-class ore are at present taken out; lower grade material is left standing.

It is not my present intention to discuss the extent and value of the Cananea ore bodies. That matter has been briefly touched upon only to bring out the fact that, by far, the greater part of the copper produced by the mines of La Cananea has come from masses of mineralized porphyry and not from "chalcopyrite ore bodies carrying accessory galena * * * practically confined to the rocks resulting from the alteration of impure limestones." A statement of this kind, coming from such an authority as Mr. Weed, might possibly cause others to feel warranted in making large expenditures upon deposits of the class indicated, basing their hopes on the supposition that the bonanzas of La Cananea were found in the contact-metamorphic deposits, with a probability of their extending "downward in depth to the granular rock."

Porphyry is by far the predominating rock along the Cananea ore belt. I use the term "porphyry" in its general sense, for there are several varieties. Possibly all varieties have had their origin in the same eruptive magma, the sub-species being due to magmatic differentiation, or to the incorporation of portions of other rocks with which the eruptives came in contact. In places is found typical quartz-porphyry; but where the ore bodies occur the quartz is not so much in evidence. There are in the district other varieties of igneous rocks, such as granite, diorite, diabase and andesite; but these are mostly at some distance from the ore belt, and, as far as I know, are not mineralized to any noticeable degree. The porphyry, however, wherever it has been artificially exposed within the entire length of 8 miles here in question, is more or less pyritic, and in places the sulphides are massed so as to form ore bodies. The mineral belt has been extensively prospected, and tunnels many hundreds of feet in length cross its trend in a number of places. In these tunnels, many of which are considerable distances away from the producing mines, this mineralized porphyry is exposed, and at such points its character can be studied to advantage. It extends from the mines on the extreme north to those on the extreme south, and is essentially the mineral-bearer of the district. The limestone occurs only in spots. Where the heavily mineralized porphyry has come into contact with this limestone, there are the usual contact-metamorphic phenomena; but these ore bodies are of subordinate commercial importance—in fact, but for the mineralized porphyry the history of La Cananea would have been a totally different one.

The quartzites do not contain mineral deposits, except where cupriferous solutions from the decomposing porphyry have found cracks and fissures in which to deposit their burdens, and these are practically a negligible quantity.

Where the limestone has been metamorphosed by contact with the porphyries, it has become one of the most, if not the most, resistant of the rocks of the district. Proof of this statement is furnished by the garnetiferous bluffs which constitute such prominent landmarks at the Puertocito end of the belt. Not in this district only, but everywhere, such resistance to weathering is characteristic of rocks thus metamorphosed; for the process itself is largely one of silicification.

The ore bodies which have made La Cananea famous are soft porphyritic masses, partly of mineralized porphyry, partly of dark-colored plastic clay, less heavily charged with copper ore. The one merges insensibly into the other, and much of the material is of a nondescript character, depending on the degree of decomposition which the rock has undergone. It bears no resemblance to metamorphosed limestone, although fragments of that rock are found in it, as are also masses of quartzite.

It is common, where porphyritic flows have broken through limestone beds, to find included masses of the latter caught in and surrounded by the porphyry, and the Cananea deposits are no exception.

The ore is so soft that no amount of timbering can hold the workings open; the stopes have to be filled as soon as the ore is removed. The ground swells to such an extent that on the third level of the deep Capote workings the shaft can only be kept open by maintaining a passage way around it. In the bottom of the mine the tops, sides and bottoms of the drifts are squeezed together, like those of a tunnel run into a bank of plastic clay. One peculiarity of the low-grade ore bodies is that, although the rock may have lost its pristine character and may be as soft as stiff putty, the pyrite distributed through it is unoxidized and bright, even on its surface.

The ore from the Capote and Oversight mines comes to the concentrator and smelter mostly as whitish-gray clayey "fines." In the concentrator the Oversight ore in particular gives trouble, because it "thickens" the water, thereby preventing the mineral from separating out. On the concentrating tables, garnets and similar minerals, characteristic of contact-metamorphism, are noticeably inconspicuous. At Puertocito the mineralized porphyry taken from one of the shafts "slacks" in the air to a powder.

That white feldspathic porphyry similar to, if not identical with, that of La Sierra de la Cananea, may be itself a highly cupriferous mineral bearer is evidenced by the deposits at Ajo, in southern Arizona, not far northwest of La Cananea. Here masses of mineralized porphyry form hills within a basin of other eruptive matter. The rock is pyritic throughout, and in places the ore is identical with that of the Capote basin. I noticed no sedimentary rocks at Ajo. The ore bodies are porphyry, carrying pyrite, with chalcocite, and other cupriferous minerals.

At Clifton, also, notably on Metcalf hill, the mineralized porphyry, constituting the ore bodies of the Arizona Copper Co., is of similar nature, if not the same, as that of Ajo and La Cananea. And the same may be said of the rock in which lies the large pyritic body of Iron mountain, in California.

For the reasons above given, and without wishing to disparage the statements of such an eminent and accomplished geologist as Mr. Weed, I question the propriety of describing the large copper producing ore bodies of La Cananea as a type of contact metamorphic deposits. The porphyries have certainly taken a more important part in the genesis of these cupriferous deposits than that which he has assigned to them. At Puertocito, as well as in the Capote basin, it would seem to be more in accord with the facts to assume that the pyritic minerals brought up by the porphyry became, through magmatic differentiation, more concentrated in certain localities than in others, and that these heavily mineralized portions were very susceptible to attack from atmospheric waters. In the Capote basin, where the mineralization was the greatest, the porphyry yielded readily to decay, the result being the formation of ferric masses (gossan), which were left on or near the surface, and the concentration of the copper below in the form of chalcocite. The gossan found on the top of the ground is a fairly good flux, and is used as such; but it becomes more and more siliceous with depth, until it rests on the ore. It presents an irregular bottom limit, penetrating the ore in places. Immediately under the gossan comes the chalcocite bearing porphyry. At the junction of the two native silver is sometimes found. The workings in this portion of the Capote mine were very hot, and the more it was attempted to ventilate them, the hotter they became. Quartz sand also (used for building purposes) was found in this zone.

There are contact metamorphic deposits at La Cananea, but they were of comparatively subordinate importance in connection with the output of copper in 1901, and they are still subordinate. The main ore deposits are concentrations in the porphyry of chalcocite derived from cupriferous pyrite, which came up as an accessory component of the original rock.

A correct diagnosis of the genesis of an ore deposit is of more than scientific interest; it is of great economic importance. A better appreciation of this truism by those in responsible charge of mining operations would result in the saving of vast sums of money which are uselessly expended at the present time.

In regard to the occurrence of arsenopyrite in or close to contact metamorphic deposits, the case of Sacrificio mountain, in Durango, might be cited in addition to those mentioned by Mr. Weed. These deposits, which are typically contact-metamorphic in the sense given the term by Mr. Weed—"zones of altered sediments about igneous intrusions"—are associated with veins of arsenopyrite.

*Abstract W. H. Weed's Paper Amer. Inst. Min. Engrs.

The Assaying of Silver-Gold Bullion.

Written for the MINING AND SCIENTIFIC PRESS by H. B. KAEDING.

While much has been written on the subject of bullion assaying, and while the methods are in general well known, different schemes are often worked out along well known lines to fit varying conditions; recently the writer was placed in a position where the assaying of the bullion output of four stamp mills and two cyanide plants came under his direction, and as it was essential that absolute accuracy be maintained, after considerable experimenting the following method was found to give good results, and was adopted in the various assay offices:

The mill bullion ran about .550 gold, 370 silver and .080 base, the base metal consisting largely of lead; the cyanide bullion ran from .500 gold to as low as .250 gold, with about .100 base, and the balance in silver, the base metal in this case being partially copper.

It was found essential that the bullion be well stirred immediately before pouring into the moulds, in order to insure a homogeneous mixture of the metals, and consequent even sampling.

SAMPLING.—After trying various methods, the best satisfaction was obtained by drilling the bars; after a bar had been scoured clean, washed and well dried, it was placed under the drill press in a gold pan and six holes on the top and six on the bottom of the bar started well into the metal; these surface borings were then rejected, and the bar brushed and placed on a sheet of glazed paper, and the twelve drill holes sunk to a depth of about .75 of an inch. In selecting a drill for this work, one of $\frac{1}{8}$-inch diameter was taken, and care was exercised to get a drill that would deliver the borings in small, fine chips, rather than in one shaving; by using a very light pressure it was possible to obtain a finely divided product that permitted of thorough mixing on the paper.

WEIGHING.—After the chips were well mixed, an exact 500 milligrams was weighed and placed in the lead foil with the requisite amount of silver. In working with a bullion that runs fairly constant as to composition, the assayer will soon learn to guess or judge its silver content, rendering a preliminary assay unnecessary, and enough silver should be added to bring the total silver in the charge up to two and one-quarter the weight of the gold.

In cutting the lead foil for wrapping the chips, the foil was first smoothed with a pencil, and three sheets were laid together and cut with a sharp shears, giving three pieces of foil exactly the same size and weight, thus insuring "blicking" in the cupels simultaneously. These pieces of foil were twisted into three cornucopias, and the bullion chips and silver dropped into two of them. They were then squeezed into bullets and were ready for the muffle.

Two charges were made from each sample and the third piece of foil used for the proof assay; this proof was composed of pure or "proof" gold and silver, and was made up by taking a weight of proof gold equal to the supposed weight of gold in the bullion charges, and adding two and one-quarter its weight of silver, thus giving a proof in which the exact gold and silver content was known.

When running samples from more than one bar it was found advisable to cut the lead foil so that each set of three pieces was progressively smaller than the first set cut; by placing the largest three in the first row of cupels, decreasing in the others, it was possible to have the first row of buttons "blick" first, and the others in rotation, giving convenience in handling in the muffle.

CUPELLING.—Twice as many cupels were placed in the muffle as were necessary, thus giving a hot cover for each button. When nicely hot, a piece of stick lead was dropped in each cupel that was to receive a charge, and as soon as this was driving nicely the charges were dropped in. In cutting this stick lead the same method of cutting three at a time was followed as in the case of the lead foil. The cupels were placed three abreast in the muffle, and the proof in each assay placed in the center cupel, with the duplicate bullions on each side of it. Cupelling carefully, and with the lead weighing alike in the three, they were found to "blick" at practically the same moment, and were covered at once with the hot extra cupels and moved toward the front of the muffle. By proceeding slowly in withdrawing the cupels from the muffle it was easy to obtain compact buttons and prevent sprouting or spirting.

DETERMINATION OF THE BASE CONTENT.—The buttons were brushed well and weighed; if the two duplicates were found to check fairly well in weight the results were averaged. The proof also was weighed and a note made of the loss of silver in cupellation; this loss was figured as occurring in the same ratio in the samples, and the factor so determined was applied correctively to the apparent weight of the silver in the assay. The method of figuring this will be readily seen in the example given below.

PARTING.—The buttons, of so nearly the same weight, have about the same diameter; hence, if rolled to the same length, will be of equal thickness, which was found to be an important point in maintaining the relations between samples and proof. The buttons were rolled to about 3 inches in length, annealing frequently in a spirit lamp during the rolling, and, finally, after the rolling was completed. If not kept soft during the rolling there was a tendency in small particles to flake off the surface, naturally causing loss.

The strips were then rolled around a glass rod and the coils parted in small flasks in the usual manner, using two strengths of acid. A small piece of charcoal dropped into each flask was found to prevent "bumping" during boiling. Parting being complete, the cornets were placed in annealing cups and washed thoroughly with a fine spray of distilled water, dried, annealed and weighed.

WEIGHING.—The weight of the proof was found to have increased, giving a surcharge that had to be taken into consideration when figuring up the results of the assay in the same manner as the loss in silver was figured. The final returns on the gold should check in the duplicates to the fourth decimal place, in which event they were averaged.

RESULTS.—When these methods were followed with care, and the bars weighed carefully, it was found possible to place in the hands of the management a value of the bullion that would be found to check within $1.50, in a bar weighing 1000 ounces, of the amount paid for it by the mint.

REMARKS.—We found that it was essential to success to see that throughout the whole operation the two charges and their proof received the same treatment; they had to be placed in the muffle and withdrawn simultaneously; they had to be rolled to the same thickness, parted with acids of the same strengths over one fire, all together, or else the proof ceased to be such. The object of the proof being to show the results of the treatment the samples received, it is obvious that the three charges had to be passed through the operation as a single unit.

We made our own proof gold by dissolving assay residues in nitro-hydrochloric acid and precipitating with ferrous sulphate; our proof silver we bought. In handling either it was of course necessary to use forceps to avoid contaminating with the fingers.

Method of figuring results on an assay of bullion known to contain approximately 500 points gold, 400 points silver and 100 points base in 1000:

No. 1.	Gram.	No. 2.	Gram.
Bullion taken	.5000	Bullion taken	.5000
Silver added	.3625	Silver added	.3625
	.8625		.8625
After cupellation	.8125	After cupellation	.8100
Apparent base	.0500	Apparent base	.0525
Average apparent base	.05125		
Gold residue	.25386	Gold residue	.25362
Average apparent gold	.25365		

Proof.	Gram.
Gold taken	.2500
Silver added	.5625
	.8125
After cupellation	.8025
	.8025
Gold content	.2500
Silver content, after cupellation	.5525
Gold residue	.2520

$\frac{250}{252} \times .25365$ gram $= .25045$ gram $=$ corrected gold weight.

$.500$ gram $- (.25045$ gram $+ .05125$ gram$) \times \frac{5625}{5525}$

$= .19830$ gram $\times \frac{5625}{5525} = .20189$ gram $=$ corrected gold weight.

$.500$ gram $- (.25045$ gram $+ 20189$ gram$) = .04766$ gram $=$ corrected base weight.

Final result in 1000ths:

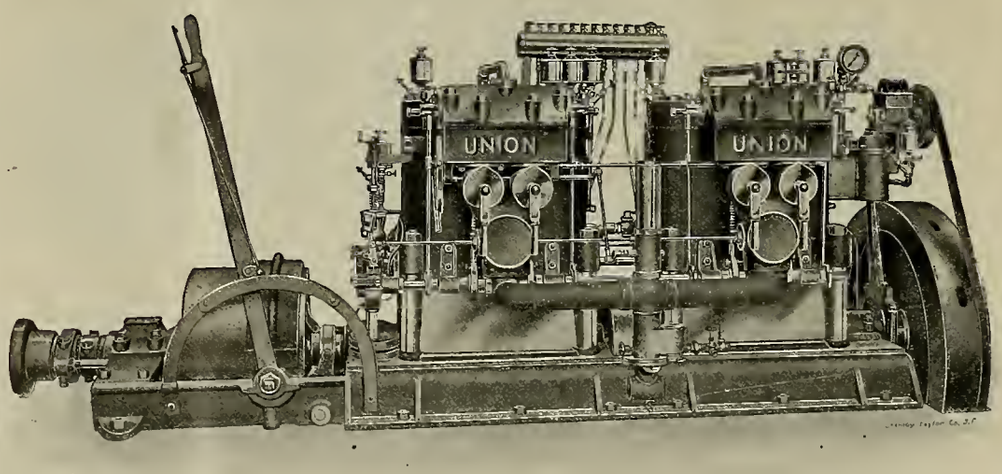
Gold	500.90
Silver	403.78
Base	95.32
Total	1000.00

Marine Gas Engine Launch.

The accompanying illustrations show the launch Flyer plying on the bay of San Francisco, Califor-



Gas Engine Launch "Flyer."



Marine Gas Engine in Launch "Flyer."

nia. It is 51 feet long, 11 feet beam, and is fitted with an 85 H. P. four-cylinder Union engine, having all the latest improvements. This launch has a speed of about 13 miles per hour, and is a good seagoing craft. The weight of the engine is 6800 pounds, and at 500 revolutions per minute, which is an easy working speed for it, it will develop about 100 actual H. P. on the propeller shaft. The crank pins are lubricated by centrifugal oilers designed to enable the engine to run any distance at required speed without liability of heating. All the bearings are lubricated from a multiple sight-feed lubricator, which stands above the engine. The engine is also fitted with a sensitive governor, and a speed controller which operates on the governor, and enables the engineer to absolutely control the speed of the engine. The accompanying engraving gives a good idea of the general appearance of the 100 H. P. marine engine for the launch as depicted herewith.

The Union Gas Engine Co., of San Francisco, Cal., during the past season, has built a number of these four-cylinder engines, several of which are installed in launches on San Francisco bay, iueluding the 60-foot launch Idlewild, owned by C. F. Kohl; the Chipmunk, owned by Gordou Blanding; and the Vladimir, owned by F. A. Hyde.

Pneumatic Tools.

Compressed air devices are deservedly popular among machine workers because of their adaptability. Herewith are illustrated a few of the "Imperial" pneumatic tools made and furnished by the Rand Drill Co., 128 Broadway, New York:



FIG. 1.

Fig. 1 is a combination breast and screw feed drill; has compound gear, slow speed for heavy work and fast speed for light work; will drill up to $\frac{5}{16}$ inch in diameter in any kind of metal; air compressed per minute, 12 cubic feet; weight 8 pounds.

Fig. 2 shows a motor running at a rate of 3000



FIG. 2.

revolutions per minute, without any vibration.

Fig. 3 is an "Imperial" air motor hoist, made in all capacities up to 10,000 pounds, with chain or wire rope.

Fig. 4 shows an air tool that speaks for itself to any machinist. This machine is an effective tool and will consume 15 cubic feet free air per minute at eighty pounds pressure.

The Rand Co. make a specialty of installing complete air plants.

Assay of Tin in Tailings and Slimes.*

Written by GEORGE L. MACKENZIE.

One not infrequently hears it said by tin miners that there is no satisfactory laboratory assay for tin. There certainly is none which for rapidity, cheapness and comparative accuracy can compete with the vanning shovel, but it breaks down when tested with very fine slimes, and even with coarser samples one has only to examine through a lens the residue which the vanner weighs as tin oxide to see that the accuracy of this method is not such as would be accepted in a laboratory. If the vanner is directed to wash all gangue off his shovel, leaving only tin oxide, a low result may be expected. No one who has watched an experienced vanner at work can fail to be struck with the extreme neatness and dexterity of his manipulation; but, after all, vanning by hand and dressing by automatic machines are based on similar principles, and the causes which produce loss in the dressing plant tend also to cause loss in vanning. The manager who wishes to know exactly what his losses in dressing are must therefore resort to another method of assay, especially if he wishes very poor or very slimy samples tested.

This question was recently put before the writer by a tin mining company, and it has been suggested that details of the scheme of assay he employed might be useful to others, as many methods have been proposed and the testing of even one of them requires much time and patience.

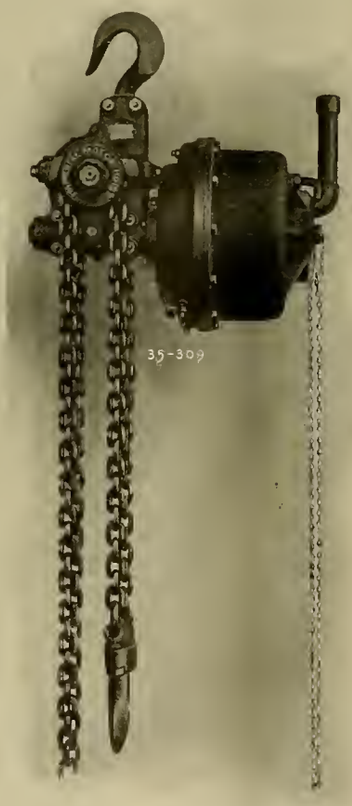


FIG. 3.



FIG. 4.

METHOD.—Clean the ore with aqua regia. Reduce the stannic oxide to tin by ignition in an atmosphere of coal gas (used as hydrogen). Dissolve out the tin with hydrochloric acid and free chlorine. Precipitate as stannic sulphide by passing hydrogen sulphide. Convert the stannic sulphide to oxide by ignition in a small weighed Berlin crucible and weigh as stannic oxide.

Take from 1 to 5 grams ore, according to richness, so as to get a weighable quantity of stannic oxide, 1 gram of a 2% ore is sufficient; if the ore is very poor, two lots of 5 grams may be combined after reduction separately in the combustion tube.

Crushing must be very fine, the sample well mixed and not shaken about afterwards or the tin oxide will get concentrated in the lower part of the sample. In quartering samples the finest dust left on the sampling paper will probably be the richest.

1. CLEANING THE ORE.—Cover assay with aqua regia in beaker or evaporating dish; heat nearly to boiling point for about twenty minutes, longer if wolfram is present. Dilute with hot water. Filter hot and wash well with hot water, especially if any lead is present in the ore. If there is tungsten or silver in the ore, digest the residue for about ten minutes with warm dilute ammonia; filter again and wash well the portion on the filter with the same reagent. Dry residue and brush most of residue off the paper. Burn the paper and add the ash to residue.

NOTE.—The solid residue from aqua regia consists mainly of silica, stannic oxide, small amounts of iron oxide, various insoluble silicates, and possibly sulphur and insoluble chlorides and oxides produced by the acids used. It is essential to remove here those which will not be removed in subsequent stages of the assay.

If tungsten is present in the sample, probably as wolfram or scheelite, the residue will contain tungstic acid, a yellow solid readily soluble in ammonia. This, if not removed, will count as stannic oxide, giving a high result. Wolfram, even when very finely powdered, is only slowly attacked by aqua regia, and time must be allowed for this. After treatment with ammonia niobic oxide, a white solid derived from columbite may still remain, but it is unlikely to be present in sufficient quantity to seriously affect results. If its presence is suspected, the substance weighed as stannic oxide may be tested for it and also for tantalic oxide.

2. REDUCTION OF THE STANNIC OXIDE TO TIN.—Heat the assay to dull redness for about forty minutes in an atmosphere of coal gas—$SnO_2 + 2H_2 = Sn + 2H_2O$.

NOTE.—A combustion tube works perfectly, although it is inconvenient to manipulate. Poor ores in 5-gram lots may be placed direct in the tube. Rich ores in 1-gram lots can be placed in china boats to avoid loss in getting them out of the tube. To place a 5-gram charge in the tube, it is convenient to have a tin spoon of semi-circular section, with a long wire handle.

Commence passing gas first. When all air has been expelled from the tube light the jet at its outer end, then warm the tube from end to end, place the Bunsen under the assay and cover the tube with a bent sheet of asbestos to retain the heat. Complete reduction of the stannic oxide in a large charge may be assisted by slightly turning the tube round once or twice to better expose the lower part of assay to the gas. Carbon is reduced from the gas and darkens the assay, but does not interfere. If any tungsten is present it will be partly reduced if the temperature is high and will give a high result. Any iron present is reduced, but is removed in filtering after passing H_2S at a later stage. After reduction is complete extinguish the Bunsen but leave the gas passing until the assay is cold enough not to reoxidize on admission of air. Most of the charge can then be poured out of the tube and the remainder cleaned out by a rod with a cork on its end if the sample is poor; or washed out with hydrochloric acid, if rich.

3. SOLUTION OF THE REDUCED TIN.—Transfer assay to a beaker. Cover with strong hydrochloric acid and add about 2 c.c. of a 10% solution of perman-

*Abstract Trans. Inst. Min. & Met.

ganate. Heat nearly to boiling for about twenty minutes, stirring occasioually. Add a few drops of permanganate towards the end. Dilute, filter into a beaker, washing residue well.

NOTE.—In this step all metals preseut are converted to chlorides, e.g.: $Sn + 2HCl = SnCl_2 + H_2$. Then $SnCl_2 + Cl_2 = SnCl_4$. The chlorine, liberated by the permanganate, assists in the solution of the tin and further converts it to the stannic condition.

4. PRECIPITATION AS STANNIC SULPHIDE.—Partly neutralize the filtrate by adding sodium bicarbouate cautiously until effervescence becomes less brisk, but the filtrate must remain acid. Pass hydrogen sulphide. The precipitate is stannic sulphide, and should be yellow or brownish yellow. Allow assay to stand as long as convenient—over night if possible—to allow precipitate to settle and clot. Filter on small ashless paper. Wash well with solution of ammonium acetate containing a little free acetic acid. The sodium salts now preseut should be completely washed ont.

NOTE.—As strong hydrochloric acid attacks stannic sulphide, it is better to reduce the acidity as above. The solntion must remaiu acid to kcep np metals other than tin. The precipitated sulphide is very finely divided and apt to pass through the filter paper; this is partly counteracted by allowing the precipitate to settle and clot, and also by the sodium chloride produced by the addition of the carbonate.

5. CONVERSION OF THE STANNIC SULPHIDE TO OXIDE.—Dry thoroughly the paper containing the precipitate, which will darkeu considerably. If small in quantity all had better be left on the paper. Holding the paper between a small pair of forceps, burn it as completely as possible and drop the ash into a small weighed Berlin crncible. Add one or two drop of nitric acid and heat gently until dry. Iguite over blowpipe, first gently, then strougly. Cool and weigh as stannic oxide.

NOTE.—The sulphide can be burned to oxide without the addition of nitric acid, but loss may occur, as the sulphide is slightly volatile.

TEST ASSAYS.—For these prepare artificial ores of pure silica and stannic oxide. The former, if ignited, is very hydroscopic, so must be kept in a stoppered bottle. The latter must be tested for purity, and had better be prepared from the purest tinfoil obtainable, by boiling in nitric acid, filtering, aud washing with hot water until filtrate gives no precipitate (PbS) with hydrogeu sulphide.

A 1% ore and aud a 0.5% ore should be sufficient, and after very little practice an assayer should be able to get the full tin content ont of these samples, but must be on his guard against some of the very finely divided silica passing through the filter.

The hydrogen reduction can be checked by saviug the residue and re-igniting in the tube. This should not be omitted where close accuracy is required, aud, in ordinary practice, time can be saved by adding the solution obtaiued iu stage 3 from the residue to the similar solution already obtained iu stage 3 of the assay aud theu passing hydrogen sulphide through the combined solutions.

The tendeucy in most steps of the assay is to get low results, and the manipulation requires time and patience; but the assayer who works on artificial ores of knowu tin contents unti. he can trust himself will be satisfied with the method for the purpose of mine assaying.

Low results arise from incomplete reduction, incomplete solution of the reduced tin, and volatilization of the sulphide by too hurried ignition. Of these the first is most probable, and an assayer would be wise to at first save the residues from stage 3, re-reduce them in the tube and run them as separate assays, hus determiniug for himself the probable error due o this cause in the ores of his mine. The greater he proportiou of silica present the less complete is the reduction apt to be. In reporting results it should be borne in miud that "black tiu" is impnre stannic oxide, the actual tin coutent varying on different mines.

The last series of assays run by the writer gave the following results, 4-gram ore being taken for each experiment:

	Stannic Oxide Got.		Stannic Oxide recovered from residues by a second reduction in tube.		Total
No.	Grams.	Percentage.	Grams.	Percentage.	Percentage.
1. . .	0.230	5.75	0.0020	0.050	5.800
2.	0.230	5.75	0.0031	0.077	5.827
3.	0.0238	5.95	0.0031	0.077	6.027
4.	0.230	5.75	0.0033	0.082	5.832

The residues from Nos. 1 and 2 were reduced a third time in the tube, but only a tracе of tin was got.

To illnstrate the interference due to wolfram four charges of 4 grams each were taken from the above sample; to each 0.01 gram taken from a crystal of wolfram was added and the residue from aqna regia was not treated with ammonia, the resnlts being the following:

	Stannic and Tungstic Oxide Got.		Recovered From Residues by a Second Reduction in Tube.	
No.	Grams.	Percentage.	Grams.	Percentage.
1.	0.0292	0.730	0.0030	0.075
2.	0.0254	0.635	0.0032	0.080
3.	0.0262	0.055	Not re-reduced	....
4.	0.0270	0.675	Not re-reduced	....

Treatment of Telluride Ores at Kalgoorlie, Western Australia.*

NUMBER V.—CONCLUDED.

Written by W. E. SIMPSON.

SUMMARY.—Of the two processes at work in Kalgoorlie, it is difficult to say which is the better. Both are snccessful, and each has a large number of supporters. Wet crushiug is generally admitted to be cheaper aud better than dry crushing, though in Kalgoorlie it is supposed to be severely handicapped by the high cost of water. It may be paradoxical, but an investigation of the facts tends to show that the "dry" process is a greater water consumer than the "wet."

The amount of water used in any plant shonld be the sum of the moisture sent out with the residues, and the quantity lost by evaporation, leakage, of course, being inadmissible. The residues from the wet process contain only 8% to 10% of moisture, as against 18% to 24% in the residues from the dry; this is due to the alteration in the chemical and physical character of the ore treated; and the loss by evaporatiou can not possibly be so great where the battery water, solutions, etc., are only at the temperature of the surrouuding atmosphere, as where hot ore is a constituent of the working pulp. Besides, if, as is often the case, the ore is wet from actual mine water, the battery gets the benefit; whereas, for the dry process the ore must be as far as possible free from moisture; the smallest percentage seriously restricts the mill's capacity; and if the amount exceeds 3%, operatious are practically brought to a standstill. On the Boulder Main Reef nothing but perfectly dry ore is seut to the extraction works; any wet stuff is dumped on the surface aud allowed to dry in the sun before treatment.

In the "all-roasting" process, the disturbing element, tellurium, is eliminated in the early stage under advantageous conditions, and the loss in gold, if any, is so small as to remain undetected by assay. The mechanical loss, too, can not be great, for the reason that the fine dust sent into the atmosphere is composed of particles of low specific gravity, and, consequently, of low assay value. On the Boulder Main Reef it has been found that the flue dust obtained in treating ore containing more than 1 ounce per ton assayed only 13 dwts., and, as it is ouly reasouable to assume that what does settle in the flues is a conceutrate compared with what escapes by the stack, the losses due to roasting raw ore must be small. It has also been noted on the Great Boulder Proprietary that the fluc dust is poorer iu gold than the ore which is being treated.

In the Diehl process, as practiced at Lake View Consols and Haunau's Brown Hill, the object of concentration is to bring the refractory elements into the smallest possible bulk aud reduce the quantity to be roasted. The actual amount of sulphur, tellurium, etc., to be climiuated is not diminished in any way, and the furnace which can roast twenty tons of ore per day will treat efficiently, perhaps, only eight or ten tons of concentrates. The tendency in the large Diehl plants is to elaborate the coucentratiou, treat the product by roasting and "sliming," and thns reduce the consumption of expensive chemicals. On the Lake View Consols, from a monthly yield of 5000 ounces fine gold, 50% to 60%, or nearly 3000 ounces, is obtained from treating wasted concentrates, and the remainder by the wet method aud use of cyanogen bromide.

While a small loss may occur through volatilization, etc., in the "dry" process, it is only reasonable to assume that at least an equivalent if not a greater loss occurs in the "wet." The concentrates contain a comparatively large percentage of volatile snbstances, they assay six or eight ounces per tou, and they are roasted in au atmosphere which is chloridizing, from the salt ever present in the concentration water, and the flue dust assays 10 to 15 ouuces of fine gold.

The popular notion is that, in treatiug tellurides, cyanogen brómide eliminates the tellurium, and thus takes the place of roasting; but this is a great mistake. Bromo-cyanide simply acts as a sort of shnnting agent, setting aside, as it were, the tellurium in appreciable quantities aud that the residues leaving it do not. My investigatiou shows that the tellurium is oxidized iu the agitation vats and subsequently precipitated, probably in the metallic state, iu the extractor boxes, and we are brought face to face with the fact that, no matter what may be the process in use, the tellurinm must be got rid of by roastiug.

The Hannan's Star Co., which has to pay no royalty on its Diehl plant, as it introduced the process, recovers what little gold is amalgamable on copper plates, and the rest by means of cyanogen bromide. It does not concentrate the ore, but relies for good extraction on a very fine pulverizing, prolonged agitation, and a slightly greater consumption of chemicals. The secret of snccess in this kind of treatment lies in the fortnnate fact that tellnrides are extremely friable and can be redneed to a powder so fine as to be readily attacked by dilute chemical solvents.

Tellnrides usually occur in coarse specks, are nonamalgamable; and, if they were malleable like the precious metal itself, it seems probable that the extraction with cyanogen bromide alone would be but little better than would result from plain cyanidation of an ore containing coarse gold.

The advautage of the dry process is due to its simplicity and rapidity of action, and to the fact that a large proportion of the gold yield (50% at the Great Boulder Proprietary works) is recovered iu the grinding pans within a few hours of entering the plant, and that the tellurium is eliminated iu the early stage of the treatment, any further risk of gold loss from this source being theu at an end.

The cleanup is a comparatively light operation, involves no difficulties aud gives little trouble. The bullion slime is of small bulk and is merely dried, not roasted, before being smelted. At the Boulder Main Reef extraction works it is not even stirred or rabbled in the bullion muffle, and it is smelted direct into minting bars without even the process of remelting.

In the Diehl process the tellurium is everywhere present; the bullion slime is loaded with it, and roasting in a muffle, even with a considerable amount of rabbling at a fairly high temperature, only partially eliminates it; it is found in the melting pot, aud coats all the gold bars, and even appears in the bars themselves, rendering them occasionally so brittle that they break when struck with a 2-lb. hammer during the process of chipping off the slag; it often gives rise to what is called a "matte," a product having a specific gravity of 9.09, which, on analysis, is found to be eomposed of 30% gold, 30% silver and 40% tellurium. This "matte" does not make its appearance when the roasting and smelting have been conducted at a very high temperature. It is evideut in this case that the tellurium has all been driveu off, and it seems probable that at least a mechanical loss of gold occurs during the volatilization, as the bullion slime is exceediugly soft and powdery and has none of that gluey cohesiveness so noticeable in slime obtaiued from the dry method of treatment.

In spite of these drawbacks, I consider that the Diehl process has a big future before it. Its great advantage lies in the fact that it enables wet crushiug to be adopted, thereby increasing the efficiency of the crushing appliances and ridding the mill of the objectionable dust so deleterious to the health of the workmen.

The contour of the country unfortunately allows of practically no natural advantages for the disposal of residues. On the Lake View Cousols the mill is situated on the nearest hill, and the ore is transported from the shaft along an aerial ropeway, and, in the case of the Boulder Maiu Reef and the Great Boulder Proprietory, the plants are erected on the flat, close to their respective shafts, and the residues have to be elevated to the dump after treatment. The cost of power on the Lake View Consols is stated to be higher than would result were their treatment plant better arranged, the Great Boulder Proprietary admit that ball mills in their plant would be an improvement, and the Bouldcr Main Reef claim that if their roasting capacity were increasecl by the addition of another furnace, the mills could be kept ruuning continuosly instead of intermittingly, and all the plant being then fully employed, the cost per ton would be considerably reduced.

In the discussion on the paper of Mr. Simpson, A. G. Charleton said, with regard to the push conveyors, he had seen them at work on the Great Boulder and at other mines, and was very much impressed with the way in which they handled the stuff, often in a very hot coudition. They seemed simple and easy to repair. He had also seen the Merton furnace at work. This appeared a decided improvemeut in mechanical arrangement on other furnaces, and from what he was told of the coursc of working, he thought the results were good. The author evidently had a prefereuce for the Ball mills, but he did not see that the table of results bore out all of his contentions.

The Diehl costs given, although recent, were apparently not the latest figures published, because according to recent report from Kalgoorlie, the cost at Lake View had becn brought down to 15s 1d. He had looked into the question very carefully some time ago, as to the relative cost of the two proeesses, and came to the same conclusion as the author, that there was very little to choose between. When he visited Kalgoolie last April, however, the Diehl process seemed to have made a distinct advauce in the reduction of costs; but the dry-crushing process had also followed suit, as he noticed in an article written by Mr. Hoover some time ago the cost at the Boulder Perseverance treatiug 12,500 short tons was only $3.65, which was, roughly speaking, only about 15s 2d a ton. Practically, therefore, the two processes seemed to have kept pace with one another.

W. McDermott said the paper of Mr. Simpsou was valuable, but did not thiuk it had succeeded in settling the qnestion of the choice of process. The impression left on his miud with regard to the treatment in Kalgoorlie was rather that it did not seem a matter of the machinery used, but, whatever process was adopted, it was about equally good. The district was peculiar in that way just as it was in a mining sense. Iu no other mining district would they find such a variety of absolntely different proeesses all successfully going on.

*Abstract Trans. Institution Mining and Metallurgy.

Mining Summary.

SPECIALLY COMPILED AND REPORTED FOR THE MINING AND SCIENTIFIC PRESS.

ALASKA.

The Treadwell M. Co. at Douglas is adding to its holdings, having bought the Juneau-Alaska group on the mainland across Gastineau channel, opposite the Treadwell. A tunnel 2 miles long will be run to open the bodies of ore. There are 63 miles of tunneling in this mine, and one of these tunnels is said to extend out under the sea for 1200 feet. On the surface are 6 miles of tracks to keep the Treadwell plants in operation. Two hundred tons of coal a day are required. The 800 stamps crush 4500 tons of rocks daily, and the concentrates are carried in ships to the Tacoma smelter.

ARIZONA.

Cochise County.

In the Huachuca mountains, southwest of Bisbee, the Mitchell C. Co. reports No. 2 shaft has cut a seam of low-grade ore 1 foot in thickness at depth of 200 feet. This seam has a dip of 45°. At depth of 250 feet, 50 feet below the point where the vein was cut, a crosscut was started and has opened the vein at 50 feet north of the shaft, showing it widened to 4 feet, and assaying 3.26% copper and 3.8 ounces of silver. Sinking has been resumed in the shaft, which will be carried down another 100 feet, and at the 350-foot level another crosscut will be driven. In the veins lime and iron are mixed with copper glance, copper pyrites and peacock copper.

Graham County.

On the claims of the Markeene C. Co., near Morenci, L. A. Dunham et al. are preparing to begin further development. The nine claims are in the Copper King belt, and there are two shafts, one down 175 feet and the other 150 feet. In the bottom of the last there is a showing of ore. In the other shaft there are 15 feet of work on a rich 6-inch vein.

An electric trolley line equipment is being put into the Humboldt tunnel of the Arizona C. Co., near Clifton.

A tunnel 1000 feet in length to connect the Old Yankee and the West Yankee will be started this week by the Detroit C. Co. and is expected to be completed within six months. The tunnel is to do away with the hoist from the Yankee and elevate the ores of both mines from the shaft of the West Yankee. Machine drills will be used in the tunnel. It will be started from the lower level of the Yankee, 126 feet deeper than the 300-foot shaft of the West Yankee, which latter will be sunk.

Maricopa County.

(Special Correspondence).—J. V. Creath & H. H. Mullen are developing a group of claims 14 miles southwest of Mesa and will handle the ore taken out in an arrastra.

Fleming Bros. have several men at work on the Charley Fleming group of claims near Cave Creek. A strike of high-grade free-milling ore is reported made on one of the claims. More men will be put on.——The Grand Traverse & Arizona Co. is working men on its group near Gold Hill, in Cave Creek district, and the number will be increased this week.——J. G. Hardin is working men on claims near New River.

The parties cyaniding the tailings from the Vulture mill, north of Wickenburg, have made a partial cleanup, with satisfactory results.——A. S. Mills is developing copper claims near Gold Hill, near Cave Creek, and is taking out shipping ore.

W. Waddington and J. Montgomery are developing a group of claims in the Eagle Tail mountains, near Phœnix. The number of men will be increased next week.

N. L. Brunor, assayer for the White Tank M. Co., in the White Tank mountains, says twenty men are employed at the camp. Water is hauled from Beardsley, and ore is being shipped to the smelter.

Phœnix, Dec. 21.

Mohave County.

At the Leland and Mitchell mines of the Mohave G. M. Co., near Acme, the bins have been completed and the trains began carrying ore to the mill this week. The company is working forty men at the mine and is driving the tunnel into the hill. The south tunnel is in 700 feet and the tunnel from the north side of the mountain has reached 500 feet. It is thought that by Jan. 1st the new mill will be running steadily. The mill is of forty stamps and is fitted with plates and concentrators.

The Altata M. Co. has begun operations on the Altata mine, near Chloride. The company put in a hoisting plant of capacity to sink to depth of 1000 feet. The mine is a former producer.

C. J. Greene, superintendent of the Swiss-American group of mines, near Snowhall, near Kingman, says work will be resumed and development increased.

Pinal County.

(Special Correspondence).—It is proposed to build a custom smelter near Florence in the spring.——The Copper Butte M. Co. is preparing to put in a hoist on its mine, between Kelvin and Florence.

Florence, Dec. 21.

Yavapai County.

Men have been put to work in the Silver Flake mine, near Groom creek, which has been idle for several years. J. J. Philbin is part owner. It is equipped with steam hoist and stamp mill.

The Peck mine in the Bradshaw mountains is being unwatered, heavier pumping and other machinery having been put in. H. B. Clifford of New York is owner. The ores formerly produced carried principally silver values, with some gold.

The Kimball mine on Lynx creek hill, near Lynx Creek, has been cleaned out, drained of 90 feet of water, and the shafts and drifts retimbered. Development work is again under way. This mine has three shafts, 200, 70 and 35 feet in depth with drifts 100 feet in length from which ore has been stoped. The ledge is 6 feet between walls with 2 feet of pay ore. A hoist and other machinery are being put in at the Great Republic group near Turkey Creek station on the Crown King railroad near Prescott, and work of developing the property will be increased. The company owns thirty-seven contiguous claims.

J. J. Philbin last week put men to work on the Silver Flake group of mines, 7 miles south of Prescott, near Groom Creek. The vein shows ore 5 feet in width. There is on the property a 10-stamp mill, a 120 H. P. Corliss engine, 120 H. P. boiler and a steam hoist, where a pumping plant forces water from Groom creek, 2200 feet distant, through a 4-inch pipe to a reservoir.

ARKANSAS.

Marion County.

Manager Chaso reports a discovery at the Morning Star mine, near Yellville. He had reached a sand and quartzite bar and passed on through it, reaching a deposit of zinc that in mill run yielded 50% of jack. This opening was made 150 feet above the level of the creek, and there is natural drainage.

At Dodd City, a concentrating plant is being built by the Iola M. Co. Six teams were used to haul the boiler from Harrison to Iola mine.——The Hill-Fountaine Co. reports satisfactory prospects near Peel. The core drill for the Jonesville mine has been put to prospecting. S. R. Reese is doing final assessment work on sixteen mining claims.

Newton County.

J. G. Atkins of White Eagle, Okla., president of the Buffalo M. Co., and H. P. Ladd of Ponca City, report work being increased on their group in Boxley district.

Searcy County.

At the Jack Pot mine, near Marshall, machinery for the crusher has been set up.

White County.

The Jones & Gilcriss zinc mine of Searcy has put in a heavier steam hoister and other shaft machinery.

CALIFORNIA.

Fresno County.

The Grass Valley Coalinga Oil Co. and the Coalinga Banner Oil Co., both of Grass Valley, have joined interests. Both companies hold adjoining ground in Coalinga district. W. G. Thomas and D. E. Morgan of Nevada City are interested.

Kern County.

The Arcata Oil Co., on the divide between Sunset and Midway districts, struck oil last week at a depth of 1750 feet, says Manager A. W. Gilfillen of Bakersfield. This well is near the Vulture, which quit work at 1400 feet.

Mono County.

The Castle Peak gold mines at Castle Peak, near Bodie, are closed down for the winter, says Superintendent Mitchell. The company will renew operations in the spring.

Nevada County.

Machinery is on the ground for the North Star G. M. Co., near Grass Valley, for the 40-stamp mill being built at the Central shaft of the company.

M. Owens is arranging for resuming work at the Standard mine at Deadman's Flat, near Nevada City. Owens is owner of this and other properties in same district. Considerable work has been done.

At the Champion mine, near Nevada City, since work has been resumed, forty stamps have been kept running on ore, and developments are showing satisfactorily, says J. Eddie, superintendent.

It is reported work will be started in January on the Cold Spring mine, near Nevada City. This mine has been idle for twenty years, since the last work was done by the Cold Spring Co. It adjoins the Harmony mine, and its reopening is expected to result in starting work on a number of other gravel mines on Washington ridge.

J. C. Campbell has completed arrangements to consolidate the Mountaineer, Summit and R. C. mines, near Nevada City. The pumps are unwatering the workings.

The Summit mine (formerly the Fortuna) was worked five years ago, when the shaft was opened and sunk to depth of 400 feet. The machinery was inadequate to handle the water.

The electric plant built on Poorman's creek, ½ mile from the mine, by the Gaston Ridge Co., near Washington, is in operation. Ore is being taken out of the 300-foot shaft, which is below the level of the tunnel. The latter is in 2000 feet.

The 20-stamp mill at the Blue Tent gravel mine is completed, but it is expected it will be several weeks before the mill will be started, as an elbow to connect the pipe line must be put in. The main tunnel is being driven ahead before an upraise will be made to tap the gravel channel. The 3-stamp mill formerly in use has been placed in order and will also be used.

The Phelps Hill Dev. Co. has temporarily suspended work at the mine near Grass Valley.

Work is progressing at the Federal Loan mine in Willow Valley, near Nevada City. Eleven men are employed and are taking out fair grade ore, which the mill is crushing. At present no development work is being done.

The stamps are dropping again at the Union Hill mine near Grass Valley on rock taken from the old surface workings.

The mill at the Zeibright mine near the Placer county line, south of Grass Valley, has been completed and is expected to be put in operation this week.——A 20-stamp mill will be built on the Bonnie B. mine, near the Zeibright mine.

The South Yuba M. & S. Co. is reported to have bonded six of its claims on the South Yuba river, near Grass Valley, to San Francisco and Philadelphia men for $500,000.

Manager J. Underwood says the Omega M. Co. has completed 3000 feet of flume near Nevada City. The work at the mine has been delayed on account of trouble in getting in lumber. When the restraining dam is completed, which is expected to be this week, all preliminary work shall have been completed. Lack of water prevents starting of mining as yet. The tunnel driven will be used for drifting purposes and work on it will not begin till spring. The drift will be run from the north side of the claim.

Plumas County.

H. Kling of Seattle, Wash., has made arrangements to open up and operate the Emigrant Hill placer mine north of Quincy, and preliminary work is being done. A debris restraining dam will be started this week.

G. R. Goodhue, operating at Iron Bar, near Quincy, reports the cement gravel crusher put in the past summer is working satisfactorily. It can be cheaply operated, one man handling the machinery when it is working to its full capacity, of 125 tons per day. The principal work that has been done there this season, besides putting in the machinery, was stripping the hard top cement preparatory to working the softer deposit near the bedrock. Goodhue also has started work on the tunnel near the Shoofly bridge and will keep two shifts at work all winter.

San Diego County.

The Cleveland–Pacific mine, near Escondido, an extension of the Oro Fino mine, has expended $30,000 in retimbering the mine, repairing the mill, removing machinery, etc., preparatory to resuming production.

Shasta County.

Development work is progressing at the Pawneo group of seven claims owned by O. B. Sherman, H. G. Schrivner and J. T. Weeks, on Wildcat creek, a tributary of Pit river, which empties into that stream from the south opposite Brushy canyon, near De Lamar. Mineral bearing rock was found on a contact between granitoporphyry and diorite, says the Enterprise. A 50-foot open cut and a drift of 30 feet on the ledge showed ore assaying $4.50 for width of 20 feet. A tunnel will be started lower.

Keswick reports say the crosscut on the Evening Star mine in the Old Diggings district, owned by Panter & Litsch, was completed last week, resulting in tapping a pay shoot at depth of 150 feet lower than any other workings in the mine. The main tunnel is 1000 feet in length. The body of ore is said to be 3 feet in width.

Siskiyou County.

J. F. Welch is opening up a hydraulic mine at Grouse creek, a tributary of East Fork of Scott river, near Callahans, for a San Francisco company. Teams are hauling lumber, machinery and pipe from Gazelle depot to equip the mine during the winter and spring.——The dredger in South Fork of Scott river, worked by electric power, is in full operation raising bedrock gravel, and report realizing good returns.——Teamsters are hauling lumber and supplies to the Kinley quartz mine on Humbug creek, near Hawkinsville, says Manager Draper. The mill machinery has been hauled in, and 100,000 feet of lumber bought. There are fifty men at work getting out quartz.

A. C. Brokaw of Quartz Valley has bonded the Mountain Lion, Advanco and Outlet quartz mines in Liberty district for $70,000. He will put men at work Jan. 14th for development and build a mill.

The Fort Jones Farmer and Miner says J. W. Wheeler of Fort Jones has arranged to put machinery on his claim in Scott river for opening the channel and prospecting the same.

The Medina M. Co., operating the Gardner and Eastlick quartz mines at Oro Fino, is rushing work to have its machinery in place and under cover before snow begins. An engine, pump and hoist are going in. Besides the machinery, a 50-ton cyanide plant will be built as soon as outside work is completed.

The Dewey quartz mines, near Yreka, continues to yield satisfactory returns, says the Journal, and the 10-stamp mill is kept in operation crushing picked quartz. The lower grade ore is put through the cyanide process. The company intends putting up a larger mill, adding more stamps, to be run by an electric plant with water power from Parks creek. There are 1000 tons of quartz on the dumps, which will not pay to run in the small mill of steam power, burning six cords of wood or more per day.

Tuolumne County.

The Big Tree M. Co. has bought 480 acres of mineral land on the Tuolumne side of the Stanislaus river, near Big Trees, above Murphys.

At the Cordova claim, above the Dreisam, near Carters, Superintendent Bryant of the Prudhomme mine has men at work and sinking is in progress.——At the Duffield mine drifting and stoping are in progress. Ore is being extracted and will be run through the Dreisam mill in the spring.——T. F. McAvoy, manager of the Hardtack mine, says he will start up the mine.

C. A. Lewis has bought the Mapes & Wetmore, the Oro Fino, the Grace, the Surprise quartz mines Nos. 1 and 2 and the Dollie Dimple quartz mine, near the head of Woods creek, on Bald mountain, near Sonora.

F. M. Mecartea et al. have bought the Bull Dog quartz mine and the Grand Pyrite claim at Big Oak Flat.

J. M. Merrill has bought the Cosmopolite claims Nos. 2, 3 and 4, near Groveland, and also a millsite.

The shaft at the McAlpine mine, near Big Oak Flat, has reached a depth of 250 feet and sinking will continue. An electric plant will be put in, says Superintendent S. E. Rigg.

COLORADO.

Boulder County.

The Poorman mine at Caribou has been bought by D. McKenzie at sheriff's sale and will be reopened.

Chaffee County.

The Calumet M. & L. Co. has been organized at Salida to develop claims on a 400-acre tract of land which has been worked for iron by the Colorado F. & I. Co. The tract contains gold claims. The officers of the company are N. H. Gherhart, Omaha, Neb., president, with J. M. Dickens, H. C. Mead and J. H. Gabriel. Their holdings are near Turret.

Clear Creek County.

C. A. Wimpfheimer of New York City, vice-president of the Sun and Moon M. & M. Co., operating at Idaho Springs, says sixty men are at work in the property and development work in the lower levels is to be increased next month. The upraise being extended from the Newhouse tunnel to the upper workings is progressing. It shows 8 feet of ore.

The Mica G. M. & M. Co., near Idaho Springs, is developing a mica-bearing dyke in connection with gold mining. The Starlight tunnel is being extended by contract to cut a number of gold-bearing veins. The dyke is said to carry mica deposits of commercial value.

The Big Five contral tunnel, near Idaho Springs, resumed operations last week, and the company is again driving the breast ahead. The tunnel is in 2536 feet. Driving operations were suspended Nov. 15th, on account of shortage of coal, due to strike in northern fields. At the Big

Five machine shops they are building a car, which is designed to work automatically, unloading at the end of the trestle by means of a derrick operated by compressed air. There is a double track from the tunnel over the trestle and bridge, one train to go out loaded, unload automatically and return on the other track. Fifteen of these cars will be built, each to have capacity of 54 cubic feet of rock.

The plant for the Gum Tree mine at Freeland is on the ground and being set up. It has capacity for sinking 1500 feet. The shaft is down 340 feet, and the first work will be to sink an additional 300 feet. After the additional 300 feet of depth is gained, it is intended to begin production, as well as to continue the work of sinking till a depth of 1500 feet is gained.

The fast drop stamps which were being operated on the west side of the Boneita mill, near Idaho Springs, for the Tauner & McNeil cyanide test have been replaced with slow drop stamps. The Boneita is now slow drop throughout, the only altogether slow drop amalgamating plaut in the district, says the Times.

The Wilkie mill, at Idaho Springs, has changed its hours of work, the shift beginning at noon and ending at midnight. The change has been made in order to secure better water power, Clear creek furnishing a greater supply of water at the hours mentioned than at any other time of day, says the Times.

Dolores County.

Lee, Miller et al. are now engaged getting the concentrating plant at the mouth of tho group tunnel ready to make a thirty-days' trial run on the stope dirt from the Enterprise and other veins in the United Rico M. Co.'s group, near Rico. They have men at work in the mine and mill and it is expected the plant will be running next week. If the trial run, with the use of steam, shows a profit, arrangements will be made to use water power, thus doing away with an expeuse of $25 per day.

At the Wellington mine, near Rico, a 30-inch body of high-grade lead and "sand" carbonates has been opened up, and the ore is being sacked and shipped. The Wellington group is being worked under lease by L. Habermann.

The Humphreys mill, Near Rico, started up last week with two shifts. The steam power plaut is completed and proves satisfactory, says the News. Moro men are being put to work in the mine.

Fremont County.

The Keystone Oil Co. of Florence will let a contract for drilling four wells on its grounds south of Florence. The daily production from the independent producers from this field is 600 barrels per day, and 300 barrels of this amount is produced by the Keystone Co.——The Blaney Oil & Gas Co., G. Johnston, manager, has its drilling outfit ready and will begin its first well Jan. 4th.

The independent oil operators and producers in the Florence field are reported arranging to build and operate an independent refinery. It will be located near Arkansas river. In the past all their production of crude oil has been sold to the United Oil Co. at rate of 84 cents a barrel. The price of crude oil has been advancing in the market and the independent operators demanded from the United Oil Co. 3 cents per gallon, or $1.26 per barrel, which was refused, and the producers propose to combine and erect a refinery.

Gilpin County.

The Nevada Con. G. M. & M. Co., operating in King flats in Nevada district, near Central City, is arranging for addition of a 100-ton plant to their mill on King flats. It will be equipped with Blake crusher, four Hartz jigs, two sets of rolls, two Huntington mills, five concentrating tables, together with separators, screens, pumps, elevators, etc. As the ores of the King, Lambertson, Warren, and other mines of this company carry as high as 20% of zinc, the company will put in an electric separator, and an electric plant will also be built for lighting the mine and milling plants. Regular developments have been resumed at the mines, says Manager Marx of Denver.

The East Boston mine, at Central City, has fifteen men at work, and the regular production amounts to 400 tons of milling ore per month, with a small percentage of smelting ore. It is owned and operated by Boston men; W. Joh, superintendent. They will resume sinking, the present depth of the shaft being 400 feet.

Gunnison County.

Operations have been started on the Boss group in the Box Canyon district, uear Pitkin, by J. T. Hanahan of Idaho Springs. This joins the Independent, Sunrise and Waunita Gold M. & M. Co.'s holdings. A 100-foot shaft will be sunk this winter, with drift run east. If this work proves satisfactory a trausportation and drainage tunnel will be driven in the spring.——The Golden Islet group of seven claims in the Gold belt, 4 miles west of Pitkin, is owned by R. T. Hefftner, who is increasing development. A 5-foot vein has been driven on for 200 feet in a 600-foot tunnel. Four and one-half feet of this ore is milling grade, the other 6 inches running 3 ounces in gold and 20% lead, says the Pitkin Miner. The ore is a sulphide and the milling grade averages $10 per ton. There are 1500 feet of workings. The walls are porphyry and granite.

Hinsdale County.

The Puzzle claim, near Lake City, was sold last week to J. T. Palmer.

Lake County.

S. Collins, president of the Collins Dev. Co., says he is arranging to resume work on the Hoffer shaft, in Big Evans gulch, and also on the Empire, on Long and Derry hill, near Leadville.

The additional battery of boilers at the Yak power house, near Leadville, are in use and full operations resumed. The addition consists of two 150 H. P. high pressure boilers. The Yak tunnel is 2 miles long aud opened and connected with shaft No. 4 Ibex. The company will continue development and other work and at same time will handle 3000 tons of ore a month.

Mineral County.

The Captive Inca mine of Creede is being developed and equipped. The three compartment shaft being sunk under contract is down 350 feet, with three shifts of men and machine. Improvements include an electric lighting system both on top and underground. Water for the plant is piped from a spring at an elevation of 250 feet. W. G. Boyle is manager.

The ore output of the mines of Creede for the year to December 1st is as follows:

Month.	Tons.
January	5,283
February	5,788
March	7,072
April	5,715
May	5,845
June	5,711
July	5,636
August	6,396
September	6,891
October	6,914
November	7,039

The output for December is estimated at 6000 tons, which will give a total tonnage for the year of 73,990 tons.

Ouray County.

The Camp Bird mine at Ouray is shut down on account of shortage of water for power, and preparations are being made to run a pipe line from the mill to the Revenue mine, and from there a sufficient head of water can be obtained.

San Juan County.

A total of 1500 feet of 22-inch pipe will be laid by the Gold Spur M. & M. Co. to convey the main stream of Cunningham gulch from a point near Neigold's town to where a tunnel has been started by the company, near Silverton. The fall is 40 feet, but the volume is sufficient to generate power for three drills, says the Standard. Manager T. Grabowsky will drive a tunnel at the base of King Solomon mountain (Cunningham gulch side), and continue for a distance of 1000 feet.

The Arpad M. Co., with a group of nineteen claims on the southern slope of King Solomon mountain, near Silverton, near the Black Prince and North Star mines, has arranged to have a 300-foot tunnel run to cut one of the principal veins of group.

The Domingo group, near Eureka, in Niagara gulch, is reported sold to the Con. Eureka M. & T. Co. for $50,000. The Domingo group consists of sixteen claims and two millsites, the latter adjoining the town of Eureka, the former being in Eureka basin. Equipment of machinery, comprising boilers, engines, drills, etc., will be placed. The company's holdings are said to be advantageously located for tunnel work, and the proposed tunnel at base of Crown mountain, below Niagara basin, will cut a majority of the veins at depth of 2000 to 2500 feet.

The Gold Spur M. & M. Co., says Manager T. Grabowsky, has started work on a 1000-foot tunnel, and he will also build a 1500-foot pipe line, erect a power house and put in machine drills. The Gold Spur mines are on the Cunningham slope of King Solomon mountain, near Howardsville.

W. L. Partridge, vice-president and manager of the Detroit & Colorado M. Co., says negotiations are under way for a group of claims owned by the Notaway Gold-Copper M. Co., consisting of twelve claims—the Champion group and the Thunder group of Silverton to develop the whole through one tunnel. These properties are grouped together on the east slope of Sultan mountain, and have a total of 4000 feet of development done.——The Ruby Basin M. & M. Co. has opened 30 inches of galena in the December lode that gives returns of 50% lead and nineteen ounces silver per ton. The tunnel, which is in 1140 feet, will be extended 300 feet farther, and it is expected in that distance will cut the Tornado vein. On the December lode, drifting both ways is in progress. T. V. Johnson and J. Bidwell of New York City are part owners.

The Robert Boner mine, a former producer, near Silverton, resumed operations under the management of W. D. Cole. The mine has 2000 feet in development. Work on the Congress mine, above Chattanooga, has been resumed.

Summit County.

W. F. Parker, manager of the Glacier Mountain M. & M. Co., near Montezuma, has men on developmeut work, and shipping ore is being taken out in opening the drifts.

Manager J. M. Thomas expects to operate the fourteen mining claims of the El Dorado G. M. & M. Co., near Breckenridge, next summer. A few men will, however, be kept at development work during the wiuter. The property is in the porphyry helt on which are the Jossie group with its 40-stamp and concentrating mill, and the Cashier group with its milling and concentrating plant.

In the Ten-Mile section, near Frisco, the Masontown M. & M. Co. has its 100-ton combination mill completed and is opening up bodies of milling ore, says Manager Keables. The Victoria vein averages 15 feet in width, with several streaks of smelting ore.——J. H. Myers and E. Chapin Gard are arranging to build a 100-ton pyritic smelter, near Frisco, on the Ten-Mile river.

The King Solomon tunnel, near Frisco, is being driven with three shifts. Work will be continued until the breast of the tunnel has entered Point Royal, a distance of 3000 feet, where it will gain depth of 2975 feet after having cut ten veins from 5 to 50 feet wide, says the Times.——Three miles above the King Solomon is the Wonderland property, embracing fourteen full lode claims and forty acres of placer ground in the valley of Ten-Mile creek. It is owned by a Pittsburg Co., who will develop it.——Opposite the Wonderland, on the northwestern side of the valley, the Money-Metal M. & T. Co. is increasing work. Its holdings include 400 acres of mineral land. They have bodies of ore in sight on the Lucky Boy and Golden Gate, and will build a concentrating mill next spring.

Teller County.

The El Paso Gold King mine, on Womac hill, near Cripple Creek, which has been closed down for several months, will resume operations in January. The property has been bothered with water, but the solution to the trouble seems to have been found in the El Paso drainage tunnel. It is being drained at rate of 15 feet per month. There was 80 feet of water in the shaft when work was stopped, but half of this amount has been drained off by the tunnel. The shaft is down 920 feet.

Superintendent E. Taylor expects to ship during the present mouth between 1600 and 1700 tons of ore from the Old Gold and C. K. & N. mines on Beacon Hill, Cripple Creek. Ore is averaging two ounces gold per ton. A station has been cut on the C. K. & N. at a depth of 498 feet, on the El Paso drainage tunnel level. If greater depth is attained it will he necessary to put in pumps. The vein at this depth has been cut 15 feet north of the shaft. There was shipped from the C. K. & N. during November 600 tons of ore, which gave returns of $50 in gold per ton. This ore was mined in a drift driven 320 feet toward the Old Gold line at a depth of 375 feet. The Old Gold produced 600 tons of ore during November, returning an average value of $36 in gold from the cross-vein, which has been exploited north and south for 225 feet. The crosscut was run from the shaft at a depth of 329 feet for 127 feet, where the crosss-vein was struck. Mr. Taylor is working two shifts each on the mines, the to al numbering seventy-five men.

The Tunnel M. & L. Co., operating under lease the Abe Lincoln, Lily, Granite Hill, Arcadia, May Queen aud Happy Boy claims in Poverty gulch, near Cripple Creek, resumed work on the Arcadia last week, which has been idle for three years. It is the only one of the group that cannot be worked through the Abe Lincoln shaft. Considerable work in the way of crosscutting and drifting is planned and work has started in a drift which was extended at a depth of 220 feet where they have an ore body already opeued up. They will mine and ship. The shaft on this mine has been sunk to a depth of 375 feet, and there is a plant of machinery with shaft and ore houses on the ground. The company is shipping smelting grade ore from the Abe Lincoln, where tho company is working thirty-eight meu in two shifts. Superintendent Swanson has sunk the shaft an additional 100 feet, giving it a total depth of 600 feet. A station has been cut and a crosscutting is under way to cut the Abe Lincoln ore shoot.

Manager C. C. Hamlin of the Granite mine, at Cripple Creek, says another ore shoot opened last month is improving as development progresses. The ore body was struck 750 feet south of the shaft at a depth of 1000 feet. It is 10 feet in width and returns from shipments give two ounces gold per ton. The company has twenty-five men at work on one shift. Next month this number will be increased and production will be doubled.——The American Eagles mine, owned by the Stratton estate, is closed down, owing to the eighteen-drill compressor being out of order, and parts of the machinery must be replaced. The lessees working the dump, however, are continuing operations. As soon as the machinery is in place the management will put on 100 men, divided into two shifts. The American Eagles shaft is down 1520 feet.

The military authorities at Cripple Creek have issued a statement that owing to the large number of idle men throughout the district, au order will be made next week that all those having no employment or visible means of support will be given the alternative of one of three things——either to go to work, leave the district or go to the bull pen for an indefinite term.

IDAHO.

Blaine County.

The Katherine group of claims, in Boulder Creek mining district near Ketchum, has been taken over on a three years' bond by J. O'Brian, W. Shakespeare, J. L. Brown and T. Schenck, of Salt Lake City, Utah, for $50,000, says the Deseret News. The mine had been opened up to show a ledge of ore 4 feet in thickness, 2½ feet of which was galena, from which shipments made averaged $40 per ton. It is intended by the Salt Lakers to begin development in the spring.

Boise County.

A. C. Gallupe, superintendent of the Golden Rod M. Co., owning the Mineral Hill group of claims near Placerville, says as a result of the clear weather a great deal of assessment work is being done in the district. On the Crown claim of the Golden Rod Co. a 4-foot body of ore which pans free gold has been opened up. It is intended to contiuue work all winter. The company is arranging to build a mill and have it in working order in the spring.

Canyon County.

R. W. Purdum of Nampa of tho Sunnyside mine says the crosscut running west is in 230 feet and the values show $7 per ton. Tbe ledge has been opened up 2200 feet to the north, with drifts and shafts. Machinery for a 40-stamp mill is on the ground. Thirty men are at work on the mine, working two shifts.

Idaho County.

The Idaho Con. C. M. Co. has taken over a group of copper properties on the Salmon river, 16 miles west of Grangeville, and has development work under way. The ore is said to carry silver values with the copper. Sbipments of ore will be made.

A. E. Borthwick of Roosevelt says, owiug to shortage of supplies in Thunder Mountain district and difficulty of packing iu, the prices of eatables compare with Alaska in early days. Flour is 14 cents per pound, bacon 35 cents, sugar 25 cents, butter 65 cents, fresh beef 25 cents, oatmeal 15 cents, potatoes 8 and 10 cents, salt 15 cents, coal oil $1.50 a gallon, syrup $1.50 per half gallon, and other necessities equally high. Competition, to make sure of delivery of goods, ran the price of packing in from 6 cents to 10 cents per pound. A large amount of all kinds of supplies and machinery are piled up on the incomplete State wagon road building into Thunder at the place of transfer from wagon to pack, ahout 55 miles south of Roosevelt. There will be no famine in breadstuffs, probably, for most of the companies operating there had early laid in full winter supplies.

At Roosevelt the Jumbo mine cleanup for month of November amounted to $11,500 in gold bulliou.

Kootenai County.

The St. Joe Basin Placer M. Co. has been incorporated by Pittsburg, Pa., men, including G. B. Legnard, J. T. Golden, J. E. Stevenson and L. H. Crick. W. A. Jones of Wallace, Shoshone county, is local agent of the company.

Lemhi County.

W. Anderson of Salmon City says within the next two years a railroad will be built to that point. The mining industry adjacent to Salmon is improving, and within a radius of 10 miles of Salmon City there are 200 men at work, with considerable development work in progress. At Leesburg the Gold Dust M. Co. has put its 10-stamp mill in operation. The mine is developed by a shaft 240 feet deep; the vein is 80 feet wide, carrying average value of $4 gold per ton. The Pope mine, operated by T. Pope & Son, is being worked under contract. The Haydee tunnol is being driven 900 feet and will cut the veiu at depth of 350 feet. The owners

expect to build reduction works in the spring.——Hill & McBride, who are working the Queen of the Hills mine, are also driving a tunnel 900 feet, by which they expect to open a vein at depth of 500 feet. On the Ramey mine, on Silver creek, development work is being done and the owners propose putting up a reduction plant next year. Soles Bros. & Rossier have also started up a mill on their mine. The Ulysses mine, on Indian creek, has added fifteen stamps to its milling capacity, the mill now having thirty stamps. ——Reports from Owl Creek district say the Yellow Jacket mine, 60 miles from Salmon City, is in operation: T. B. Giles is superintendent.

R. M. Edwards of Houghton, Mich., president of the Kittie Burton G. M. Co. at Ulysses, says thirty stamps are dropping in the mill. The mine has been producing an average of $9000 per month for the past eighteen months with fifteen stamps.

The Gold Dust M. Co., near Salmon City, shut down last week for sixty days to do development work.——A strike is reported made at the Italian mine in the bottom of the shaft being sunk. A 4-foot ledge was cut, assaying $50 per ton.—— The Wright & Edwards coal mine is in full operation and delivering lignite coal.

Shoshone County.

Freight rates on galena ore from the Cœur d'Alenes to the smelters at Denver and Pueblo, Colo., were cut $2 per ton last week, says the Spokesman-Review. The rate applying to ores valued at not over $60 per ton is reduced from $10 to $8 per ton in carload lots of not less than 30,000 pounds. The bulk of Cœur d'Alene ores is between the valuations named. The previous rates have been $8 on ores of a value not to exceed $50, $10 where the value did not exceed $65 and $12 where the value did not not exceed $100 per ton. The new rates are effective from Spokane, Wash., Wardner, Osburn, Wallace, Gem, Frisco, Burke and Mullan, Idaho. The roads making the rates are the O. R. & N., Oregon Short Line, Colorado Midland, Denver & Rio Grande, Atchison, Topeka & Santa Fe and Colorado Southern. Later the Northern Pacific also announced it would make the same schedule of rates, its rates being in connection with the Burlington, Oregon Short Line, Union Pacific, Rio Grande Western, Denver & Rio Grande, Colorado Midland, Colorado & Southern and Santa Fe lines. There is no change announced in the existing ore rates from the Cœur d'Alenes to the smelters at Tacoma and Everett, Wash. These, as shown by the Northern Pacific tariffs, are: On $50 ore, $5; on $65 ore, $6, and on $100 ore, $7.50. The existing rates from Northport, Rossland, Nelson, Kaslo and Sandon to Pueblo and Denver are $10 on zinc ore and $12 on lead ore. All these rates are based on carload lots, minimum 30,000 pounds.

The A. D. M. & B. & T. M. Co. has been incorporated at Wallace by H. G. Brown, H. Billberg, J. Thennis, A. D. Monroe and J. H. Nordquist.

J. M. Porter, civil engineer for the Bunker Hill and Sullivan M. & Concentrating Co. at Wardner, says the Kellogg tunnel, 2 miles in length, gives a maximum depth of 3000 feet on the dip of the lode, and the ore shoot has been exposed for length of 1400 feet on the new deep levels. The lode dips at 45° and holds its width of 250 or 300 feet. Manager S. Easton has 400 men at work and is shipping 100 tons daily of concentrates.

The Gold Hunter mine, near Wallace, has been closed down indefinitely. No explanation was offered. About sixty men have been employed at the mine and 250 tons of concentrates have been shipped per month during the past year.

The tunnel being driven at the Morning mine at Mullan will give vertical depth of 2500 feet when completed and will open 1000 feet of new ground, says T. Greenough, managing partner of Larson & Greenough's mining interests. The tunnel has been under way for three years. It is 6x8 feet in the clear, and is in 6000 feet. It will be driven a total of 10,000 feet, and is expected to take two years more to catch the lead. It will cut the vein at 1000 feet below No. 5 tunnel, which is now the lowest adit on the vein. They have started a 1000-foot winze from the No. 5 level to connect with the No. 6 tunnel, when it shall be completed. The winze is down 200 feet, and they are drifting both ways on the vein at the station. The vein is nearly vertical, but they are sinking the winze vertically, regardless of the lode. The Morning is milling 700 to 800 tons of ore a day, and is shipping 100 to 125 tons of concentrates daily. They have completed the additional vanner house and put in eight Frue vanners and a table concentrator.

KANSAS.

Cherokee County.

At the Goodwin-Wagnor shaft on the Gaines - Brewster lease, near Baxter Springs, additional machinery has been put in, including an 8-inch pump and a 40 H. P. boiler. Some water is coming in. The ore in this shaft shows a large amount of lead with the jack.——The north shaft at the Tom Clark mine is being sunk deeper and lead ore is being taken out.

Dillonway & Co., at the Sunny Side mine near Baxter Springs, will build a mill. They have prospected their mine by drilling and drifting.

Crawford County.

The Chapman Coal M. Co. properties are reported sold for $100,000. F. B. Chapman and S. L. Quinn, of Columbus, O., were owners of the Chapman Co.

MICHIGAN.

Lake shipments of copper by water during the thirty-two weeks of navigation the past season amounted to 87,684 tons of refined, as compared with 87,055 tons during the season of 1902, says the News.

Keweenaw County.

The compressor house at the Mohawk mill, near Allouez, is enclosed, and the machinery is being set up.

Ontonagon County.

The mill of the Mass mine, at Mass City, is only running one head on Mass rock and one on Michigan rock, shutting down at night. The Mass is said to be more than making expenses.

MISSOURI.

Jasper County.

The American Lead & Zinc Smelting Co. has bought the Richmond mines on the McGregor land, east of the road between Carterville and Prosperity, paying $15,000.

E. H. & C. D. Pratt have organized the Missouri Reduction Works in Joplin.—— The Feller Bros. are operating a prospecting drill for mineral on their land, 3 miles northeast of Carthage.

Lawrence County.

At Stotts City G. Davis et al., of the Katy mine, are drifting at the 85-foot level. At 10 feet from the shaft they have opened up zinc ore.——At the Illini the men caught up the broken ground and have the shaft in good condition. They have also repaired the mill.

The McFarlane mine at Stotts City is running steadily and getting out high-grade ore. Hatton & Haw are running the pumps at the C. C. C. and will start the mill next week, as they have ore in sight.——T. S. Waddell, of the Keystone mine, has been running his mine steadily. ——N. B. Larkin, of the Small Hope mine, has had the shaft sunk 20 feet deeper. The ground shows up well. They expect to sink another 20 feet before drifting. They are putting in a lift pump to take the place of the small steam pump heretofore used.

The building of the plant at Lucky Jack No. 2 mine, near Stotts City, is progressing, the framework going up. Most of the machinery is on the ground.—— Robertson & Davis, who have a lease on land adjoining the Boston Boy, will operate a prospecting drill.

Wright County.

Mining operations around Mansfield are reported increasing. The immediate cause is the strike of lead and zinc made in the Red Bird mine, 4 miles northwest of that city. The mine was put down to depth of 90 feet, following a fissure carrying mineral. The operators have run a drift along the fissure for 100 feet and a crosscut for 50 feet at right angles to the fissure, all said to be in ore. In this work 200 tons were taken out and a mill will be put up to clean this ore. In digging for water with which to run the mill another body of mineral was found some distance from the shaft and at 17 feet down.

MONTANA.

Receipts at the United States assay office for month of November were $202,222, of which $151,063 was from Montana. Only $1108 was in silver, the remainder being in gold. The figures afford only a partial estimate of the production of the State, as a portion of it finds its way to other assay offices, while the mines of Butte have no dealings with the government direct, their product being treated at their own smelters and shipped East.

Carbon County.

T. Cruse of Helena has bought nine oil placer claims in Carbon county, in addition to his previous holdings in same section, and the whole will be operated next season.

The Black Diamond Coal Co., H. Smith of Duluth, Minn., manager, has bought the McCarthy coal mines at Fromberg and will increase development work. W. Hymer of Red Lodge is preparing to develop the coal fields adjoining Red Lodge.

Deer Lodge County.

A. Curry, H. McElroy and J. McManus have located the Independence quartz claim on Foster creek, and J. A. McMasters has located the Lark claim on Warm Springs creek, near Anaconda. The Independence adjoins the Caledonian and all are near the headwaters of Foster and Warm Springs creeks.— G.B. English has bought the Caledonian and Anna Maud claims, also the Morning Star claim on Warm Springs creek, and the group will be developed by the Chicago-Montana G. M. & M. Co. with the Lark and Highland Chief claims and an accompanying water right.

W. J. White, owner of the Gold Coin mine, near Anaconda, carrying free milling gold ore, has bought the Midnight Bell claim adjoining the Gold Coin.

Fergus County.

E. H. Crabtree, secretary of the Case-Wilson Cyanide Dev. Co., says they are preparing to work its recently bonded properties in Tilden gulch, in the Cone Butte district, near Lewiston. Buildings have been put up, and development work on the mines will be done during the winter.

Jefferson County.

Work is progressing on the Jay Gould group, near Basin. The 20-stamp mill is going up, and it is expected to be in operation by January 1st.

The South Bend M. Co., whose claims adjoin the Peerless Jennie mines in the Onturio district, is doing extensive development work, says the Basin Progress. They are running a 500-foot tunnel, which is in 200 feet, and which will give a depth of 250 feet below the upper tunnel. In the upper tunnel they have struck a vein of ore which runs 50 ounces silver and $16 in gold a ton. The company has leased its Uncle Tom mine to Eastern men who will develop it.

Lewis and Clarke County.

The Red Bird M. Co., operating near Austin, 20 miles from Helena, is making regular weekly shipments, the ore running well in copper and gold. Work has begun on a 600-foot two-compartment shaft, the present workings being in an incline 400 feet long. Men have also been put to work on the Gold Hill mine, owned by the company, and it is expected shipments will begin next month.

Work is progressing on the Jay Gould properties near Helena, and it is expected the stamp mill will be ready by Jan. 1.

The Cook G. M. Co. has been organized by St. Paul and Duluth, Minn., men to operate the Fortune group, 5 miles west of Helena.

Madison County.

The Dakotah M. Co. is operating near the mouth of Hungry hollow, near Virginia City, under the management of T. G. Port, who is working thirteen men.

O. Borgstrom, of Butte, has bought the Galena mine for $7000 cash. The Galena is in Silver Star district and is under lease to G. B. Wyant for eighteen months, two months of which have expired. The Galena ore carries gold, silver and lead. The mine is developed by tunnels and a shaft 100 feet deep. While sinking the shaft another shoot of ore a foot wide has been cut, and a carload of ore shipped from it Dec. 1st netted $2000.

The Black Hawk M. Co. has been incorporated by A. C. Mason, president of the Big Indian Co. of Helena, with Eastern men, to operate seven claims near Norris. —— The Moline G. M. Co. has been incorporated to operate near Virginia City.

Silver Bow County.

At the Sailor's Dream mine, 14 miles northwest of Butte, owned by the Homestake G. M. Co., development is going ahead, says Manager P. Kendrick. On the dump are 200 tons of ore coming from development only. They are blocking out the ore in the mine, and in the spring it is intended to build a mill. There is but a small mill at the mine. It has not been operated for several months.

The Pittsburg-Montana M. Co., working the iron mines near Elkhorn, Jefferson county, has thirty men employed and expects to blow in its smelter, near Butte, next week.

NEVADA.

Esmeralda County.

Superintendent Minard, for Van Duzer, has a bond on the Silver Star mines, near Hawthorne, and has men at work on the group.——The showing in the Bounce on the 400-foot level is reported satisfactory.

H. C. Brougher and E. L. Mims last week bought a group of seven claims adjoining the Blue Bull mine on the east at Goldfield, south of Tonopah. A shaft shows a ledge carrying free gold. Men will be put to work for development.

Nye County.

At Hannapah, Superintendent F. B Work of the Hannapah mine, reports work pregressing. The west drift on the 250-foot level has reached a distance of 260 feet from the shaft, at which point a crosscut has been started north. Stringers of quartz have been cut. The north crosscut from the 250-foot station is out 58 feet. Some water is coming in.

Washoe County.

The Springfield - Nevada M. Co. at Olinghouse is blocking out ore in the Cabin No. 2 mine. Mill No. 2 is on an eight-hour run at full capacity and mill No. 1 was put in operation this week. The prospecting drill is down 80 feet and has not struck rock sufficiently hard to permit of core being saved, except in one instance, where a few feet of the andesite was drilled through.

The Butte and Gold Center mines at Olinghouse are blocked for ore storage and are working all their men on the stamp mill, which will be in running order next week. The mill has three stamps, quadruple discharge 1000-pound stamps, the power being a 20 H. P. steam engine, with boiler equipped for using crude oil for fuel. Blake crushers will be used.—— The Golden Eagle mine at Olinghouse has been leased to W. Brandon.

Reno reports say L. T. Brockbank of Salt Lake City, Utah, who has a lease and bond on the Monarch and Zinn mines in Pine Nut district, covering 1800 acres, is increasing development work. More men will be put on.

White Pine County.

Q. Nebeker of Salt Lake City, Utah, has taken hold of gold-bearing prospects at Osceola, and will develop them.

NEW MEXICO.

The annual report of Governor Otero for the year 1902 shows the aggregate production of gold, silver, copper and lead, was of value of $1,489,016, the output being distributed as follows: Grant county, 55,110 short tons; Socorro, 23,734; Lincoln, 23,500; Bernalillo, 9194; Sierra, 5824; San Miguel, 4375; Santa Fe, 2960; Otero, 1960; Luna, $1955; Taos, $1963; Colfax, 1353; Rio Arriba, 750: Dona Ana, 415; Mora, 250; Valencia, 10. The total for the Territory is 133,353 short tons, of which 77,173 tons were sold or treated.

The gold production was $254,205 from lode mines and $130,480 from placer mines. The gold production from lode mines, by counties, was as follows: Grant, $78,710; Lincoln, $50,607; Bernalillo, $44,182; Socorro, $42,056; Sierra, $21,705; Santa Fe, $6341; Colfax, $3552; Dona Ana, $3400; Otero, $3200; Rio Arriba, $42. From placer mines: Colfax, $117,680; Sierra, $5950; Grant, $3665; Santa Fe, $2145; Lincoln, $550; Otero, $275; Rio Arriba, $115; Taos, $100.

Silver was produced as follows: Socorro, $75,078; Grant, $25,125; Bernalillo, $19,746; Sierra, $13,096; Lincoln, $6009; Luna, $5416; Rio Arriba, $3030; Santa Fe, $945; Dona Ana, $100; Otero, $76; Colfax, $38; a total of $148,659.——Copper production: Grant, $793,028: Socorro, $48,636; Otero, $11,732; Sierra, $5728; Rio Arriba, $798; Santa Fe, $390; San Miguel, $315; Bernalillo, $110; a total of $860,737. ——Lead production was: Socorro, $43,489; Luna, $28,275; Grant, $18,162; Sierra, $3315; Santa Fe, $1294: Dona Ana, $400.

The report further says that by comparing with the previous year the heavy falling off in output of the precious metals occurs in Bernalillo, Santa Fe and Socorro counties. The cause of this in Bernalillo county is due to closing down of the Albemarle mine; in Santa Fe county to suspension of work of Santa Fe G. & C. Co., at San Pedro; and in Socorro county to shutting down the Rosedalo mine. These properties when in operation produced two-thirds of the gold of the Territory. An increase is noticeable in Colfax, Dona Ana, Grant, Sierra and Rio Arriba counties. The largest gain is in Colfax county, due to output of the dredge of the Ore Dredging Co., which produced 28.2% of all the gold in New Mexico for 1902.

In most of the camps in the Territory improvements are either completed or under way, and the output for 1903 will show decided increase. While the mining of the precious metals, including copper, lead, etc., will add materially to the prosperity of the Territory, the principal mineral wealth of New Mexico is in the extensive deposits of coal and iron.

Grant County.

The Colorado Fuel & Iron Co., owing to the coal strike in Colorado, has closed down operations at Fierro, 150 men who are usually employed in digging iron ore from the Union Hill and surrounding properties being laid off, says the New Mexican.

Ten cars of high-grade ore are being shipped per month from the Monument Key mine at Pines Altos by W. C. Chandler. He has twenty-five men developing the mine and taking out ore. This number will be increased to fifty men next month. In the last six months 400 feet of drifting on the 700-foot level has shown the vein of ore to be continuous, the cop-

per, silver aud iron being equal in value to the gold it contains.

Another 40-ton furnace will he added to the plant of the Shamrock Co. at Pinos Altos. The Shamrock mine, however, is closed at present owing to the inability of the compauy to securo a sufficieut aud steady supply of coke. Tho company is omploying sixteen men on developmeut work and tho Silver Cill will be sunk 200 feet deeper and a shaft sunk on the Keystone.

Development work is being increased by the Santa Rita M. Co. at Santa Rita. The principal operations consist of work in the 150-foot level of No. 7 shaft, from which ore is being taken, and also ou the 300-foot level of the Hearst shaft. Work is hoing dono in seven drifts. The concentrating plant was run for fifteeu days in November and the same average will ho maintained in December. About seventy men are employed.

A strike is reported on the Romero lease at Santa Rita, owned hy M. Islos and W. H. Ernest. Seven cars of ore are being shipped from this lease per month, which runs 20% copper.——The shipmonts from Santa Rita during November aggrogated forty cars. The output for Docember will be at least as much.

Rio Arriba County.

Machinery has been set up on the Jawbone mine, near Hopewoll, Bromide district. The shaft is timbered down to the 60-foot level and the timbering is being continued to the 108-foot level. A pump will be placed on that level and from thore a drift started west to cut the ore body. Drifting is heiug done on tho 60-foot level to show the width of tho ore. Work has been resumed on the Red Fissure, in Bromide district, after a shutdown of several weeks.

San Miguel County.

The Matt reduction mill at Las Vegas is heing overhauled and remodeled.

Sierra County.

McDonald Bros. are workiug their mines on Poverty gulch above Philipsburg, having put in a steam pump to control the water, says the New Mexican.——The Minnehaha mill, near Fairview, is operated occasionally. A number of meu are working in the stopes taking out ore.——Q. Vance says he has reached the limit of developmeut on the Christopher Columbus mine with his whim and has oro to the bottom. The whim will he movod to the Readjuster mine.——T. Scales is working a few men ou tho Confidonce group, also on the Dictator mine.

OREGON.

Baker County.

Managor Vinson of the Emma miue, near Baker City, says further development will be done. To tap the vein below the present workings, a tunnel 2000 feet in length will he run. As the buildings are not large enough to accommodate two sets of men, those working at the upper workings and those at the mill will ho laid off temporarily. The tuunel will be operated with twelve men. The management havo decided to huild a 20-stamp mill at the mouth of tho new tunnel next summer.

On North Pole divide, near Sumpter, the Platts group, joining the Orogon Clipper on tho south, and extending into the Rock creek hasin, has been takeu ovor hy the Geiser-Hendryx Co. Development work continues. The group consists of ten claims, sevon of which are end-on, covering a lode striking down the Rock creek basin from the North and the South Pole groups.

It is stated that the Sumpter smelter, at Sumptor, will hlow in Jan. 1st.

Douglas County.

The Oregou Securities Co. is finishing its 30-stamp mill and 500 H. P. electric plant at Bohemia. The wagon road up Champion canyon and the pole line have heou fully repaired in places, where damaged hy the storm last month, and the tramway and snowsheds from the mill up the mountain to the mouth of the tunnel and ovor tho saddles are nearing completion.

Grant County.

The Black Butto M. Co. has been organizod and has taken over tho Black Butte group in Fox valley, near Fox. Thore are tweuty-five full claims in the group, nine of which are patented. There are two mills on the group, buildings, and the lodo is opened hy adits and a wiuze sunk below this level. The officers of the company are: F. W. Viucend, Pendleton, Or., president, with T. C. Taylor, O. C. Wright, G. H. Wheeler and C. B. Wade. E. C. Allen of Portland is superintoudeut. The main lode is 100 feet wide, with a pay shoot 20 feet wide. A hoist will bo put in in tho spring, as soon as hauling is practicable, with a depth capacity of 500 feet. Drifting on the lode will he started next week. The shaft will he sunk where the winze is located.

E. Simpson, developing the Monitor group, near Susanville, is putting in a Huntington mill. With the mill is a 15 H. P. steam plant. The vein has been opened by a 70-foot crosscut, from which drifts are being made in both directions on the voin. The Huntington mill is of 5 feet diameter.

Jackson County.

The Bill Nye mino, on Galls creek, ¾ of a mile from the Golden Standard mine, near Jacksonville, under Manager Andrews of Medford, has nearly completed a 5-stamp mill and expects to begin milliug ore by Feb. 1st. Machinery has been put in of capacity to sink a 500-foot shaft; also drill and compressor.——The Purkeypile mine, also on Galls creek, has been bonded and eight mou under Foreman W. S. Clark are driving a tunnel. The ore from this mine has been hauled to Gold Hill, heretofore, hy way of Foots Creek, but a 5-stamp mill will be put in at the mine.

Josephine County.

The Sturgis hydraulic placer miues of Forest Creek district, near Graut's Pass, have heen bougbt hy S. A. Vance of Los Angeles, Cal., and $25,000 paid down. Vance will enlarge the plant and shape it for work on a more extensive scale. The property consists of 1400 acres. There are three ditches and water rights, affording a long run each season. He is having the Sturgis overhauled and re-equipped under superintendence of W. R. Olmstead. Two giants will he operated. An electric lightiug plant and telephoue system will be put in and a hydraulic elovator set up to handle the tailings.

SOUTH DAKOTA.

According to the annual report of tbe State Mine Inspector, T. Gregory, the gold production of the Black Hills for the twelve months ending Dec. 1st was $7,159,400.70. The report notes a generally prosperous condition of the mining industry of the State. Strike conditions in other States havo in some instances served to retard developments, one heing the strike among the coal and iron workers, making it difficult for the mines of South Dakota engaged in the building of mills and plants to obtain material. Under the head of labor, Gregory says harmony hetween employer and employed in the mines of South Dakota has prevailed throughout the State, the one exception heing at the smelter of tho Golden Reward M. Co. in Deadwood, in compelling the plant to close down. Other conditions, iucluding litigation, have combined to keep the plant idle, although most of the company's mines have been in operation and part of their ores treated at the company's cyanide plant in Deadwood and the remainder shipped to outside smelters. The miners and mine laborers of South Dakota are paid $3.50 per day for miners, $3 for shovelers and from $2.50 to $4 per day for mill aud other laborers. Generally ten hours' work constitutes a day, though on some work three shifts of eight hours each are employed. Under the head of new reduction plants the following have heeu completed: Horsesboe, Hidden Fortune, Penobscot, Jupiter and Golden Crest, having a combined daily tonnage of 1200 tons. The Homestake has continued as the chief producer of the Black Hills, making material increase in its production for 1903 over 1902. There has been a large amount of "dead work" done in the Black Hills during the year.

TENNESSEE.

Polk County.

The Tennessee C. Co., which is controlled by the same interests as the Santa Fe G. & C. Co., operating at San Pedro, southern Santa Fe county, N. Mex., is producing 100,000 pounds of copper monthly at its mines and smelter at Ducktown. It is laid dowu in New York at a cost of 8½ cents a pouud. The company has heen experimenting with the pyritic process of smelting and has equipped one of its three furuaces for this method. The company proposes changing its remaining furnaces and putting in a fourth. The company is said to he in position to produce during the coming year 18,000,000 pounds of copper. The mines have reached depth of 400 feet.

UTAH.

Beaver County.

The Majestic smelter, at Milford, has closed down. It has not heen intended to keep the plant in continuous operation as yet, it heing realized that this would be impossible with the limited development of the mines, says the Milford Times. The Old Hickory is relied on for the hulk of the tonnage, and the shaft at this property is hut 200 feet deep, while most of the ore that has heen treated has been stoped from above the 100-foot level. The smelter could be supplied with ore for some weeks yet, but the stock of coke on hand is short. Superintendent Kelly reports that since Dec. 1 the plant has treated an average of 206 tons of ore daily under the cold blast. The matte output has heen eighteen tons daily, of an average value of $115 per ton. The plans are to concentrate all work on development of the mines. Work will be resumed this week on the shafts at the Old Hickory, O. K. and Harrington-Hickory, which will ho sent down below water level with threo shifts each. It is intended to use electric drills in the Old Hickory and O. K. shafts. It is expected to he six months at least hefore developments have reached such a stage as to justify resumption hy the smelter. The Salt Lake offices of the Majestic C. Co. will he closed Jan. 1, to concentrate the mauagement at Milford.

Tho Newhouse pipe line is delivering water on the Newhouse townsite, near Frisco, at rate of 2,000,000 gallons every twenty-four hours. Work on the reservoir at the townsite end of the line is under way. This will be cement lined and will have a capacity of 450,000 gallons. It is expected work of construction on the concentrator and other buildings will he started February 1st. Tho water is piped through a 14-inch pipe from the west side of Wah Wah valley to the east side, a distance of 9 milos. The original cost of the springs was $70,000, and the total cost of the system is expected to be $200,000.

At the Blue Acro miue, near Milford, Manager Crowther reports progress on the main shaft, which is cutting a body of copper ore. It is intended to begin drifting as soon as the 400-foot level is reached.

Grand County.

Machinery for the John Clark mill in the La Sals, uear Basin, is on the ground and heing set up. Tho mill will he used on ores of the Gold Basin mine, and the cyaniding plant is of 100 tons daily capacity. The ledge devoloped is 60 feet in width which is said to average $7 per ton. Manager Clark says, besides the mill, a saw mill will bo taken in in tbe spring.

Iron County.

Operations will be resumed at the Ophir mine at Stateline, says Manager Schwartz, who has been ovorhauling the machinery. At first only development work will be done underground, as it will take considerable ore to koop the mill running.

Juab County.

The Grand Central dump of second-class ore at Euroka, which contained 60,000 tons, has been cleaned up and the future tonnage will come from the mine. The ore is said to have netted the company $5 a ton.

The May Day mine, near Eureka, is reported improving. The output of ore and concentrates is increasing. The rock heing marketed is of silver-lead values and brings $800 a car. The ore hody on the 200 foot level has increased in size and value. A new strike is also reported 30 feet below the 100-foot level.

The Minnie-Argontine mine, in the east end of Tintic district, near Eureka, will resume operations. This group is near the Uncle Sam mine.

The Bingham Con. C. & G. M. Co. last week bought the McChrystal estate interests in tbe Eagle & Blue Bell mine at Eureka for a cash consideration, says the Tintic Miner, and will start permanent development work, expecting to have the mine in conditio.i for handling 100 tons a day hy July 1. Manager D. McVichie says, whether the old shaft will he deepened, or a new shaft sunk at a point nearer the ore hodies from the tunnel level, has not yet heen decidod on. It is not intended to stope extensively until the new shaft has reached the ore deposits already opened from the 550-foot level to the 750-foot. The Bingham company has heen handling the mine for the past year under an option. It is near the Grand Central, Centennial Eureka and Eureka Hill.

The stoping of low-grade ores in the Swansea mine at Eureka has heen discontinued indefiuitely, the Majestic smelter, to which the product was shipped, having closed down.

Morgan County.

The New & Great Western M., S. & D. Co., which bought the properties of the Bazouk M. Co. at Bingham, and the Carbonate Gem of Morgan county, is preparing to resume work on the latter group of claims. The mine is equipped with machinery. A patent has been applied for for each of the nine claims. Work on its Bingham property—the Bazouk—is progressing.

Piute County.

The Leo Vernon M. Co. has heen incorporated at Marysvale, to develop a group of seven lode claims in the Ohio mining district, by J. F. Gihbs, J. E. Peterson, J. D. Gihbs and S. L. Page.

The Shamrock Kimherley G. M. Co. has been incorporated hy D. S. Dorrity of Kimherley, president, with M. N. Ross, G. Lewis, M. Sommer, J. C. Cbristianson, C. W. Watts and A. Paxton, Sr., as officers and directors. The company owns a group of seven mining claims (formerly the Hayseed Shamrock) in Gold Mountaiu mining district, near Kimhorley. The principal place of husiness is Richfiold. This property adjoins the Trapper's Prido on the north and the Advocate group of mines on the south, and is ou the Fish creek slope. There are three tunnels, in one of which is a 4-foot vein, assaying $5 in gold and five ounces in silver on the face, says the News. This tunnel is in 350 feet. Another tunnel, which is in 170 feet, shows gold-bearing rock. The Sevier ledge is said to run through this group. Men will be put on this week.

Salt Lake County.

The Rob Roy M. Co. has heen organized at Salt Lake City to develop four lode mining claims in the West Mountain mining district, Salt Lake and Tooele counties. E. Rauch, A. McKollar Jr. and E. McGurrin are officers.

Summit County.

At tho Daly-West mine at Park City sinking has been resumed in the shaft. It is intended to put it down to the 1700-foot level from the 1400 level.

The forwarding of conceutrates from the Kearns-Keith mill at Park City to the sampler hegau last week, says President Kearns.

Tooele County.

The station on the 700-foot level of the Stocktou mine of Stockton is completed and the drills started hoth east and west from the shaft, says Manager Trenam.

The slimes cyaniding plant of the Con. Mercur mino at Mercur is in full operation and haudling the entire output of the mine, amouuting to 800 tons daily, says President Dern.

WASHINGTON.

Ferry County.

Lignite coal is reported found at Republic hy T. Connor.

Okanogan County.

The Palmer Mountain G. M. & T. Co. is huilding a compressor plant at its mine near Loomis. Its construction will he followed by an electric power plant on Toat's Coula creek, a mile across tho valley from the mine. The power plant is preliminary to the further development of the property and eroction of an ore treatmeut plant.——The owners of the Pinnacle mino havo broken into au ore hody. Tho ditch leading to and tbe cam shaft of tho Black Bear mill, which is leased hy the Pinnacle Co., have been ropaired and the stamps are droppiug again after a shutdown of soveral weeks.

The Ruhy Hill mine at Loop Loop has heen closod for the winter, says S. M. Dudley of Portland, Or., superintendent.

H. A. Wilder has a contract to extend the tunnel of tho Northland G. & C. M. Co.'s property on Douglas mountain, near Conconully, 200 feet. The tunnel is 800 feet long and is expected to crosscut the first lead within the next 100 feet. The mine is owned hy F. S. Dement of Walla Walla.——Tho Mineral Hill miue has received several tbousand feet of air piping to provide hetter ventillation for the mine. Faus have been put in. A compressor plant is on the ground and as soon as it is set up a douhle shift of men will he put on tbe main tunnel with machino drills.

Superintendent H. Thompson, of the Interstate M. Co., reports a strike of copper-gold ore in the Koystone tunnel on tbe Crystal Butte mine, near Chesaw. The Koystone tunnel was started Sept. 1st and is in 105 feet. It is being drivon to cut a ledge at 225 feot which shows on the surface. The ore struck last week is a hlind vein.

Snohomish County.

At Silverton work is progressing in several of the mines. There is plenty of timber and water power, says the Record, with tide water near. The camp also has railroad facilities. The Bouanza Queen mine, owned by Minneapolis, Minn., men, is arranging for equipment with a reduction plant.

Stevens County.

The Hibernian G. M. Co. has heen incorporated at Spokane by H. S. Martin, C. C. Culliton and A. E. Gallagher. Tho company's property consists of the Abo Lincoln and the Bryan claims, near the Forry county line. It is a gold-bearing quartz proposition.

J. B. Tuttle, superintendeut of the King mine at Onyx, near Valley, roports more ore opened on the 350-foot level, giving 12 feet width. The ore is hlack sulphide of coppor.——Diamond drill machinery is on the ground for the Iron Hill mine.

Whatcom County.

The Red Mountain G. M. Co., in Mount Baker district, is increasing work on its free milling property. A crosscut tunnel is heing driven 130 feet below the upper workings and when completed drifting and stoping will be started. The company will build a stamp mill. The group

is on Red mountain.——The Great Excelsior mine is expected to turn out more concentrates this winter, owing to addition of more concentrators, slimers and a rolling mill. All are in operation.

The Post-Lambert 10-stamp mill, in Mount Baker district, east of Whatcom, will continue operations during the winter, and in the spring the capacity will be doubled. It is also expected a cyanide plant will be put in to treat the tailings, which assay $3 per ton. The ore carries values of $35 per ton.

WYOMING.

Albany County.

At the Coldwater's Wolverine mine, near Pearl, Colo., south of Laramie, J. Montague, superintendent, says the crosscut from the shaft at depth of 125 feet has cut the ore body for 6 feet, showing a shoot of sulphide ore.

Carbon County.

The owners of the Cumberland copper mine, 8 miles east of Saratoga, have, after a year of idleness, again begun work there. A tunnel 900 feet in length had been run to cut the vein. Not striking the vein at the point calculated, the work was abandoned for a time.

Crook County.

Operations in the oil fields of Moorcroft are being increased. The Butte Crude Petroleum Co., composed of Butte, Mont., men, which owns a large area of ground, has been working steadily since Nov. 1, while the Monumental Co., in which Butte men are also interested, has been drilling since Sept. 10. E. Hickey and J. M. Stewart are part owners and have a well down 800 to 900 feet.——B. Calkins reports having a prospect from which the seepage averages two barrels per day. None of the wells at Moorcroft are through the red sandstone.

Fremont County.

At Lander forty wells have been sunk below the red sandstone, and it was beneath this stone that oil was struck.

FOREIGN.

AFRICA.

Congo State.

The annual report of the Katanga M. Co., of which H. Pasteur of London, Eng., is a director, shows that, according to the exploration works already completed, the mining region of Katanga comprises four groups of deposits: 1. The east or Katanga group. 2. The Kambove group. 3. The Pala group. 4. The Kazemba group, on the left bank of the Upper Lualaba river. Most of the copper ore contains gold, but if the results of the investigations and analyses made are maintained, the gold in the Katanga copper ores will be too insignificant to be taken into account in working for copper. Mining exploration is being carried out to the west of the Lualaba.

Transvaal.

The Jupiter Gold Co., under date of December 3, reports at a depth of 3907 feet in the crosscut from the Catlin shaft from which a drillhole was sunk, the south reef was struck at depth of 90 feet, showing a width of 4 inches, assaying 17 ozs. 8 dwts. per ton, and 2 feet 4 inches assaying 9 dwts. per ton. Further reefs were struck in the hole at 117 feet a width of 6 feet, and at 129 feet a width of 5 feet 2 inches, the assay values being poor. Boring is being continued, and it is estimated the south reef will be struck in the shaft at a depth of 4150 feet.

The figures for production of gold on the Rand for month of November give the output at 279,813 ounces, compared with 284,544 ounces in October, and 187,375 in November, 1902.

The Robinson Central Deep mine at Johannesburg on Nov. 17 reports: The leader has been found below the south reef: the total width of south reef, the leader and the intervening quartzite, where met with in the shaft, is 5 feet 9 inches, showing assay value of 3 ozs. 7 dwts.——The Simmer & Jack West Co., Nov. 19, says in Howard shaft, at end of crosscut driven 90 feet north from the 3400-feet level, put down diamond drill hole, which cut reef at distance of 100 feet, showing 41 inches wide, of which 2 feet assays 12½ dwts per ton. Another reef, struck at depth of 142 feet, is 8 inches wide.

AUSTRALIA.

The Australian gold yield for the first nine months of this year, according to the Australian Mining Standard, shows an increase. The figures (in fine ounces) for the different States are:

	For 9 mos. 1902.	For 9 mos. 1903.	Increase.
Western Australia	1,371,500	1,561,352	189,852
Victoria	523,007	547,509	24,502
Queensland	441,670	480,100	38,430
New South Wales	184,033	203,982	19,949
Totals	2,520,210	2,792,943	272,733

At this rate, the full calendar year is expected to show a total increase in value of £1,500,000.

New South Wales.

The Broken Hill Proprietary Co. at Broken Hill reports for the four weeks ending December 2 (including product from ores purchased) refinery products were: Fine silver, 467,253 ounces; soft lead, 5075 tons; antimonial lead (estimated), 60 tons.——The Broken Hill Water Supply Co., November 30, reports 193 points of rain fallen at Broken Hill, and the reservoir rose 2 feet 10 inches, equal to 1,018,000,000 gallons. This gives a total of 2,293,000,000 gallons.

Queensland.

The Mount Morgan G. Co., at Mount Morgan, under date of Nov. 26, reports diamond drill work as follows: Bore No. 8, vertically above No. 7, at 60 feet, assays average 14 dwts. gold per ton and 3% copper; for 13 feet assays average 7 dwts. gold per ton and 2% copper; stopped. Bore No. 9, at 100 feet, assays average 2 dwts. gold per ton and 2.45% copper; 100 feet, poor; stopped. Vertical holes now being sunk. No. 1, 36 feet, poor country rock; stopped.

South Australia.

The Northern Territories M. & S. Co., under date of December 4, reports that at the Mount Ellison mine they have driven on the lode at the 120-foot level 30 feet during the month of November, making total length of level 130 feet. Ore is being raised. At the Iron Blow mine sinking was resumed on the new main shaft. On the tramway line to Mount Ellison earthworks are completed for 3¼ miles, plate laying and ballasting for 3 miles, and bridges and culverts for 4 miles. At the smelting works the reverberatory furnaces are ready for smelting and the jacket furnace completed. Smelting will start with one reverberatory furnace by December 18. Smelting operations were delayed owing to the heavy rains having soddened the tram line embankments before they were firmly set.

Molybdenite is reported found near Port Lincoln.

Victoria.

The New Chum Railway mine at Bendigo has attained depth of 3900 feet, said to be the deepest in Australia, says the New Zealand Record. At this depth it requires three men to work a rock drill which was operated by two men in the upper levels of the mine. To enable the men to work at the present depth, a stream of water is conveyed from a bulkhead at the 3200-foot level by pipes down the shaft and along the crosscut to within 20 feet of the face. At the end of the piping a spray is fixed, and the water plays on the men as they work at the face, their bodies being thus cooled, the dust kept down, and a current of air created from the shaft.

Western Australia.

The gold exports and mint returns for the eleven months to Dec. 1 are reported as follows:

1903. Period.	Quantity Ounces Exported,	Received at Perth, W. A., Mint. Ounces,	Total Ounces.	Value £
January	101,594	108,857	210,451	757,624
February	80,250	112,148	192,398	692,631
March	78,907	115,816	194,723	701,004
April	86,987	121,640	208,627	751,057
May	92,779	114,722	207,501	747,003
June	72,278	135,781	208,059	742,014
July	90,176	122,325	212,501	765,005
August	82,265	124,352	206,617	743,822
September	71,581	120,824	201,405	725,057
October	72,494	118,291	190,785	686,824
November	75,775	125,399	201,174	724,224
Totals			2,234,241	8,036,265

At the copper mines at Anaconda refining machinery is being put in for the smelter, so that further shipments of matte will not be necessary. The ore is said to average 4½% copper.

The milling plant of fifty head of stamps is in full operation at the Oroya-Brown Hill mine, at Kalgoorlie, and the management expects to treat 7000 tons of ore monthly. They will reduce the grade of ore so as to yield 30 dwt. of fine gold per ton, to permit all ore of a payable character met with in the course of mining to be extracted and treated, and also allow the monthly fine gold yield of 1050 ounces to be maintained, says the Government Journal.

ARGENTINE.

Important mineral discoveries are reported made at Agua Caliente, Provence of La Rioja. The ore carries gold, silver, tin and copper.

BRITISH COLUMBIA.

Boundary District.

Manager Pemberton of the Montreal & Boston C. Co., operating the smelter at Boundary Falls, says the smelter will continue to be run at full capacity of two furnaces this winter and another furnace will be added in the spring.

It is reported that the Granby C. Co., at its smelter at Grand Forks, last week, began surveys for six additional copper furnaces, which will give them a total of twelve furnaces.

The Snowshoe group of mines at Phoenix, after steady development for five years, has arrived at the point where it is necessary to own a smelter or an interest in one, says Manager A. J. McMillan of Rossland. It has been decided to cease shipments from the mine to customs smelters pending permanent smelting arrangements. Superintendent J. W. Astley has suspended operations temporarily. The Snowshoe has a large amount of ore blocked out, and also considerable tonnage broken down ready for removal and shipment to a smelter.

Rossland District.

The White Bear M. Co. has bought for construction of its proposed 100-ton oil process concentrator within the city limits in preference to selecting a millsite outside. The millsite selected is east of the new shafthouse, south of Kootenay avenue. Arrangements are being made for water supply, for building a tramway, etc.

Vancouver Island.

The Wellington Colliery Co. reports opening additional coal bodies in No. 7 mine at Cumberland, where it has been driving a slope for several months, encountering difficulties with water and quicksand. It has struck a 7-foot seam of hard coal which burns well. The development of the coal will be rushed. The water is under control. There are three shifts at work.

The Tyee C. Co., at Ladysmith, reports smelting results for twenty-nine days of November: Tyee ore, 4830 tons; customs ore, 1510 tons; total, 6340 tons; matte produced from same, 700 tons; gross value of contents (copper, silver and gold), after allowing for costs of refining and purchase of customs ore, were $65,735. The smelter is shut down temporarily for the usual repairs and until the completion of the aerial ropeway.

CANADA.

Ontario.

A consolidation is reported of mining properties in the Sturgeon lake section, near Wahigoou, to have been effected, and the Northern Light M. & M. Co. organized, to operate the mines. The new company will control seven groups, comprising 657 acres, which were owned by Port Arthur, Duluth and West Superior men. The mines have all been explored and show free milling ore.

GERMANY.

The association of German manufacturers of iron and steel places the production of "raw" iron of the German Empire, Luxemburg included, for month of September, 1903, at 327,298 metric tons, of which 37,799 tons were cast iron, 271,445 tons Thomas iron, and 18,054 tons puddled iron, writes United States Consul-General R. Guenther, at Frankfort. This production is 4.18% less than in preceding month, which was 341,583 tons. In September, 1902, the total production was 291,997 tons. The total production of the works comprised in said association for the first nine months of 1903 was 2,924,293 tons, against 2,465,185 tons for the corresponding period of 1902.

JAPAN.

The Department of Finance has published a report showing the following table of the production of the chief minerals produced in Japan in the years 1899-1901:

	1899.	1900.	1901.
Gold—momme	446,716	566,535	660,653
Silver—momme	14,978,060	15,681,595	14,598,749
Copper—kin	40,459,709	42,183,353	45,052,927
Iron—kwan	6,151,033	6,624,447	18,680,043
Antimony—kin	1,568,462	616,477	911,462
Manganese—kin	18,803,440	26,381,526	27,115,884
Coal—tons	6,721,798	7,429,457	8,945,930
Petroleum—koku	474,406	767,092	983,790
Sulphur—kin	17,062,186	24,064,196	27,580,478

Kwan = 1000 momme = 8.267 pounds avoirdupois. Kin = 1.325 pounds avoirdupois. Koku = 39.7 gallons.

JAVA.

Near Tjilatjap, on the coast of the island, extensive deposits of magnetic iron sand are reported to have been found. The deposits begin opposite the island of Noesa Kembangan and extend 29 miles to the east along the coast line. The sand lies on the surface and is said to contain in places a high percentage of iron. Samples taken have given good results when smelted. An English company has acquired the right of exploiting these deposits, which have been known since 1854.

MALAY PENINSULA.

The Pahang Corporation at Pahang reports returns for the month of October: In twenty-nine days 2700 tons of ore crushed, producing fifty tons of black tin, with fifty stamps running. The working costs were $29,500.——The Pahang Kabang Co. October returns were: In twenty-nine days, 620 tons of ore were crushed, producing fifteen and one-half tons of black tin, with ten stamps dropping. Working costs, $8,250.

The Perak Pioneer says: The total quantity of tin and tin ore exported from Perak, Selangor and Negri Sembilan for the first nine months of 1903, amounted to 601,344 pikuls, which represent an increase of 38,230 pikuls (2,270 tons) as compared with the corresponding period of 1902. The duty realized thereon was $7,244,942, which shows an increase of $1,141,059 over that of the same period in 1902.

MEXICO.

U. S. Consul J. A. LeRoy, at Durango, writes that during the past ten years imports of coal and coke from the United States to Mexico have increased rapidly, owing to the extension of railroads and the industrial development of the country. It is thought, however, that these imports, while they may continue to gain in actual value on account of such development, will show a relative decline. One of the subcommissions of the Mexican monetary conference has reported the annual production of coal and coke in Mexico amounts to 1,000,000 tons, and that, at the present rate of increase, this production will be doubled by 1905. The Mexican National Iron & Steel Co., an American company, which is exploiting the "iron mountain" at Durango, gets all its coke from Sabinas district, in State of Coahuila, where three-fourths of the Mexican output of coal and coke is produced. The price paid for coke at Durango is $7 to $10 per ton.

Chihuahua.

E. M. Alpangh of Los Angeles, Cal., of the Santa Maria & Parral M. Co., reports work going ahead at their group in Dallerza mining district, 30 miles from Parral. Pay ore was discovered at the grass roots and a shaft has been sunk on the ore body for 100 feet. The vein is 9 feet in width and averaging $20 in lead-silver values. There is ample supply of timber on the ground, an abundance of water, and a wagon road from the mines to the railroad, a distance of 25 miles. There are forty pertenencias in the group. The company also own the Porte Rican gold property in the State of Durango. Machinery will be put in at both mines.

Preparations are said to be under way for metallurgical works and smelters by Senor Becerra at El Potrero, on the left bank of the Urique river, in municipality of Urique, under a concession granted by the Government. The concession gives him the right to use the waters of the river for motive power.

H. I. Smith and F. I. Davison of Boston, Mass., G. H. Davis and G. W. Boyce, have bought the Campo Vieje silver-lead mine, in Terrazas camp, 25 miles north of Chihuahua, and one mile from the main line of the Mexican Central railroad. The Campo Viejo is said to be on the same vein as the Americana mine, which is producing 150 tons per day, yielding forty ounces of silver per ton and 20% lead.

The Mines Companies Ltd. of Boston, Mass., is being organized to operate the Campo Viejo. Several shafts will be sunk. Work will be started this week on shaft No. 1, where a steam hoist will be put in. G. W. Boyce is superintendent.

The output of the Palmillo mine, at Parral, is said to be $100,000 per day, reports the Mexican Investor. On the 700-foot level the vein is 40 feet wide. The new shaft, which is down 700 feet, is equipped with an electric hoist, having a capacity for raising 1500 tons of ore per day from a depth of 2500 feet. Work is progressing on the Capusaya group which adjoins the Palmillo mine. It is being operated by the Mexican M. & Exp. Co., with H. G. Catlin as manager. The Guaynopa S. & R. Co., operating in Guerrero district, proposes to build a power plant on the Guaynopa river. The smelting plant of this company is in operation.——In the Arteaga district, the Guazapares M. & M. Co. is pushing work on its properties 45 kilometers east from Chinipas. Development work totals 4300 feet, and the group is equipped with mill, leaching plant, etc.

L. Marks, interested in the Laverona mines, near the Dolores mine, near Terrazas, has bought thirty pertenencias of ground adjoining the Laverona, said to be for $100,000 gold. The vein is 6 feet wide and averages $30 per ton, mostly free milling.

L. Marks, interested with J. W. Pender in the Laverona mines, near the Dolores, near Terrazas, has bought thirty pertenencias adjoining the Delores. The Enterprise says, through an erreneous survey, the shaft which was supposed to be on the Laverona was found by a resurvey to be on the property bought by Marks. The vein is 6 feet wide and averages $30 per ton, mostly free milling.

Durango.

The Huahuapan M. Co., which has re-

sumed operations, is increasing development work on its group, near Huahuapan, in San Dimas district. The ore carries values in silver,——La Cong mine, near Inde district, is said to be shipping 200 tons per month of ore, which runs 800 ounces silver, and 0.3 ounce gold per ton, and 10% lead. The Portilla mine, in the same district, is shipping 200 tons of ore per month. In the Santiago Papasquiaro district, the Bacis G. & S. M., Ltd., is pushing work on its properties. The ore carries silver and gold and runs $30 per ton. Equipment consists of a 30-stamp mill, one roller mill, concentrators, etc., operated by water power. Development consists of twelve tunnels, with crosscuts, drifts, etc., the total being over 14,500 feet.

Personal.

J. A. MURRAY of Butte, Mont., is in San Francisco, Cal.

GEO. B. EARNSHAW of Nogales, Arizona, is visiting California.

G. JOHNSTON is manager of the Blaney Oil & Gas Co., near Florence, Colo.

ERNEST STEIN goes as assayer in the new mill at Guanacevi, Mexico.

D. M. MUNRO of San Francisco, Cal., has gone to Rosario, Sinaloa, Mexico.

W. H. MITCHELL of Salt Lake City, Utah, is in San Francisco, Cal., on business.

E. A. H. TAYS, Fuerte, Sinaloa, is in the City of Mexico on professional business.

H. VINCENT WALLACE of Altar, Mexico, is on a three months' visit to London, Eng.

J. J. DALY of Salt Lake City, Utah, of the Daly-West M. Co., is in San Francisco, Cal.

H. C. HOLTHOFF, president of the Holthoff Machinery Co., Cudahy, Wis., is visiting Denver, Colo.

C. O. POOLE, with Hendrie & Bolthoff Mfg. & Supply Co. of Denver, Colo., is in San Francisco, Cal.

A. C. PRATT is superintendent of the Monte Cristo mine near Sweetwater, Esmeralda county, Nev.

D. T. PARKER of Parker & Jamison, Denver, Colo., is examining mining property at Leadville, Colo.

B. H. TATEM of Helena, Mont., is president and manager of the Oro Hondo mine, near Deadwood, S. D.

S. A. HARSH has returned to Denver, Colo., from New Mexico, where he has been for several months past.

SUPERINTENDENT MITCHELL of the Castle Peak mines, near Bodie, Cal., is in Denver, Colo., for the winter.

F. COGILL of London, Eng., has gone to the Gold Coast, West Africa, as secretary for mines of the Gold Coast.

M. MANLEY, superintendent of the Enterprise mines in Trinity county, has gone to Boston, Mass., on mining business.

JOHN T. MILLIKIN, superintendent of the Imperial mill, Deadwood, S. D., is spending the holidays in Denver, Colo.

E. C. ALLEN of Portland, Or., is superintendent of the Black Butte M. Co., operating in Fox valley, Grant county, Or.

R. DE LARGE of Dewey, Ariz., is constructing engineer on the Tonto basin dam, near Livingstone, Gila county, Ariz.

MANAGER PEMBERTON of the Montreal & Boston C. Co., at Boundary Falls, B. C., returned last week from a business trip East.

R. HARRIS, a mining engineer formerly in the Kootenays, B. C., has returned to London, England, from a trip to Rossland, B. C.

J. ADAMI, assayer at the Wallace sampler of the Federal M. & S. Co., Wallace, Idaho, has been appointed superintendent of the plant.

THOMAS J. BARBOUR, chief engineer of the Risdon Iron Works, has returned to San Francisco, Cal., from a several weeks' visit to New York.

W. F. DETERT of Jackson, Cal., president and manager of the Argonaut M. Co., made a business trip to San Francisco, Cal., this week.

SUPERINTENDENT HAMPTON of the Oneida mine, north of Jackson, Amador county, Cal., has returned to Jackson from San Francisco, Cal.

T. S. DAYTON, resident manager of the Mexico Mine & Smelter Supply Co., has returned to Mexico City from a trip to New York, N. Y., and Denver, Colo.

W. R. FELDTMANN of London, Eng., is consulting engineer for the Wassau (Gold Coast) M. Co., Ltd., and for the Gold Coast Amalgamated Mines, Ltd., West Africa.

J. H. TIBBITS of Redding, Cal., for the past eight months superintendent of the smelting works at Marfa, Texas, is at Sutter Creek, Cal., and will go to St. Louis, Mo., next month.

T. BUTEMENT, formerly manager of the Princess Royal mine, at Cue, Western Australia, and recently in charge of the Field's Find, is assistant director of the School of Mines at Kalgoorlie, Western Australia.

F. W. BRADLEY of San Francisco, Cal., president of the Bunker Hill & Sullivan M. & Concentrating Co. of Wardner, Idaho, has returned to San Francisco from a trip to New York and an extended visit to mines in the Northwest.

H. CLAGETT, recently superintendent of the Wallace (Idaho) sampler of the Federal M. & S. Co., is with the Hecla M. Co. of Burke, Idaho. He left for Salida, Colo., last week to represent the company at the smelter where its ores are being treated.

KIKEI NISHIKAWAR, chief engineer of the Bessi Copper Co. of Tokio, Japan, operating copper mines in Japan, is in San Francisco, Cal. He will visit the principal copper camps of the United States to inspect the American methods of mining and smelting copper ore.

R. G. WILSON of Salt Lake City, Utah, president of the New York Bonanza mine, at Park City, Utah, returned last week from an extended trip through the East and South, in the course of which he inspected some of the iron prospects of northeastern Texas, near the Indian Territory line.

Commercial Paragraphs.

FROM Jas. L. Robertson & Sons, 204 Fulton street, New York, N. Y., is received a clever little lock bill file that serves a useful purpose, and incidentally advertises their Eureka packing. The bill file will be sent anywhere on request.

"WE PULL FOR LESCHENS" is what one reads on the large leather collars of the horses attached to the wagons of A. Leschen & Sons Rope Co., in St. Louis, New York, Chicago and Denver. These are the wagons in which they deliver their reels and coils of Hercules and patent flattened strand and all other kinds of wire rope. A. Leschen & Sons Rope Co. also manufacture and erect aerial wire rope tramways of every description; likewise underground and surface wire rope haulage plants, with experienced engineers in charge of the different departments. The home office of A. Leschen & Sons Rope Co. is 920-932 North First St., St. Louis, Mo.

Books Received.

"The Factory Manager and Accountant" is the title of a new work by Horace L. Arnold—a book of practical cost keeping. The blanks and forms appearing in the book are reproductions of actual pages, and these forms can be suited to any kind of manufacturing business and also to mining, in which industry the keeping of accurate cost sheets has become a necessity. The methods of successful managers are incorporated in this volume, and any manager not fully satisfied with his own methods may find in this new publication something that will assist him to evolve just what he wants; 432 pages, 6x9 inches; illustrated; cloth binding. Price, $5. The Engineering Magazine, 120 Liberty St., New York City, and 222 Strand, London, W. C.

Obituary.

J. POWNING, a pioneer mining man of the Comstock in Nevada and of Grass Valley, Cal., died at Grass Valley on the 11th inst.

W. C. HARRINGTON, a pioneer mining man of Eureka, Nev., died in Eureka on the 8th inst. Deceased was a native of Vermont, 79 years of age. In 1869 he was foreman of the Jackson mine, in Eureka district, and later was owner of several claims on Peelstick hill.

J. M. JOHNSON, a pioneer miner and millman of California, died at Grass Valley, Cal., on the 12th inst. from consumption. Deceased was a native of Morgan, Indiana, 73 years of age, and went to California in 1850 and mined in Amador, Placer and Nevada counties.

Latest Market Reports.

SAN FRANCISCO, December 24, 1903.

METALS.

SILVER.—Per oz., Troy: London, 27½d (standard ounce, 925 fine); New York, bar silver, 55⅝c, refined (1000 fine); San Francisco, 55⅝c; Mexican dollars, 43@45c San Francisco, 42⅜c New York.

COPPER. — New York: Standard, $12.37½; Lake, 1 to 3 casks, $12.37½; Electrolytic, 1 to 3 casks, $12.25; Casting, 1 to 3 casks, $12.12½; San Francisco: $15.00. Mill copper plates, $17.00; bars, 18@24c. London: £56 15d spot per ton.

Copper has remained unchanged in New York during the past week, but made a slight advance in London, with somewhat higher price for future delivery.

LEAD. — New York, $4.37½; Salt Lake City, $3.50; St. Louis, $4.00; San Francisco, $4.50, carload lots; 4⅜c 1000 to 4000 lbs.; pipe 6½, sheet 7, bar 5¾c; pig, $4.75. London: £11 6s 3d ℔ long ton.

SPELTER.—New York, $5.00; St. Louis, $5.10; London, £21 7s 6d ℔ ton; San Francisco, ton lots, 6¾c; 100-lb. lots, 7c.

TIN.—New York, pig, $28.25 @ 28.50; San Francisco, ton lots, 30c; 500 lbs., 28½c; 200 lbs., 30½c; less, 31c; bar tin, ℔ lb., 30@32c. London, £129.

PLATINUM. — San Francisco, crude, $18.00 ℔ oz.; New York, ingot, $19.00 ℔ Troy oz. Platinum ware, 75 @ 82c ℔ gram.

QUICKSILVER. — New York, $46.50@47.00, large lots; London, £8 7s 6d; San Francisco, local, $44@44.50 ℔ flask of 76½ lbs.; Denver, $48.00. Export, $42.00@42.50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 31½c; Eclipse, 35c.

SOLDER. — Half-and-half, 100-lb. lots, 18.75c; San Francisco, Plumbers', 100-lb. lots, 15.75c.

ZINC.—Metallic, chemically pure, ℔ lb., 50c; dust, ℔ lb., 10c; sulphate, ℔ lb., .04c.

NICKEL.—New York, 50@60c ℔ lb.; ton lots, 40@47c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30@34c.

LUMBER. — (Retail): Pine, ordinary sizes, $24.00@25.00; extra sizes higher; redwood, $28.00@30.00; lath, 4 feet, $4.50 @5.00; pickets, $21.00; shingles, $2.50 for No. 1 and $2.25 for No. 2; shakes, $13.50 for split and $15.00 for sawed; rustic, $28.00 @35.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, $3.35; Cut, $3.55; 10d to 16d, Wire, $3.45; Cut, $3.35; 8d Wire, $3.50; Cut, $3.50; 6d and 7d, Wire, $3.60; Cut, $3.60; 4 and 5d, Wire, $3.70; Cut, $3.70; 3d, Wire, $3.85; Cut, $3.85; 2d, Wire, $4.10; Cut, $4.10. Special rates for carload lots.

LIME.—Santa Cruz, $1.60 country, $1.75 city ℔ bbl.

CEMENT.—Imported, $2.50@2.75 ℔ bbl.; California carload lots, $2.25 f. o. b. at works; small lots, $2.50 ℔ bbl. in sacks, 4 sacks to bbl.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, $14.00 @14.35; gray forge, $12.35; San Francisco, bar, 3c ℔ lb., 3¼c in small quantities.

STEEL. — Bessemer billets, Pittsburg, $23.00@23.00; open hearth billets, $23.00 @23.00; San Francisco, bar, 7c to 12c ℔ lb.

GENERAL SUPPLIES.

ANTIMONY. — New York, Cookson's, 7½c; Hallett's, 6¾c; San Francisco, 1000-lb. lots, 8c; 300@500-lbs., 8½c; 100-lb. lots, 10½c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2.00 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x $8; Lion, $9, in lots not less than 1000.

FUSE. —Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c ℔ set; 14 oz., 40s., 10c.

CHEMICALS. — Cyanide of potassium, 98%-99%, jobbing, 23@24c ℔ lb.; carloads, 23@23½c; in tins, 30c; soda ash, $2.00 ℔ 100 lbs.; hyposulphite of soda, 3@3½c per lb.; caustic soda, in drums, 3@3½c ℔ lb.; Cal. s. soda, bbls., $1.20@1.40 ℔ 100 lbs.; sks., $1.05; chlorate of potash, 12@13c; nitrate of potash, bbls., 10c; caustic potash, 10c in 40-lb. tins; roll sulphur, 2½@2¾c; powdered sulphur, 2@3c; flour sulphur, French, 3½@3¾c; alum, $2.00@2.25; California refined, 1¾@2c; sulphide of iron, 8c ℔ lb.; copper sulphate, 5½@5¾c; chloride of lime, spot, $2.50@2.75; sulphuric acid, in carboys, 66% B, 1¾@2c ℔ lb.; nitric acid, carboys, 8c ℔ lb.

BONE ASH.—Extra No. 1, 5@6c ℔ lb. No. 1, 4@5c.

WHITE LEAD.—Per lb., in kegs: 500 lbs. and over at one purchase, per lb., 6½c; less than 500 lbs., per lb., 7c; in 25-lb. tin pails, ¼c ℔ lb. above keg price; in 1 and 5-lb tin cans, 100 lbs. per case, ½c. per lb. above keg price. Dry Lead—In bbls., 1 ton and over, 6½c; do. in kegs, 7c.

RED LEAD.—500 lbs. and over at one purchase, ℔ lb., 6½c; less than 500 lbs., 7c.

LITHARGE.—Pure, in 25-lb. bags, 8@9c ℔ lb.

BORAX.—Concentrated, 6@7c ℔ lb; powdered, 8@10c; fused, 20@25c; crystal, 7c; calcined, 25c.

MANGANESE.—Pure, ℔ lb., 60c.

SODIUM.—Metal, ℔ lb., $1.00.

BISMUTH.—Subnitrate, ℔ lb., $1.75.

MERCURY.—Bichloride, ℔ lb., 90c.

MOLYBDENUM.—$2.00 ℔ lb.

CHROMIUM.—90% and over, ℔ lb., $1.00.

PHOSPHORUS.—American, ℔ lb., 75c.

SILVER.—Chloride, ℔ oz., 90c@$1.00; nitrate, 55c.

ALUMINUM.—No. 1., 99%, small lots, 37c ℔ lb.; 100 lbs., 35c; 1000 lbs, 34c; ton lots and over, 33c, Pittsburg. No. 2, 90%, small lots, 34c; ton lots and over, 31c, Pittsburg.

URANIUM.—Oxide, ℔ lb., $3.50.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific Coast inventors:

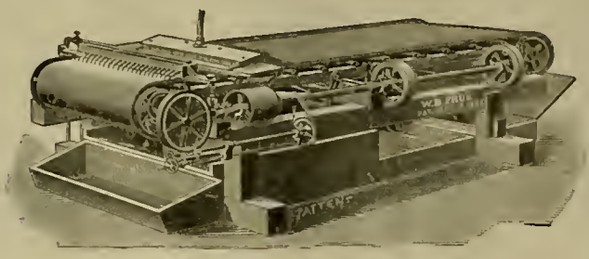
FOR THE WEEK ENDING DECEMBER 15, 1903.

747,113.—HOISTING APPARATUS—C. J. Allen, S. F.
747,116.—LOCK—W. Amstalden, Amador City, Cal.
747,291.—PROCESS—D. M. Balch, Coronado, Cal.
747,119.—HANGER—H. Barry, S. F.
746,914.—VAPOR GENERATOR—F. H. Bates, S. F.
747,120.—BUILDING CONSTRUCTION—J. W. Beaumont, Los Angeles, Cal.
746,662.—CAN HEADER—Black & Smith, S. F.
747,037.—RAIL JOINT—R. C. Bott, Grouse, Or.
747,298.—CLUTCH—T. Carroll, Anaheim, Cal.
747,136.—HAILROAD RAIL FASTENER—C. G. Chamberlain, Pacific Grove, Cal.
746,790.—FOWL FOTNTAIN—S. H. Church, Los Angeles, Cal.
747,145.—HAND HOLD—G. W. Covington, Emeryville, Cal.
746,685.—CATTLE GUARD—Dement & Prendergast, Blaine, Wash.
746,686.—SAW—E. B. Dennison, Eureka, Cal.
747,151.—STEAM COOKER—F. A. Dixon, San Jose, Cal.
747,155.—TROLLEY SWITCH | L, E. Elwell, Los Angeles, Cal.
747,054.—PITMAN—D. W. Fagalde, Douglas, Or.
74g,815.—CAN—D. Ghirardelli, S. F.
746,816.—TRUCK—C. A Goddard, Seattle, Wash.
747,176.—BED BOTTOM—J. Hoey, S. F.
746,842.—BOTTLE—Irwin & Jackson, S. F.
746,720.—PULP REMOVER—H. H. Lyon, Riverside, Cal.
746,982.—SAW SHARPENER — McCauley & Renie, Hoquiam, Cal.
746,977.—RAILROAD SIGNAL—Mills & Piddington, Los Angeles, Cal.
747,225.—RAILROAD SIGNAL—Mills & Piddington, Los Angeles, Cal.
746,869.—PREVENTING SNORING — S. A. Moulton, Campbell, Cal.
747,212.—DISPLAY LIGHT—D. J. O'Brien, S. F.
747,083.—UNDERCUTTER — J. Pierce, Tumwater, Wash.
747,223.—DEEP WELL PUMP—G. C. Richards, Oakland, Cal.
746,880.—CANE—L. R. Robertson, Oakland, Cal.
747,008.—HOSE COUPLING—H. E. Smith, Roslyn, Wash.
746,897.—PENCIL CASE — B. F. Stuart, Seattle, Wash.
747,268.—GOLD SAVING DEVICE—S. C. Szenaaski, S. F.
746,899.—FURNACE—J. Todd, Seattle, Wash.

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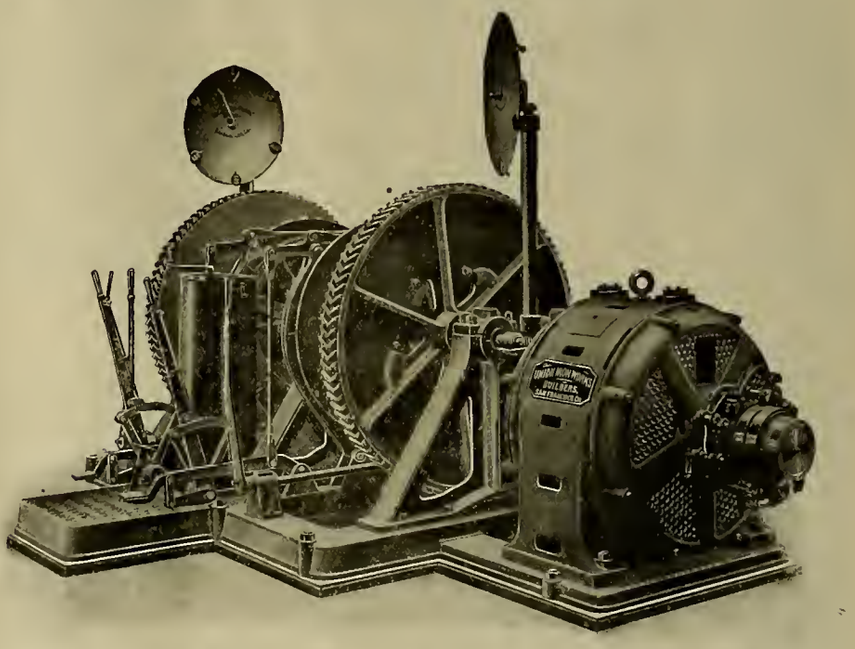
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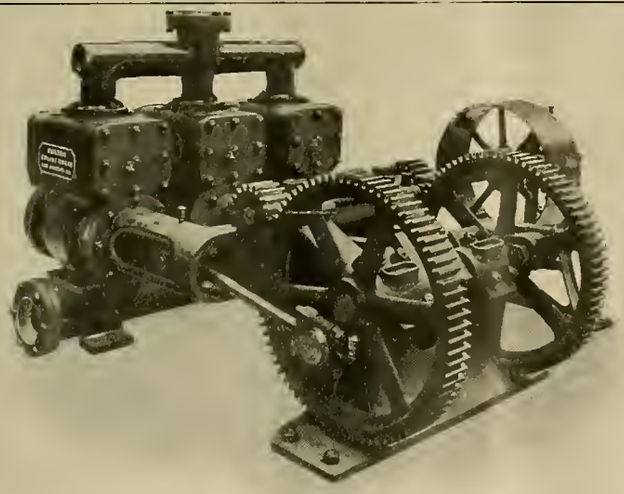
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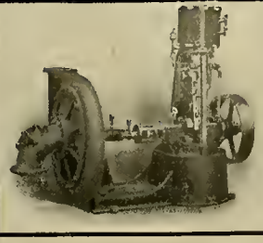
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INDEX TO VOLUME LXXXVII

OF THE

Mining and Scientific Press

FROM JULY TO DECEMBER, 1903.

A

Accessibility as a Factor in Mining and Related Business....371
Accumulator, Electric....383
Acetylene....128
Acid, Hydrocyanic....366
As Solvents in Leaching Copper Ores....54
Muriatic....35
Of Boiler Water, to Neutralize....111
Parting of Gold and Silver....128
Adulteration in Cement, Detection of....403
Advance in Machinery....146
Advantages of Leasing System....95
Of Tecbnical Education....332
Advertising....146
*Aerial Ropeway....172
*Ropeway, Automatic Bucket Loader for....189
*Ropeway, Discharge Terminal for....307
Tramways....200
Tramways in South America....417
African Mines....13, 14, 30, 58, 92, 123, 140, 159, 176, 193, 226, 244, 261, 278, 311, 345, 361, 378, 397, 412, 430
Age of Stamp Mill....49
Agglomerate....79
Agricultural Land....339
Aiken, P. B....399, 402
Ainsworth, W., & Sons....93
Air Compressor, Capacity....49, 417
Compressor, Efficiency of....418
Compressor, Electrically Driven....79
*Compressor, Four Stage....405
*Compressor, Valve for....274
Compressor Valves....266
For Drill....49
Liquid....147
Receiver....146
Weight of....417
*Ajax Drill Sharpener....9
Alabama Mines....258
Alabaster....96
Alaska and Northwest Territory, Observations On....81
Boundary Fixed....265
*Douglas Island Milling....268, 269, 289, 303
*Douglas Island Mining....320
Kayak Coal and Oil Fields....65
Mines....11, 27, 42, 56, 71, 88, 103, 120, 137, 156, 173, 190, 207, 223, 240, 258, 275, 292, 308, 325, 342, 358, 375, 393, 408, 426.
*Mining In....94
*Alcohol Blow Pipe....135
Alderson, M. W....267
Algonkian and Archæan....66
Alkalies in Cyanide Process, Use of....52
Allis-Chalmers Co....124, 150, 228, 398
Alloy, An Expansive....128
For Bearings....131
Fusible....147, 248
Nickel-Iron, Process for Making....136
Of Gold and Aluminum....248
Resembling Silver....248
*Alluvial Deposits of Horsefly, B. C....284, 285, 305
Almaden, Spain, Mines....300
*Alsek Placer District, Yukon Territory....370
Altitude and Rainfall....96
Effect on Boiling Point....63
Of California and Colorado Mines....79
Aluminum....3, 181
And Bauxite....202
*Manufactured from Silicate....22
Not Easily Soldered or Plated....367
Amalgam, Cleaning....333
Cleaning Up....198
*Machine for Recovering....374
On Concentrators....383
Retorting....63
Use of Instead of Quicksilver....111
Amalgamating After Roasting....333
Gold Ores....3
Plates....366
Amalgamation, Hints on....65
On Silver Plates....111
*Amalgamator....87, 239, 341, 374
*And Concentrator....374
*Quicksilver Feed For....41
American Miners Abroad....163
Concentrator Co....178
Institute of Mining Engineers....229
Machinery for South Africa....203
Mining Congress....48, 95, 146, 166, 182, 365, 403
Steam Gauge and Valve Mfg. Co....413
Timbers, Strength of....389
Amethyst....19
Ammonal, a New Explosive....306
Amorphous....128
Amperage for Incandescent Light....147
Amphibole....79, 417
Analysis of Cements....147
Ancient Mines, Modern Methods in....299
"Angle of Convenience"....19
In Cornish Pump Rod....215
Of Dip, Effect of, on Stoping....215
Of Inclination of Shaft....111
Anorthite....316
Annealed Silver Wire....401
Annealing and Case Hardening Tool Steel....288
Anniversary Congratulations....126
Answers to Questions....181
Antidote for Cyanide Poisoning....147
Antimonial Lead....147, 417
Antimony in Hard Lead....248
Oxide....266
Salts of....283
Apex....366
*Apparatus for Separating Liquids From Solids....41
*Concentrating....388
*Conveyor....102
*For Charging and Cleaning Furnaces....307
*For Dearsenicating and Amalgamating Ores....291
*For Dumping....102
*For Extracting Gold and Other Metals From Ores....172, 189
*For Extracting Precious Metals....274
*For Extracting Precious Metals From Cyanide Solutions....357
*For Handling Ores....55
*For Mixing Mineral or Other Dry Substances....324
*For Ore Lixiviating....119
*For Recovery of Precious Metals....119
*For Removing Impurities From Furnaces....407
*For Sizing Ores or Other Uses....6
*For Smelting....87

*This mark indicates that the article indexed is illustrated.

PAGE.
*For Storing Materials....41
*For Treating Ores....388
*Mine Timbering....324
*Ore Dumping....136
*Ore Milling....6
*Pulverizing....257, 407
*Sizing and Classifying....291
*Supporting and Conveying for Ore Scrapers....307
*Application of Water in Rock Drilling....152
Of the Cyanide Process....399
*Approximate Data on Open Streams, Weirs, Pipes, Etc....86
*Aqueducts in Mining....131
Archæan and Algonkian....66
Area of Circle....49
Argument....417
Arizona Copper Smelting Practice....147
*Gold Mill and Cyanide Plant....162, 166
Mines....11, 27, 42, 56, 71, 88, 103, 120, 137, 156, 173, 190, 207, 223, 240, 258, 275, 292, 308, 325, 342, 358, 375, 393, 408, 426.
Strikers....315
*Sultan Mine Equipment....314, 319, 335
Arkansas Mines....27, 56, 88, 103, 137, 156, 190, 258, 275, 393, 426.
Armstrong Bros.' Tool Co....380
Arrastra, Power for....401
Arsenic....79
In Ores....333
Artificial Diamonds....19
Art of Diamond Cutting....33
Asbestos....147, 360
Et al....165
Production....401
Asb of Charcoal....128
*Ashland Mine, Shaft Sinking and Equipment at....323, 337
Asiatic Labor for the Rand....349
Asphalt....181
Assassination by Strikers....349
*Assayer's Ore Crushers....136
*Pulverizing Apparatus....407
Assaying Cyanide Solutions....10, 266, 316
Copper Ores....49
Gold and Silver at the U. S. Mint....317
Of Silver-Gold Bullion....363
Zinc Ores....316
Assay Losses....111
Of Copper....417
Of Lead in Ores....114, 128
Of Tin in Tailings and Slimes....424
Of Wall Rocks....283
Assessment Work....49, 63, 146, 231, 266, 366
Atlantic Slope, Gold Fields of....183
Atmospheric Pressure....417
*Attachment for Roasting Furnace....374
Augite....350
*Augur, Earth Boring....306
Austin Mfg. Co....279
Australian Mines....14, 30, 44, 58, 74, 92, 123, 140, 159, 193, 210, 226, 244, 261, 295, 311, 328, 345, 361, 378, 370, 412, 430.
Australia, Western, Steam Condensing....63
*Automatic Bucket Loader for Aerial Wire Ropeway....189
Dumping of Skips....266
*Dumping Device for Ore Buckets....102
Ore Samplers....40
*Pulp Sampler....222
*Shut-off Valve, Locke....85
Axles, Car, Steel for....266

B

Bald Mt. District, S. D., Potsdam Formation....167
Ballarat District, Victoria, Geology of....283
*Ball Grinding Mill....341
*Mill, Tubular....374
Stamp....383
Barium Chloride....417
Barometric Pressure and Shaft Deptb....417
Barrel Chlorination....248
Barren Zone in a Mine....417
Barriers in Yuba River, Cal....365
Bartlett, C. O., & Snow Co....93, 263
Basalt....231, 333
Base Ores, Treatment....300
Basis of Mine Investigation....230
Battery Blocks....231
Capacity....3
Plates, Covered With Coarse Screen....300
Plates Detached....96
"Beach Washer"....401
Beam, I. W....160
*Beaudry Champion Power Hammer....38
Becker, C....245
Becket, F. S....36
Belgium's Mines....378
Bell, R. M....351
Ranch, N. M., Rock Sample....283
Signal Code....230
Wires, Springs on....266
Belt Dressing....383
*Or Like Conveyor....239
Belts....96, 164, 198, 366
Conveying....49
Speed of....366
Bendigo, Australia, Saddle Reefs....215
*Berrigan Centrifugal Separator....184
Bessemerizing Copper Matte....80
Best Mfg. Co....168
*Big Indian Mine....229, 236
Bismuth....63
*Bit for Rock Drill....87
*Bituminous Rock in California....151
Black Hills, Devonian Rock in....283
*Mines, Two Noted....264
*Mining Telluride Ores in....281, 290
Ore Deposits of....166, 187, 205, 221
Oxide of Manganese....383
Prints, Making of, From Drawing....248
*Sand, Device for Treating....321
Sand, Gold Bearing....147
Blacksmith Not a Machinist....19
Blaisdell Co....313, 329
Blanket Concentration....35
*Blast Cartridge, Safety....87
*Cavities, Tester for....407
*Furnace....218, 366
Furnace Capacity....417
*Furnace Charging Car....136
Furnace, Size of....248
*Furnace Top....41
Furnace, Fine Ore in....164
*Furnace, Support for Cooling Plates of....374, 407
Blasting Compounds....248
*Caps, Device for Protecting....407
Signal....266
*Squib....291
Bleaching Powder....283
Blende, Zinc in....128
Blocks, Battery....231
"Blowing In"....19
Blowpipe, Determination of Minerals by....231
*Double Jet Alcobol....135
Blue Prints....383
*Prints, How to Make....153
"Blue Leads" of California Placers....401
Bohemian Miners' Wages in....154
Boiler, Horse Power of....231, 350
Scale....79, 417
Tests....63
Boilers, Riveted Joints of....128
Setting....401
Boiling Point, Effect of Altitude on....62
Point, Effect of Pressure on....79
Bonded Stocks....180

PAGE.
Bonds, Giving of, on Sbaft Work....79
Bookkeeping....266
Book Notices....32, 93, 211, 228, 245, 263, 296, 329, 374, 398, 412, 431.
Borate, California, Mineral Sample....79, 215
Borax, Production....114
Bornite....35
Borthwick, A. E....389
Boundaries of Locations....400, 417
Bounty on Lead, Canadian....34
On Steel, Canadian....41
Bouse Hydraulic Machinery Co....245
*Box Electric Drill....199
"Bracket Flume"....248
Bradley, W. W....201
Brakes on Hoisting Engine....215
Brass....231, 383
And Mercury, Amalgamation of....283
Brazil, Diamonds in....49
Brazil's Mines....92, 140, 261
"Breast Boards" in Running Ground....350
Brewer, W. M....1, 7, 284, 285, 305, 370
Bricks....366
For Refractory Linings, Process for Making....87
Brittle Gold....266, 333
Briquettes, Petroleum....117
*British Columbia, Cascade, Cascade Water Power and Ligbt Co....—
Cbinese in....314, 332
Cyanide Plant and Practice at Ymir Mine....253, 271
Guiana's Mines....262
*Horsefly Alluvial Deposits of....284, 285, 305
Lenora Mine, Mt. Sicker....382
Mines....14, 30, 31, 45, 59, 74, 92, 107, 123, 140, 141, 159, 176, 194, 210, 227, 244, 261, 278, 295, 312, 328, 345, 361, 362, 379, 397, 412, 430.
Mining Court in....400
*Mount Sicker Mining District....1, 7
"Rawbiding" Ore....383
Refining Silver in....373
*Broken Hill, N. S. W., Mining in....40, 53, 67
Proprietary Mine, N. S. W....111
Bromine....40
Bromo-cyanide Process....3, 198
Brown Corliss Engine Co....245, 363
Brown, S. O....221
Bruckner Roasting Furnace....63
Bucket, In Shaft Sinking....96
*Loader for Aerial Tram....189
*Buckets, Jeffry Grab....39
Buff & Buff Instrument Mfg. Co....398
Buena Vista, Colo., Rock Sample....198
Bullion, Assaying Silver-Gold....423
Parting....129
Tax, Mexican....367
*Bumping Screen....102
Bunker, C. E....314, 319, 335
Bushel....181
Butte Mont., Evolution of Metallurgy in....62
Litigation....283
Mines....315
Miners....299, 332
*Burner, Hydrocarbon....172, 341
Burning Tin Screens....63
Burt Mfg. Co....195
Buying Gold in Central and Soutb America....3

C

Cabinet Dept. of Mines and Mining....127, 146
Cadmium....333
*Cage, Safety....274
*Safety Chair for....55
Cake, Thickness of From Slimes Press....111
Calaverite....128, 417
Calcined Slimes, Flux for....417
*Calcining Quicksilver Ores, Furnaces for....257
Calcite With Gold....266
California Asphalt....181
At the St. Louis Exposition....53
*Bituminous Rock....151
"Blue Leads"....401
Court Decisions....400
*Dewey Mine....9
*Drift Mine....199
Flumes....164
*Gold Belt, Structural Features of....112, 129, 149, 165, 183, 202, 216.
Gold Product....356
In 1902....230
Labor Troubles....315
Maps....184
Mines....11, 27, 28, 42, 56, 71, 88, 103, 120, 137, 156, 173, 190, 207, 223, 240, 241, 258, 275, 292, 308, 325, 342, 358, 375, 393, 408, 426.
*Mines of Randsburg....126, 132
Mojave Desert Mining....405
Oil Fields, U. S. Geological Survey in....68
Oil Well, Deepest....350
State Miners' Association....164, 256, 265, 340, 355
Water Decision....365
Calkins Co....124, 363
Calorie....79
Calumet & Hecla Sbares....118
Cam....350
*Sectional....341
Substitutes for....79
Cameron, A. S., Steam Pump Works....228
Canada, Grapbite in....38
Mineral Output of....230
Canadian Asbestos....147
Lead Bounty....34
Mines....45, 50, 107, 124, 177, 210, 227, 262, 278, 312, 325, 345, 362, 379, 412, 430.
Steel Bounty....41
Canvas Plant, Grade in....111
Capacity of Air Compressor....49
Of Dredge....147
Of Pumps....164
Of Stamp Battery....3
Cape Breton, N. S., Coxheath Mines....401
*Car....136, 374
Carat....35
"Carbonate Ore"....383
Of Soda....111
Carbonic Acid Gas....164
Carbide of Iron....128
*Carborundum, Manufacture of....171
Care of Electrical Macbinery....128
Carnahan, F. W....403
*Cars, Device for Locking to Track....155
*Cartridge, Safety Blast....87
*Carriage for Slag Ladles....257
*Casing Head for Oil Wells....172
*Cascade Water, Power & Ligbt Co., Cascade, B. C....23
Cast Iron, Malleable....3
Catalogues, Standard Size....126
"Catenary" Curve....366
Causes of Gold Mill Losses....368
Cederberg, A. H....220, 235, 255
Cedros Island Ores....135
Cement....366
Adulterations....403
Analysis....147
*Iron....290
Painting of....417
Cemented Gravels....181
Cements, Testing Methods in Physical Examination of....220, 235, 255
Centrifugal Pump....128
*Separator, Berrigan....184
Centigrade Thermometer....79
Century Drop Motion Jig....148
Cerargyrite....164
*Chair, Safety, for Mining Cages....55
Chalmers, Thos. Stuart....68

PAGE.
Changes in Rock Stratum....417
Chapin Iron Mine, Micbigan....417
Charcoal Ash....128
Bushel....181
*Charging Car for Blast Furnaces....136
Cheap Mining....198
Mining and Milling....214
Mining in Montana....339
Checks, Miners', Discounting....332
Chemical Test for Calaverite and Sylvanite....128
Analysis, Standardizing Methods of....306
Chicago Business Manager MINING AND SCIENTIFIC PRESS....46
*Chihuahua, Mexico, Guadalupe y Calvo District....61, 64, 77, 83
*Mexico, Parral to Guadalupe y Calvo....47, 51
Chilean Mill....111
Childs & Cbristensen....329
Chile's Mines....141, 262, 379
China, Jade in....118
Copper Resources of....339
China's Mines....177, 345
Chinese as Miners....62
In British Columbia....314, 332
In California Mines....315
Chlorine Smelting, With Electrolysis....82, 99
Smelting....352
Chlorite....19, 350
Chloride of Gold....215
Of Silver....164
Of Silver With Gold....111
Chlorination, Barrel....248
Costs....333
Difficulties....164
Preliminary Roasting for....111
Cboice of Manager....197
Christy Box Car Loader Co....262
Chromite Production....132
*Chromium, Extracting From Cbrome Iron Ores....341
Churn Drill....96
Circle, Area of....49
Circular Saw....300
Circulating Water Pipes in Gasoline Engines....79
Claim and Location....299
Boundaries....417
Mining, Size of....35, 215
Claims, Mining, Number that Can be Taken....164
Patented....382
*Classifier, Ore....180, 324
Classifiers, Use of....333
*Classification, Notes On....390, 406
*Classifying or Sizing Apparatus....291
Clay Selvage....324
Clays, Fusibility of....96
*Cleaner, Weinland Mechanical....5
Cleaning Scale From Gasoline Engine Water Pipes....79
Clearance, Piston and Cylinder....417
*Clear Creek Co., Colo....385
Cliff Recession....300
*Clutch for Drill Swivels....39
*For Holsting Machine....119
Coal Croppings....198
Determination of Sulphur in....418
Mines of South Africa....164
Miners' Wages in Bohemia....154
*Mining Machine....218
*Or Rock Drill....257
*Pocket, Gate for....70
Production....128, 375
Cobalt....248
Oxide....164
To Recover From Burnt Pyrites....40
Coating, Porcelain, for Iron Pipe....181
Cocoa Matting....367
Code of Bell Signals....230
Colombia Mines....31, 345
*Colorado and Montana Buildings at St. Louis....389
*Clear Creek Co....385
Coal Strike....315
Glacial Lake....417
Iron Works....75, 93, 262, 346, 413
*Last Chance Mine Ice Palace....404
Law on Tamping Bars....333
Legislature and Eight Hour Law....48
Mines....11, 12, 28, 42, 43, 57, 72, 80, 104, 121, 138, 156, 157, 173, 174, 191, 208, 224, 241, 242, 259, 276, 292, 309, 326, 342, 343, 359, 376, 377, 394, 409, 427.
*Mines of Summit Co....170
*Placer Mine....264, 267
River at Yuma....19
Silverton District....392
Tin in....128
Vindicator Mine....349
Color of Vein Croppings....3
Colors of Gold....63
Columbia, Cal., Mineral Sample....215
*Combined Cable and Rotary Rig for Drilling Deep Wells....41
*Hot Blast Oven and Dust Collector....87
*Ore Concentrator and Amalgamator....239
Commission, Payment of for Mine Sale....417
Commutators, Electric....333
Companies, Stock....416
Compass, Magnetic, Variation....96
Magnetic, in Underground Surveying....401
Open Sight, in Surveying....215
Watch Dial as....49
*Complex Ores, Process of Treating....218
Compressed Air....128
Air, Lifting Water by....165
Air Machinery Co....125
Air For Pumps....417
Reheating....63
*Compressor, Four Stage....405
Compressors, Electrically Driven....79
Capacity of....49
Heat in....350
Computing Form of Irregular Body....128
Comstock, Rise and Fall of....127
Concentrated Zinchlende....128
"Concentrates," Character of....418
Concentrates, Cyaniding....248, 416
Sluice, Values in....54
*Concentrating Macbine....208
*Apparatus....388
Ore, to Determine....171
Precipitates....147
*Surfaces, Process of Preparing....357
*Tables, Head Motion for....87
Concentration, Blanket....35
Difficulty of....299
*Of Ores by Oil....304, 392
Of Telluride Ores....283, 366
Sizing for....333, 338
Water for....333
*Concentrator and Amalgamator....374
Amalgam on....383
*Driving Mechanism for....239
*Ore....22, 172, 206, 239, 291, 307, 324, 357, 407
*Overstrom....256
*Pinder....338
*Table....189
Concentrators, Speed Regulator for....248
Concrete, Linear Expansion of....181
In Mines....316
Mixing....316, 401
Steel....96
Condensed Food....164
Conditions Favorable to Hot Blast Smelting....97
Conductivity, Electric....266
Congress, American Mining....48, 95
Conical Pile of Ore, Weight....300
*Conserving Water for Hydraulic Mining....399, 402
*Con. Mercur Mines, Moore Process at....331, 334
*Construction of Head Frames....17, 21, 109
Of Shafts....265
*Variations in....109
Consumption of Cyanide....266
Of Dynamite....35
Of Steam....96
Of Zinc in Cyanide Plants....287, 302, 318, 336
Contact Metamorpbism....300

PAGE.
Changes in Rock Stratum....417
Chapin Iron Mine, Micbigan....417
Charcoal Ash....128
Bushel....181
*Charging Car for Blast Furnaces....136
Cheap Mining....198
Mining and Milling....214
Mining in Montana....339
Checks, Miners', Discounting....332
Chemical Test for Calaverite and Sylvanite....128
Analysis, Standardizing Methods of....306
Chicago Business Manager MINING AND SCIENTIFIC PRESS....46
*Chihuahua, Mexico, Guadalupe y Calva District....61, 64, 77, 83
*Mexico, Parral to Guadalupe y Calvo....47, 51
Chilean Mill....111
Childs & Cbristensen....329
Chile's Mines....141, 262, 379
China, Jade in....118
Copper Resources of....339
China's Mines....177, 345
Chinese as Miners....62
In British Columbia....314, 332
In California Mines....315
Chlorine Smelting, With Electrolysis....82, 99
Smelting....352
Chlorite....19, 350
Chloride of Gold....215
Of Silver....164
Of Silver With Gold....111
Chlorination, Barrel....248
Costs....333
Difficulties....164
Preliminary Roasting for....111
Cboice of Manager....197
Christy Box Car Loader Co....262
Chromite Production....132
*Chromium, Extracting From Cbrome Iron Ores....341
Churn Drill....96
Circle, Area of....49
Circular Saw....300
Circulating Water Pipes in Gasoline Engines....79
Claim and Location....299
Boundaries....417
Mining, Size of....35, 215
Claims, Mining, Number that Can be Taken....164
Patented....382
*Classifier, Ore....180, 324
Classifiers, Use of....333
*Classification, Notes On....390, 406
*Classifying or Sizing Apparatus....291
Clay Selvage....324
Clays, Fusibility of....96
*Cleaner, Weinland Mechanical....5
Cleaning Scale From Gasoline Engine Water Pipes....79
Clearance, Piston and Cylinder....417
*Clear Creek Co., Colo....385
Cliff Recession....300
*Clutch for Drill Swivels....39
*For Holsting Machine....119
Coal Croppings....198
Determination of Sulphur in....418
Mines of South Africa....164
Miners' Wages in Bohemia....154
*Mining Machine....218
*Or Rock Drill....257
*Pocket, Gate for....70
Production....128, 375
Cobalt....248
Oxide....164
To Recover From Burnt Pyrites....40
Coating, Porcelain, for Iron Pipe....181
Cocoa Matting....367
Code of Bell Signals....230
Colombia Mines....31, 345
*Colorado and Montana Buildings at St. Louis....389
*Clear Creek Co....385
Coal Strike....315
Glacial Lake....417
Iron Works....75, 93, 262, 346, 413
*Last Chance Mine Ice Palace....404
Law on Tamping Bars....333
Legislature and Eight Hour Law....48
Mines....11, 12, 28, 42, 43, 57, 72, 80, 104, 121, 138, 156, 157, 173, 174, 191, 208, 224, 241, 242, 259, 276, 292, 309, 326, 342, 343, 359, 376, 377, 394, 409, 427.
*Mines of Summit Co....170
*Placer Mine....264, 267
River at Yuma....19
Silverton District....392
Tin in....128
Vindicator Mine....349
Color of Vein Croppings....3
Colors of Gold....63
Columbia, Cal., Mineral Sample....215
*Combined Cable and Rotary Rig for Drilling Deep Wells....41
*Hot Blast Oven and Dust Collector....87
*Ore Concentrator and Amalgamator....239
Commission, Payment of for Mine Sale....417
Commutators, Electric....333
Companies, Stock....416
Compass, Magnetic, Variation....96
Magnetic, in Underground Surveying....401
Open Sight, in Surveying....215
Watch Dial as....49
*Complex Ores, Process of Treating....218
Compressed Air....128
Air, Lifting Water by....165
Air Machinery Co....125
Air For Pumps....417
Reheating....63
*Compressor, Four Stage....405
Compressors, Electrically Driven....79
Capacity of....49
Heat in....350
Computing Form of Irregular Body....128
Comstock, Rise and Fall of....127
Concentrated Zinchlende....128
"Concentrates," Character of....418
Concentrates, Cyaniding....248, 416
Sluice, Values in....54
*Concentrating Macbine....208
*Apparatus....388
Ore, to Determine....171
Precipitates....147
*Surfaces, Process of Preparing....357
*Tables, Head Motion for....87
Concentration, Blanket....35
Difficulty of....299
*Of Ores by Oil....304, 392
Of Telluride Ores....283, 366
Sizing for....333, 338
Water for....333
*Concentrator and Amalgamator....374
Amalgam on....383
*Driving Mechanism for....239
*Ore....22, 172, 206, 239, 291, 307, 324, 357, 407
*Overstrom....256
*Pinder....338
*Table....189
Concentrators, Speed Regulator for....248
Concrete, Linear Expansion of....181
In Mines....316
Mixing....316, 401
Steel....96
Condensed Food....164
Conditions Favorable to Hot Blast Smelting....97
Conductivity, Electric....266
Congress, American Mining....48, 95
Conical Pile of Ore, Weight....300
*Conserving Water for Hydraulic Mining....399, 402
*Con. Mercur Mines, Moore Process at....331, 334
*Construction of Head Frames....17, 21, 109
Of Shafts....265
*Variations in....109
Consumption of Cyanide....266
Of Dynamite....35
Of Steam....96
Of Zinc in Cyanide Plants....287, 302, 318, 336
Contact Metamorpbism....300

PAGE.
Contacts, Igneous, Ore Deposits Near. 422
Contractor. 128
Converter Linings 111
Conveying Belts 49
Steam in Pipes 401
*Conveyor Apparatus 192, 238, 388
*Convenient Mine Switch 270
Coolgardie, Western Australia, Steam Condensing at 63
Co-operative Mining 21
Copper 333
Action of on Cyanide Solutions. 181
Blast Furnace Capacity 417
Blister 333
Converter Linings 111
Cost of Producing 63
Electric Conductivity of 265
Electrolytic Refining of 234, 254
Fire Assay of 417
From Mine Water 333
In Missouri 300
*Matting Pyritic Smelting 184
Market 382
Metallurgy in Montana, Notes on 66, 80, 101, 115, 133, 152, 168, 185, 203.
Mill Plates 161
Mines of Lake Superior. 349
Mining in Mexico 401
Native, With Silver 333
New Method of Extracting From Sulphide Ore 319
Ore, Assaying 49
Ore, Electrolytic Leaching 130
Ore Leaching 169
Ore Values 215
Ores Containing Gold 248
*Ores, Heap Roasting of 1
Ores, Leaching With Acids as Solvents 51
Ores, Roasting 401
Outcrops 215, 388
Outlook 18
Oxide 96, 333
Plates 182, 248
Production of 1902 221
Refining 407
Resources of China 337
Corea's Mines 74
*Corliss (Reynolds) Engine 373
*Corrugated Lining for Pulverizers 374
Corundum 70
"Costening" 231
Cost of Drilling in Raises 387
Of Electric Drilling 39
Of Gold Milling 10
Of Milling and Smelting of Ores 215
Of Mine Investment 34
Of Mining and Reducing Ores, New York & Nevada C. Co., Ely, Nev 54
Of Mining in Mexico 96
Of Open-Cut Work 79
Of Powder 231
Of Producing Copper 63
Of Treating Sulphides 111
Of Stoping 266
Of Shaft Sinking on the Rand 217
Of Transporting Ore 231
Returns, Uniform 321, 322
Costs, Reducing 107
Working 179, 266
"Cotton Balls" 316
Country Rock and Vein Values 18
Rock, Native Gold in 248
Court, Mining, in British Columbia 400
Covellite 221
Coxheath Mines, Cape Breton, N. S. 401
Cradle or Rocker for Gravel Washing 283
Creation of Power 416
Credulity 127
Cripple Creek District, Resurvey of 338
*Drainage Tunnel 130
Leasing System 349
Strike 214, 266, 349
Crocker-Wheeler Co 245, 313, 363
Cross Veins, Rights on 231
Crosscut as an Air Reeeiver 146
Timbering Soft Zones 350
Crosscuts, Use of 147, 350
Crosshead 215
Crucible Process for Steel 0
Crushed Rock in Ore Zones of San Bernardino Range, Cal 283
*Crusher 70, 136, 388
*Crushing Mill 321
*And Pulverizing Mill 324
*And Stamping Ores, Method of 341
*Mill, Three-Roll 41
Rock With Machine Drill 19
*Rolls 155, 307, 357
Wet vs. Dry 48
Crust, Earth's, Depth of 111
Cuba, Public Lands In 201
Cuba's Mines 227, 345, 362
Cupels 3, 35
Cure and Prevention of Cyanide Poisoning 236
*Current Flow of Electric Circuit 371
"Current" of Electricity 164
*Curtain Raiser for Mines 206
Curve, Catenary 366
*Custom Ores, Sampling 356
Cuts, Open, Slope of 248
Cutting Diamonds, Art of 33
Rubber 111
*Cyanidation, Filter Press and Montejus for 298, 306
*Modern Methods of 116, 117, 133, 135, 154
Cyanide and Amalgam 350
Coarse Gold Not Dissolved in 198
Consumption 266
*Filter Press Treatment of Gold Ores and Slimes by 4, 24, 25
Of Potassium 215, 417
Plant and Practice at Ymir, B. C 253, 271
*Plant Machinery 364, 367, 368
*Plant, Pump for 306
Poisoning 147, 236
Process 22, 111
*Process, Invention in 331
Process, Application of 399
Solutions, Action of Copper on 181
Solutions, Assay of 10, 266, 316, 336, 355
*Solutions, Apparatus for Extracting Precious Metals From 357
Solutions, Method of Estimating Gold in 355
Solutions, Oxygen Necessary 128
Solutions, Precipitation of Gold From 50, 316
*Solutions, Process of Treating 274
Solutions, Regeneration of 4, 34
*Treatment of Sands on the Rand 186
Use of Alkalies in 52
Zinc Consumption in 287, 302, 318, 336
Cyaniding Concentrates 248, 416
Low-Grade Slimes 354
Slimes 19
Sulphurets 383
Tailings 63
Cyclone Drilling Machine Co 124
Cylinder Clearance 417
Cylindrical Column, Strength of 266

D

Damper on Telephone Wire 79
Dams, Earth, Plank Sheeting on 300
Danger in Mine Fires 282
Of Electric Shocks 184
*Data on Open Streams, Weirs, Pipes, Etc 36
Davis, F. M., Iron Works Co 93, 313
Dawson, O. B 150
Deadly Fire Damp 2
De Beers Con. Co., South Africa, Diamond Yield 96
Debts, Mining Claims Held for 47
*Deep Levels, Ventilation of 238, 250
Mine Pump 333
Winding, Engines for 21
PAGE.
Del-Prat Process 9, 118
*Delivery Mechanism for Ore Bins 172
Delta, Colo., Mineral Specimen 350
Denver, Colo., Rock Specimen 300
Engineering Works Co 93
Fire Clay Co 75
Department of Mines 332
Depth of Earth's Crust 111
Increase of Temperatures With 118
Of Rand Shafts 111
Of Shaft by Barometric Reading 417
Vertical, Gained by Tunnel 300
De Renzer Water Wheel Co 368
Desilverization of Lead 231
*Desulphurizing Furnace, Gross 135
Slimes by Heap Roasting 80, 98
Sulphur-Bearing Petroleum, Process for 374
Detached Battery Plates 96
Detection of Adulteration in Cement 403
Determination of Lead in Ores 114
Of Silver and Gold in Cyanide Solutions 336
*Development and Operation of a Mine 111, 120
Of Water Power 337
Work 184
Work Preceding Metallurgical Plants 115
*Device for Locking Ore Cars to Truck 155
*For Protecting Blasting Caps 407
*For Saving Gold 189
*For Treating Slimes 189
*To Stop Humming of Telephone Wire 170
*For Treating Black Sand 321
*Design for Powder Thawer 369
Detroit Lubricator Co 363
Pump Co 363
Devonian Rocks in the Black Hills, S. D 283
*Dewey Mine 9
*Diagram of Drill Holes 166
Diamond Drill 3, 19
*Drill Bores, Survey of 353
Drill Holes 300, 316
Yield and Weights 96
Diamonds, Artificial 19
Art of Cutting 33
In Brazil 19
*Dietz Electric Rock Drill 287
Difficulties of Concentration 200
Dike 316
"Dip" of Vein 35
Dipping Needle 35
Direct-Acting Hoist 215
Direct Steam Ore Stamps 25, 83
Directors of Mining Companies 365
Directories, Mining 116
Dirt in Concrete 401
*Discharge Terminal for Wire Rope Tramway 307
Discharging Water 128
Ditch Banks, Crude Oil on 300
Ditches as Assessment Work 49
Walling of 248
Discounting Miners' Checks 332
Displacement of Water by Sphere 164
Distribution of Publication of the U. S. Geological Survey 354
Dividends 180
Dividing Water 366
Dixon, J., Crucible Co 32, 93, 363
*Dorleska Gold Mine 246, 252
*Double Jet Alcohol Blowpipe 145
*Douglas Island, Alaska, Milling on 268, 269, 298, 303
*Mining on 320
Drainage, Mine 281
into Adjoining Mine 283, 401
Necessity of 315
*Tunnel, Cripple Creek, Colo 130
Drawings, Keeping Clean 181
Making Black Prints From 248
Dredge, Capacity of 147
*Dredger 22, 341
*Dredging and Valuing Dredging Ground in Oroville, Cal 20, 33, 39
*Drier, Rotary 206
*Drift Mine, A California 199
Of Diamond Drill Hole 300
*Timbering 219, 233, 234, 290
Drifting in Running Ground With "Breast Boards" 350
*Drill 257
Air Required 49, 418
*Bit 87
Box Electric 190
Diamond 3, 19
*Dietz Electric 287
Efficiency 418
*Electric 374
*Oil Well 41
*Redfield Rock 96
*Rock 70, 119, 136
*Sharpener 6, 87
*Sharpener, Ajax 9
Steel Tempering 300
*Tempering 96
Torpedo 69
Drills in Stoping 366
Machine 10, 366
Machine, Use of Steam in 331
Number Used in Shaft 70
*Valve Mechanism for 189
Drilling Deep Wells, Rig for 41
Electric, Cost of 39
In Raises, Cost of 387
In Soft Rock 96
Machine 6, 155
Oil Wells 3, 19
System 218
*Driving Mechanism for Ore Concentrator 239
Drop Motion Jig, New Century 148
Order of 198, 306, 316
Speed of 316
Dropping Weight, Force of 417
*Drosses, Press for Squeezing 206
"Dry" vs. "Wet" Ores 385
Crushing and Roasting of Telluride Ores 350
Mines, Tailings as Filling in 350
Vs. Wet Crushing 48
*Dryer, Rotary 206
Drying of Minerals, Mechanical 199
Of Peat 99
*Dumping Apparatus 102, 136
*Device for Ore Buckets 102
Duplication of Names 106
Durango, Mexico, Iron Mountain 386
Dust Collector and Hot Blast Oven 87
Duty of a Stamp Mill 381
On Nitro Powder 18
Per Stamp 3
Dynamite, Consumption of 35
Nitro Glycerine in 128
Thawing 265
Dynamo, "Series" and "Shunt" 63
*Dynamos and Motors, Showing the Various Windings and Wire Connections 301

E

*Earth Boring Augur 206
Interior Constitution of 111
Ecuador and Peru 403
Economles, False 315
In Mining 62
Economy, Parsimonious 214
Education, Technical, Advantages of 332
*Efficiencies of Tangential Water Wheels 84
Efficiency Problems 164
Of Air Compressor 418
Eight-Hour Law, Colorado 18
Nevada 2
Electric Accumulator 383
Bells in Mines 418
Conductivity 266
Conductor, Resistance of 401
*Circuit, Current Flow of 371
*Drill, Box 190
*Drill, Dietz 287
PAGE.
Drilling, Cost of 39
Furnace Experiments 270
Furnace in Metallurgy 339
Generators, Foundations for 117
Manufacture of Ferro-silicon 118
Motor and Dynamo, Principle of Construction of 418
Ore Reduction 215
Portable Hammer 117
Precip tation of Gold 300
*Rock Drill or Rock Drilling Machine 374
Shocks 184
Electrical Equivalents and Units 184
Heating 117
Machinery, Care of 128
Machinery in South Africa 382
Phenomena 266
Transmission 111, 128
Electrically Driven Air Compressor 70
*Driven Power Pumps 387
Electricity 164
In Gold Extraction 270
*In Placer Mining 100
Versus the Mule 250
*Electro-Depositing of Metals 307
Magnets for Black Sand Separation 3
Metallurgical Production of Zinc 128
Electrolysis, Refining Metals by 218
With Chlorine Smelting 82, 99
*Electrolytic Generator 114
Leaching of Copper Ores 130
*Process of Recovering Metals from Their Compounds 206
Refining of Copper 231, 254
*Elevator, Hydraulic 274
*Elevator, Hydraulic 266
Elimination of Impurities in Bessemerizing Copper Matte 80
El Oro District, Mex., Geology of 273
Ely, Nev., N. Y. & Nev. C. Co. Costs 51
Engineering as a Profession 166
Efficiency 164
Modern, Possibilities of 265
*Engine, Explosive, Vaporizer for 155
Engines for Deep Winding 21
Oil and Gas 349
Steam, High and Low Pressure 63
Traction Engines 316
Enrichment of Mineral Veins 97
Secondary 127
*Equipment of the Garnet Mine, Pony, Mont 323
*Of the Sultan Mine, Ariz 314, 319, 335
Erosion 300
Erubescite 26
Essen, Germany, Steam Turbine 136
Estimatlng Horse Power of Boilers 231
Etching on Steel 350
Eucalyptus Stamp Stem Guides 3
Evils In Mine Promoting 197
Evolution of Metallurgy in Butte, Mont 62
Examination of Portland Cements, Testing Methods for 220, 235, 255
Excavated Earth, Expansion of 248
*Excavating Machine 357
*Mechanism 22
*Excavator 70
Exhaust Blower for Woodworking Shops 147
Of Steam Mine Pump 215
Expansion of Excavated Earth 248
Expansive Alloy 128
Experience and Education 400
Experiences of a Working Miner 114
Experimenter 232
Experiment Stations for Mining 349
Explosive, a New, Ammonal 206
*Engine, Vaporizer for 155
Exports, Mexican, Value of 132
Extension of Rand Banket 48
Extinguishing Mine Fires 3
*Extracting and Lixiviating Apparatus for Ores 119
*Chromium from Chrome Iron Ores 341
Copper from Sulpbide Ore 319
Gold and Silver from Ores, Process for 102
*Gold from Ores, Apparatus for 172, 189
Gold or Silver from Slimes 22
*Precious Metals, Apparatus for 274
*Precious metals from Ores, Process for 55, 388
Precious Metals, Sulphuric Acid Proeess for 22
*Process for Gold 22, 41
Extraction Process for Zinc 239
Of Precious Metals from Their Ores 218
*Of Zinc, Lead and Silver Sulphides from Ores 102
Percentage of 164, 213
Extralateral Rights 49, 96, 181, 215, 366
Rights, None in Mexico 401
Extra Parts, Supply of, for Mill 49

F

Fahrenheit Thermometer 79
Fairbanks, Morse & Co 159, 413
False Economies 315
Famine, Water 315
Fans, Ventilating 198
Father de Smet Stamp Mill 283
Faults at Leadville, Colo 316
*Feeder, Ore 357
*Ore, Regulator for 374
Feeding Quicksilver 96
Feeders, Ore 366
*Feed, Quicksilver for Amalgamators 141
*Regulator for Ore Feeders 374
Feet, Land Office 163
Panama Mining 164
"Feldenite" 383
Feldspars, Decomposition and Kaolinization of 400
Ferris Wheel 396
Ferro-silicon, Manufaeture of 118
Filling Grooves in Transmission Pulleys 49
Mine, Tailings Used as 350
Waste Used as 417
*Filter for Oil 270
Press Slimes in Cakes 111
*Press Treatment of Gold Ores and Slimes by Cyanide 4, 24, 25
*Rotary 341
*Filtering Press 55
*Fine Ore Concentrator 357
Ore in Blast Furnace 164
Fire Assay Losses 111
Assay of Copper 417
Damp, Deadly 2
Test of Oil 70
Fires, Mine 282
Fitch, C. H 25, 371
Flat Wheels, Remedy for 266
Floating Gold 266
In Water, Velocity of Objects 52
Flow of Water Over Yosemite Falls 118
Of Steam in Pipe 417
Of Water in Pipe 417
Flume for Water in Tunnel 333
On Brackets 333
On Brackets 248
Flumes in California 164
"Fluorine" 316
Flux for Calcined Slimes 417
Flywheel, Speed of 198, 366
Following a Vein 316
Food, Condensed 164
Foos Gas Engine Co 195
Footboards on Plates in Mill 368
Force of Dropping Weight 417
*Forging Rock Drills, Process for 6
Forms of Mine Shafts 246
Forest Reserves 2
Reserves, Mineral Entries on 365
Foul Air Dispelling from Tunnel 19
Foundations for Heavy Machinery 170
For Electric Generators 417
PAGE.
*Four-Stage Air Compressor 105
*Framing Machine for Mine Timbers 119
Fraser & Chalmers, Ltd 125, 413
Freaks in Mining 160
Freezing Running Ground 49, 69
*Freid Gravity Dry Process Separator 403
Fuchsite 266
Fuel Bill of Steam Plant 3
*Oil, Notes on Use of 221
On the Pacific Const 181
"Stimulants" 128
Fuels, Relative Value of 339
Fuelier, C. M 150, 346, 394
Fullers Earth 283
Fumes from Sulphuric Acid 248
Nuisance, Rationale of 247
*Furnace 257
*Apparatus for Charging and Cleaning 307
*Blast 218
Blast, Size of 248
*Blast, Support for Cooling Plates of 371, 407
*Blast, Top for 11
Bruckner 63
Electric 270
*For Calcining Quicksilver Ores 257
*For Melting Metals 70
*Gas 119
* Gases, Apparatus for Removing Impurities From 407
*Gross Desulphurizing 135
Linings 366
*Melting 218
*Metallurgical 22, 155, 239
*Quicksilver 119
*Reverberatory 248, 257
*Roasting 55, 70, 155, 218, 257, 291, 357, 388
*Roasting, Attachment for 371
Slag, Utilization of 8
*Smelting 155, 307
Furnaces, Blast 366
Fusible Alloys 147
Fusibility of Clays 96
Fusion of Silver Sulphide 164

G

Galena Roasting 181
Gambie, Mining Not n 181
Garnet and Pyrite 19
*Mine, Pony, Mont., Equipment 323
Garnets, Production of 383
Garnierite 40
Gasoline 181
Engine, Price of 164
Gas, Dispelling, After Blasting in Tunnel 19
Engine 146, 117
Engine, Largest 417
*Engine for Marine Launch 123
In Iron Smelting 248
*Furnace 119
Turbine 49
*Gases, Recovering Values From 407
Gash Veins 63
Gasket, Oil and Graphite on 63
*Gate for Coal or Other Pockets 70
*For Mine 239
Gauge of Wire 248
*Gear, Safety, for Cages, Skips, etc 274
General Electric Co 380
Metals Co 212
*Generator, Electrolytic 114
Genesis of Ore Deposits 111
Geologists and Mining 416
Geology in Mining 382, 416
Of Ballarat District, Victoria, Australia 283
Of El Oro District, Mexico 273
Of San Bernardino Range, Cal 283
Geomorphology 350
Georgia, Gold in 49
Mines 410
Germany's Mines 45, 177, 262, 312
Gilpin Co., Colo., Mineral Sample 366
Glacial Lake 417
Glass, Constituents of 96
Manufacture 19, 96
Glassy Rock, Gold in 385
Gold Amalgam 63, 111
Amalgamation 3
And Chloride of Silver 111
And Silver, Test for 131
And Silver in Cyanide Solutions 336
And Tin, Assoeiated 164
Bearing Black Sand 147
Bought in Central and South America 3
Brittle 266, 333
Chloride 215
Coarse, Not Dissolved in Cyanide 198
Colors of 63
Estimating, in Working Cyanide Solutions 355
*Extracting Apparatus 172, 189
Extracting Process 22
Extraction, Electrleity in 270
Extraction from Slimes 22
Fields of Atlantic Slope 383
Floating 266
How Produced 283
In Georgia 49
In Igneous Rocks 385
In Litharge 128
In Marine Shales 147
In Soapstone 96
In Santo Domingo 283
Making 62
*Mill and Cyanide Plant, Arizona 162, 166
Mill Losses, Causes of 368
Milling, Cost of 10
Milling, Notes on 284
Mines and Industrial Conditions 299
*Mines of San Diego Co., Cal 145, 150
*Mining, Gravel Washing Machines for 206
In Nova Scotia 402
Nuggets Do Not "Grow" 215
*Ores and Slimes, Filter Press Treatment 4, 24 25.
Pockets 81, 350
Precipitation from Cyanide Solutions 50, 316
Precipitation of 316
Product of Cal 356
Properties of 198
*Reduction Plant on the Rand 271, 272, 273
Refining 128, 266
*Saving Deviee 189
Saving, Limit of 63
*Separator 22, 70, 218, 388
*Washing Machine 136
With Calcite 266
Golden Sand Juan, The 304
*Good in Peace or War 168
Roads for Mines 204
Gossan of Copper Deposits 383
Goth, T. R. & Co 15
Government Aid to Mining 415
Government and the Miner 400
Government Inspector 163
*Governor, Sectroidal Relay 357
*Grab Buckets, Jeffry 39
Grade of Mill Plates 198
Of Placer Sluice Box 111
In Canvas Plant Tables 111
Granite and Syenite 231
Protogine 316
Graphite in Canada 38
On Steam Gasket 63
Grant's Pass, Or., Ore Sample 366
Gravels, Cemented 181
Gravel Channel, Width of 316
Elevators, Hydraulic 266
*Washing and Cleaning Machine for Gold 206
*Gravity Separator, Freid 403
Grease Around Mortars 3

(Continued on Next Page.)

INDEX TO VOLUME LXXXVII.

(Continued From Preceding Page.)

PAGE.

Great Basin ... 35
Plains, An Important Uplift Under ... 352
Greaterville, Ariz., Rock Sample ... 215
Greenhorn, Or., Rock Sample ... 198
Grinding Amalgam ... 333
*Mill ... 189, 341, 357, 388
Mills, Rotary ... 266
Grooves in Transmission Pulleys ... 49, 300
*Gross Automatic and Mechanically Stirred Ore Desulphurizing Furnace ... 135
"Grub Stake" ... 131
*Guadalupe y Calvo, Chihuahua, Mex. ... 47, 51, 61, 64, 77, 83.
Guaranteed Stocks ... 180
Guides, of Eucalyptus, for Stamp Stems ... 3
Gun Metal ... 417

H

Halloran, A. H. ... 162, 166
"Halogen" ... 79
*Hammer, Beaudry Champion Power ... 38
Pneumatic ... 417
Portable ... 147
Test for Boilers ... 63
*Hampson Patent Turntable ... 305
Hand Feeding in Stamp Batteries ... 19
Sorting Ores ... 417
Versus Machine Drilling ... 37
Handling Ore ... 364
*Ores, Apparatus for ... 55
Timbers ... 316
Hanging Walls, Two ... 316
Haphazard Experimenter ... 232
Hardening Lead ... 248
Steel ... 128
Harron, Rickard & McCone ... 279
Hawthorne, Nev., Mica ... 417
Hayward Co ... 160
Headache from Powder Fumes ... 128
*Headframe Construction ... 17, 21, 109
*Novel ... 47
Headframes, Steel vs. Timber ... 18
*Head Motion for Concentrating Tables ... 87
*Heap Roasting of Copper Ores ... 1, 401
Roasting to Desulphurize Slimes ... 80, 98
Heat in Air Compressor ... 350
Heating by Electricity ... 147
*Furnace ... 257
Water ... 164
Hematite ... 63
In Spain ... 9
Hemp Hoisting Ropes ... 333
Hendrie & Bolthoff Mfg. & S. Co ... 413
Hendy, J., Machine Works ... 296
Henshaw, Bulkley & Co ... 15, 59
Herrick, C. L ... 97
Hidden Treasure Mine, Gravel Channel ... 316
*High Duty Pumping Machinery ... 421
Hints on Amalgamation ... 65
Hogs Rooting Tailings ... 350
*Hoist ... 172
Marks on Reel of ... 266
*Motor Driven ... 81
Hoisting Engine, Brakes on ... 215
Engine, Direct Acting ... 215
*Machines, Clutch for ... 119
Problems on the Witwatersrand ... 372
Rope in Shaft, Stress on ... 401
Ropes ... 63, 215, 333
Hole in Mortar ... 96
Holes in "Round," Number of ... 111
*Home-Made Oil Filter ... 370
Homestake Mine, Mining at ... 4
*Ore, Metallurgy of ... 217, 232, 251, 269
Honduras Mines ... 328
"Hope" ... 127
Horn Silver Nuggets ... 333
Hornblende ... 417
Horse Power ... 147, 231, 350
Of Boiler ... 350
Of Steam Engine ... 350
Of Water ... 417
Hose, Suction, Wired, for Pumps ... 215
Hot Acid Waters Decomposing Feldspars ... 300
*Blast Oven ... 87
Blast Smelting ... 97
Blast Smelting for Production of Lead ... 252
*Blast Stove ... 291
How to Determine if You Have a Concentrating Ore ... 171
*To Make Blue Prints ... 153
Hubnerite ... 383
*Humming, Simple Device to Stop ... 170
Hungarian Mines ... 14
Rifles ... 401
Hungary, Sulphide Smelting in ... 418
Hunt, R. W ... 296
Hollow Cylindrical Columns ... 266
Holthoff Machinery Co ... 329
*Hydraulic Air Compressor, Valve for ... 274
*Elevator ... 274
Gravel Elevators ... 266
*Mining, Conserving Water for ... 399, 402
*Mining in Southern Oregon ... 213, 216
Patents ... 147
Pressure ... 198
Hydraulicking Alluvial Off for Mill Foundations ... 248
*Hydrocarbon Burner ... 341
Hydrochloric Acid ... 35
Hydrocyanic Acid ... 366
Hydro-Electric Plants, Modern Practice in ... 69
Hydrogen Peroxide ... 147

I

Ibapah, Utah, Rock Specimen ... 111
*Ice Palace ... 404
Idaho Labor Union, Legal Responsibility of ... 128
Mineral Specimen ... 417
Mines ... 12, 28, 29, 43, 57, 73, 90, 105, 121, 122, 138, 157, 174, 175, 191, 208, 224, 242, 260, 276, 277, 293, 309, 326, 343, 359, 377, 395, 410, 428.
State Mining Association ... 416
Thunder Mountain District ... 389
Idaho Springs, Colo., Labor Troubles ... 95
Identifying Igneous Rocks ... 50
*Identity and Continuity of Veins ... 333, 349, 373
Idle Men ... 180
Igneous Rocks Associated With Ore Deposits ... 3
Contacts, Ore Deposits Near ... 422
Rocks, Gold in ... 385
Rocks, How to Identify Them ... 50
Illinois Mines ... 242
*Impact Screen for Ores ... 306
Water Wheels ... 111
*Water Wheels, Nozzles for ... 6
Important Uplift Under the Great Plains ... 352
Imports of Manufacturiog Materials ... 131
Iron and Steel ... 81
*Improved Method of Pipe Driving ... 217
Methods, Result of ... 247
Impurities in Copper Matte, Elimination of ... 80
Ineeotive to Invention ... 247
*In Clear Creek Co., Colo ... 385
Incline Shafts, Dumping Skips at ... 266
Increasing Temperature With Depth ... 118
Indiana Miues ... 28
Indian Territory's Mines ... 105
India's Mines ... 14, 59, 379
Indicator ... 49
Indicolite ... 333
Industrial Conditions and the Gold Miner ... 299
Influeuce of Country Rock on Vein Values ... 18
*Ingenious Prospectors ... 77
Ingersoll-Sergeant Drill Co ... 124, 313, 363
Injector, Steam ... 300
Inspection of Shafts ... 265
Inspector, Government ... 163
Invention, Incentive to ... 247
*In the Cyanide Process ... 331
Iovestigation of Mines, Basis of ... 230
*Iovestment in Mexico ... 298
Mine, Cost of ... 34
Investments, Retarding of, by Labor Troubles ... 110
Mining ... 416
Iodine ... 49
Iron and Steel Imports ... 81
Carbide ... 128
*Cement for Machinery ... 290
Manufacture, Furnaces in ... 366
Matte Smelting ... 248
Mines of Minnesota and Michigan ... 283
Mountain, Durango, Mexico ... 386
Ore, Not Precipitant of Copper ... 287
Ore of Lake Superior District ... 283
Pseudomorph ... 19
Sands on Lake Superior ... 26
Smelting With Gas ... 248
Use of Lead Paint on ... 198
Welding ... 147
Irregular Body, Computing Form of ... 238
Irrigation Congress ... 180
Practical Results of ... 236
Italian Asbestos ... 147

J

Jackson, Byron, Machine Works ... 15
Jade in China ... 118
Japan Mines ... 430
Java Mines ... 430
Javasite ... 198
Jeanesville Iron Works Co ... 15, 59, 93
*Jeffrey Grab Bucket ... 39
Jeffrey Manufacturing Co ... 60, 245, 380
*Jig ... 155
New Century ... 148
Jigs ... 333
Johannesburg, Lead Smelting of Zinc Slimes ... 181
Johnson, J., & Co ... 93
Joplin, Mo., Mining ... 231

K

Kaeding, H. B ... 423
Kalgoorlie, W. A., Treatment of Telluride Ores at ... 369, 392, 404, 425
Kansas Mines ... 12, 29, 43, 57, 105, 225, 326, 344, 360, 377, 395, 428.
Kayak Coal and Oil Fields of Alaska ... 65
Keepiog Drawings Clean ... 181
Kerosene in Steam Boilers ... 417
Keystone Driller Co ... 141
Kilogram ... 184
King, C. S ... 398
Kingsford Foundry & Machine Works ... 380
*Kinks in Ropes ... 419
Klondike Mines ... 31, 74, 93, 124, 141, 159, 194, 379, 412
"Knocking" in Steam Engines ... 216
Koppel, A ... 228, 329
*Korea, Mining in ... 196
Korea's Mines ... 74
Kritzer, W. H ... 65, 171, 301, 339, 371, 419
Kunzite ... 181
A New Gem ... 339

L

Labor Conditions in the West ... 34
Problem on the Rand ... 18, 110, 230
Situations ... 180, 282, 332, 382
Troubles Retarding Investments ... 110
Unions ... 2
Lacolite ... 63, 96
Lagging ... 266
Lagonda Manufacturing Co ... 108, 329, 413
La Grange, Cal., Rock Sample ... 231
Laidlaw-Dunn-Gordon Co ... 413
Lake, Glacial ... 417
Lake Superior Iron Ores ... 283
Copper Assaying ... 417
Copper Mining ... 349
Iron Sands ... 26
Tamarack Shaft ... 164
Land, Mineral, Value of ... 34
Office Procedures ... 163
Landslide ... 49
*Last Chance Mine, Colo., Ice Palace ... 404
Latent Heat and Boiling Point ... 79
"Lateral Secretion" ... 283
Latite ... 63
Latitude, Length of Minute of ... 316
Law, Mining ... 35, 49, 79, 96, 128, 164, 198, 215, 231, 248, 266, 283, 316, 339, 366, 383, 400, 401, 417.
Leaching Siliceous Copper Ores With Acids as Solvents ... 54
Copper Ore, Electrolytic ... 130
Low-Grade Copper Ores ... 169
Ores or Tailings With Cyanide, Process for ... 22
Ores, Process of ... 41
Lead Alloys ... 248
Antimonial ... 147, 348, 417
Assays ... 114, 128
Bounty, Canadian ... 34
Desilverization of ... 231
Hardening ... 248
Hot Blast Smelting for ... 252
In Steam Engioe ... 63
In Zincblende ... 198
Paint on Structural Iron ... 198
Process of Obtaining From Ores or Mattes ... 102
Smelting of Zinc Slimes ... 181
Silver Bullion Refining ... 316
Leadville, Colo., Faults ... 316
Ore Deposits ... 283
Leaky Joints on Pipe Line ... 111
Valves ... 266
Leasing System, Advantages of ... 95
System at Cripple Creek, Coln ... 349
Leather Belts ... 96, 164
Le Fevre, E. L ... 26, 37
Length of Minute of Latitude ... 316
Leschen, A., & Sons Rope Co ... 32, 431
Lesson, An Object ... 230
Leyner, J. Geo., Engineering Works ... 329, 380
Lietz, A., Co ... 296
Lifting Water by Compressed Air ... 165
"Limestone Dike" ... 316
Limit of Electrical Transmission ... 111
Limitation, Statute of ... 366
Linear Expansion of Concrete ... 181
*Lioing, Corrugated, for Pulverizers ... 374
Of Copper Converters ... 111
Up a Vertical Shaft ... 79
Link Belt Machinery Co ... 313
Liquid Air ... 147
Liscum, Ariz., Rock Sample ... 248
List of Patents ... 15, 32, 46, 60, 75, 93, 108, 125, 141, 160, 178, 195, 212, 228, 245, 264, 280, 297, 313, 330, 347, 363, 380, 398, 413, 431.
Lists of Mining Names ... 181, 416
Litharge, Gold and Silver in ... 128
*Process for Making ... 55
Litigation in Butte, Mont ... 282
Llewellyn Iron Works ... 363
*Loader, Automatic for Aerial Tram ... 180
Location and Claim ... 299
Of Placers ... 135
Of Tonopah ... 180
Locations, Mining ... 316, 383
Must Conform to Government Survey ... 400
*Locke Automatic Shut-Off Valve ... 85
*Locking Ore Cars to Tracks, Device for ... 155
Locomotive, Tractive Force ... 231
Locomotives ... 184
Lodes in Placers ... 35, 283, 366, 401
Losses in Fire Assays ... 111
In Gold Mills ... 368
Loss of Quicksilver ... 49, 333, 368
Louisiana's Mines ... 242
Lower California, San Roque Placers ... 111
*Ybarra Mines of ... 348, 351
Low-Grade Slimes, Cyaniding ... 354
Lubricator for Compressed Air Cylinder ... 128
Lundy, Cal., Hogs Rooting Tailings at ... 350
Lunkenheimer Co ... 313

M

*Machine, Coal Mining ... 218
*Concentrating ... 206
Drill, Air for ... 49, 373
Drill as a Rock Crusher ... 19
Drills, Mining With ... 26, 37
*For Excavating ... 22, 357
*For Mining ... 136
*For Separating Ores ... 6
*For Washing Gold ... 136
*Oil Drilling ... 155
*Rock Drilling ... 6
Rock Drills ... 19
Drilling vs. Hand ... 37
*Drill in Mining ... 268
*For Recovering Mercury and Amalgam From Ores ... 374
*For Washing and Cleaning Gravel in Gold Mining ... 206
*Ore Crushing ... 388
Machinery, American, for South Africa ... 203
*For Cyanide Plant ... 364, 367, 368
Foundations ... 176
Anti-Rust Compounds for ... 147
"Machinist" and Blacksmith ... 19
Macomber & Whyte Rope Co ... 363
Magnesite ... 63
Magnet, Action of on Coil Bearing Electric Current ... 418
Magnetic Compass Variation ... 96
Compass in Underground Surveying ... 401
*Separator ... 6
Magnetite, Separation of From Sand ... 3
*Making Litharge, Process for ... 55
Records in Mining Work ... 48
*Sulphuric Acid, Process for ... 172
Malay Peninsula Mines ... 430
Maly States' Mines ... 124
Malleable Cast Iron ... 3
Management of Mines, Real Values in ... 85
Manganese Ore on Pacific Coast ... 128
Black Oxide ... 283
Metallic ... 418
Manila Ropes ... 63
Manufacture of Ferro-Silicon ... 118
Man Who Is Right ... 3
Malachite ... 300
Manager, Choice of ... 197
Manager's "Hnbby" ... 180
*Manufacture of Aluminum and Silicon From Silicates of Aluminum ... 22
*Of Carborundum ... 171
Manufacturing Materials, Imports of ... 131
Maps of Mine Workings ... 147
Map, Topographic, of Montana ... 321
March of Progress ... 62
Marine Shales, Gold in ... 147
*Gas Engine Launch ... 423
Mariposite ... 266
Markings on Platinum ... 79
Marks on Hoist Reel ... 266
Masonry in Mines ... 316
Masurite Explosive Co ... 159
Matting, Cocoa ... 367
Mazama, Wash., Rock Samples ... 401
McIntosh, C ... 229, 236
*Means for Utilizing Oil or Gas in Ore Reducing Furnaces ... 274
Measurement of Undeveloped Ore ... 18
Of Water, Uniform ... 314
Of High Temperatures ... 352
Measures, Retaliatory ... 95
Measurements, Stadia ... 19
*Mechanical Cleaner, Weinland ... 5
Drying of Minerals ... 199
*Mechanism, Excavating ... 22
*Driving, for Concentrator ... 239
Mecklenburg Iron Works ... 329, 363
Meese & Gottfried ... 50
Melting Bullion ... 283
*Furnace ... 218
*Metals, Furnace for ... 70
*Metal Extracting and Ore Lixiviating Apparatus ... 119
*Metals, Electrolytic Process of Recovering ... 206
Extraction of ... 218
Metallic Zinc ... 96
Manganese ... 418
*Metallurgical Furnace ... 22, 155, 239
Process ... 324
Metallurgy, Electric Furnace in ... 339
Of Copper in Montana ... 66, 86, 101, 115, 133, 152, 168, 185, 203,
*Of the Homestake Ore ... 217, 233, 251, 269
*Method of Crushing and Stamping Ores ... 341
Of Disposing Foul Air From Tuncel ... 19
Of Estimating Gold in Working Cyanide Solutions ... 355
*Of Making Stamp Shoes or Dies ... 6
Of Pile Driving ... 217
*Of Recovering Values From Siliceous Ores ... 407
*Methods of Ore Cyanidation ... 116, 117, 133, 134, 151
Of Mining ... 61
Improved, Result of ... 247
Mercury ... 198
Loss of ... 368
Traps ... 333
Metamorphism, Contact ... 300
Mexican Bullion Tax ... 367
Exports, Value of ... 132
Native Miners ... 283
Mines ... 14, 31, 45, 59, 74, 75, 92, 107, 124, 141, 159, 177, 194, 210, 227, 244, 262, 278, 279, 295, 296, 312, 328, 345, 362, 379, 397, 398, 412, 430.
Mining Law ... 181, 198
Silver ... 181
Mexico, Cost of Mining in ... 96
Durango, Iron Mountain ... 386
El Oro District Geology ... 273
First Silver From ... 350
*Mine Investment ... 298
Mining Copper in ... 401
Mining in ... 214
No Extralateral Rights in ... 401
*Santa Eulalia Mines ... 399, 402
Twenty-League Zone ... 417
Mica ... 35, 128, 248, 333
From Hawthorne, Nev ... 417
Schist ... 35
*Michigan, Ashland Mine ... 323, 337
Chapin Iron Mine ... 417
Mines ... 12, 29, 43, 57, 73, 90, 105, 122, 138, 157, 158, 175, 192, 208, 225, 242, 260, 277, 293, 310, 344, 360, 377, 395, 410.
Microscopes ... 383
Microscopic Study of Rocks ... 216, 366, 383
Midas, Nev., Rock Sample ... 283
*Mill, Crushing and Pulverizing ... 324
Extra Parts for ... 49
Foot Board on Plates in ... 368
*For Crushing Ores ... 324
Foundations, Hydraulicking Alluvial Off, for ... 248
*Grinding ... 189, 341, 357
Mine Water Used in ... 333
Plates, Grade of ... 198
*Quartz ... 102, 136, 324
Power for ... 49
*Stamp ... 70, 87, 291
Nitro Powder in ... 365
Screens ... 231, 316
Stamp, Duty of ... 381
*Tubular, Ball ... 374
Milling and Smeltiog Costs ... 215
Gold, Cost of ... 10
Gold, Notes on ... 284
*On Douglas Island, Alaska ... 268, 269, 289, 303
On the Rand ... 286, 373
Practice ... 10
Millman ... 49
And "Pet Theory" ... 3
Millsite ... 128
Mine & Smelter Supply Co ... 15, 45, 159, 178, 263, 313, 413.
*Car ... 136
*Curtain Raiser ... 206
*Development and Operation of a ... 414, 420
Drainage ... 281, 401
Fires, Danger in ... 382
*Gate ... 239
Investment, Cost of ... 34
*Investment in Mexico ... 298
Investigation, Basis of ... 230
Management, Real Values in ... 85
Model, New Use for ... 247, 338
*Hoist, Motor-Driven ... 81
Water, Copper From ... 333
Sampling ... 78, 96
Shafts, Forms of ... 346
Taxation ... 2
*Telephone System ... 391
*Timber Framing Machine ... 119
*Tipple ... 218
Work, Making Records in ... 48
*Switch ... 270
*Timbering Apparatus ... 324
Water Used in Mill ... 333
Mineral Entries on Forest Reserves ... 365
Land, Value of ... 34
Land, What Constitutes ... 49
Production, United States ... 342
Sample ... 79, 215, 350, 366
Structure ... 231
"Zone" ... 19
Output of Canada ... 239
Minerals, Determining by Blowpipe ... 231
Of the Soda Group ... 417
*Process of Reducing ... 172
Pyro-Electric ... 401
Miner and the Goverooment ... 400
Needs of ... 385
Mines, Good Roads for ... 204
Altitude of in California and Colorado ... 79
Number Scheme for ... 267, 305, 391, 420
Ancient, Modern Methods in ... 399
Masonry and Concrete in ... 316
*Of Randsburg, Cal ... 126, 132
*Santa Eulalia, Mexico ... 399, 402
*Of Summit Co., Colo ... 170
Department of ... 332
*Of Santa Eulalia, Mexico ... 348
*Of Snuthern Oregon ... 381, 391
*Signal System for ... 324
Miners, American, Abroad ... 163
*Miner's Pick ... 41
*Blasting Squib ... 391
*Safety Cage ... 274
Miners' Hours and Miners' Wages ... 118
Mining, Accessibility as a Factor ... 371
And Photography ... 181
*And Metallurgical Parents ... 6, 22, 41, 55, 70, 87, 102, 119, 136, 165, 172, 189, 206, 218, 239, 257, 274, 291, 307, 324, 341, 357, 374, 388, 407.
And Milling, Cheap ... 214
And Milling in Mojave esert, Cal ... 405
And Prosperity ... 126
And Scientific Progress ... 416
At the Homestake Mine ... 4
*Aqueducts ... 131
Claim and Townsite ... 383
Companies ... 416
Co-operative ... 21
Copper in Mexico ... 401
Court in British Columbia ... 400
Directors ... 365
Directories ... 416
Economies in ... 62
Experiment Stations ... 349
Freaks ... 169
Geology in ... 382, 416
Government Aid to ... 415
*In Alaska ... 94
*In Broken Hill, N. S. W ... 40, 53, 67
In Joplin, Mo ... 231
*In Korea ... 196
In Mexico ... 214
Investments ... 416
Law ... 35, 49, 70, 96, 128, 164, 198, 215, 231, 248, 266, 316, 339, 366, 383, 400, 401, 417,
Machine ... 136, 218
Not a Gamble ... 181
Not Controlled by a Trust ... 100
Partnership ... 79
Claim Pateuts ... 128
*Photography in ... 229
Prospectuses ... 96
With Machine Drill ... 268
Reports Written by Novices ... 78
Summary ... Every Issue
*Telluride Ores in the Black Hills, S. D ... 281, 290
*Tool ... 102
With Machine Drills ... 26, 37
Minneapolis Steel & Machinery Co ... 262
Minnesota Placers ... 283
Minnesota's Mines ... 192, 208, 260
Mint Report for 1902-1903 ... 375
United States, Assaying Gold and Silver at ... 317
Mirrors, Reflecting Sunlight Into Mine by ... 333
"Missed Holes" ... 35
Missoula, Mont., Rock Sample ... 49
Missouri, Copper in ... 300
Mines ... 12, 29, 43, 44, 57, 73, 90, 105, 122, 138, 139, 175, 192, 208, 225, 242, 260, 277, 293, 310, 326, 344, 360, 377, 395, 428.
Zinc Mines ... 314, 365
Mistakes ... 164
*Mixing Apparatus ... 324
Model of Mine ... 247, 338
Modern Methods in Aocient Mines ... 299
*Methods of Ore Treatment by Cyanidation ... 116, 117, 133, 134, 154
Practice in Hydro-Electric Plants ... 69
Moebius Process of Silver Refining ... 164
Mogul Engioes ... 184
Molybdenum ... 112
*Montana, Big Indian Mine ... 229, 236
Cheap Mining in ... 230
*At St. Louis Exposition ... 389
Legislation ... 315, 382
Metallurgy of Copper in ... 66, 86, 101, 115, 133, 152, 168, 185.
Mines ... 12, 13, 29, 44, 57, 7', 90, 105, 122, 139, 158, 175, 192, 209, 225, 242, 260, 277, 294, 310, 326, 327, 344, 360, 377, 395, 410, 428.
Northwestern, Topographic Map of ... 321
*Montejus and Filter Press for Cyanidation ... 298, 306
Moore, C. C., & Co ... 15, 262
Moore, Geo ... 331, 334
*Process at Coo. Mercur Gold Mines ... 331, 334
*Mortar and Muller for Grinding, Crushing and Mixing Ores, Chemicals, Etc ... 388
Block, Pit for ... 401
*For Stamp Mill ... 102
Hole in ... 96
Mortars, Types of ... 3
*Motion, Head, for Concentrating Tables ... 87
*Motor-Driven Mine Hoist ... 81
*Mount Sicker Mining District, B. C ... 1, 7
Mule vs. Electricity ... 256
Muriatic Acid ... 35

PAGE.

Myers, G. W. 263
Mojave Desert, Cal., Mining Cal., Inquiry 266

N

Names, Duplication of 196
National Necessity 127
Wood Pipe Co. 262, 316
Native Copper and Silver. 333
Gold in Wall Rocks 218
Necessity for Drainage 315
Needle, Dipping 35
Need of Uniform Signal Code 18
Needs of the Miner 385
Neutralizing Acid of Boiler Water. 111
Nevada's Eight-Hour Law 2
Nevada Mines 13, 29, 14, 58, 73, 90, 106, 122, 139, 158, 175, 192, 209, 225, 242, 243, 260, 277, 294, 310, 327, 344, 360, 377, 395, 396, 410, 428.
Sulphur Mine In. 372
*New Almaden, Cal., Quicksilver Reduction at 201
New Century Drop Motion Jig 118
New Method of Extracting Copper From Sulphide Ores. 319
*Reduction Process 150
*Standard Reynolds Corliss Engine 373
Use for Mine Model 247
Zinc Field 396
New Mexico Mines 13, 29, 44, 58, 73, 91, 106, 122, 139, 158, 175, 193, 209, 225, 243, 261, 277, 294, 310, 327, 344, 360, 378, 396, 410, 111, 428.
Newport, Or., Rock Specimen 248
New South Wales, Broken Hill Proprietary Mine. 111
*Mining In 10, 53, 65
New York Belting & Packing Co. 313
New Zealand Mines. 14, 92, 194, 227, 312
Nicaragua 312
Nickel-Iron Alloys, Process for Making Ores 3
Steel 417
Nitric Acid 19
Nitroglycerine 198
In Dynamite 128
Nitro Powder, Duty on 18
Powder in the Mill 305
Noted Man, Passing of 68
Notes on Gold Milling 284
On Metallurgy of Copper of Montana 66, 84, 101, 115, 133, 152, 168, 185, 203.
On Classification 390, 406
On Quartz Milling on the Rand 285, 373, 386
Notices of Recent Patents. 15, 32, 46, 60, 75, 108, 125, 141, 160, 178, 105, 212, 228, 245, 264, 280, 297, 313, 330, 347, 363, 380, 398, 413, 431.
North Carolina Mines. 91
Noumeite 49
Nova Scotia, Coxheath Mines, Cape Breton Mines 401
329
N. V., Gold Mining In 102
*Novel Head Frame. 47
Novices Writing Mining Reports 78
Nozzle Discharge of Water 96
*For Oil Burner 136
*Nozzles for Impact Water Wheels 6
Nuggets of Gold Do Not "Grow" 215
Of Horn Silver 333
Number of Claims That May Be Taken 164
Of Holes in "Round" 111
Scheme for Mines 267, 305, 391, 420

O

Oakland Iron Works 141
Object Lesson, An 230
Observations on Alaska and Northwest Territory 81
Obsidian 333
Obtaining Lead From Ores or Mattes, Process of 102
Occidental Lode, Virginia City, Nev 300
Offices of MINING AND SCIENTIFIC PRESS 48
Ohio's Mines 294
Ohmen Engine Works 45
*Oil and Gas in Reducing Furnaces 274
And Gas Engines 349
*Burner Nozzle 136
Concentration 215
*Concentration of Ores by 304, 392
*Drilling Machine 155
Fields of California, U. S. G. S. In 68
Fields of Kayak, Alaska 65
*Filter 270
Fire Test of 79
Pressure in Pipe 417
On Ditch Banks 300
Well, Deepest in California 350
*Well Drill 41
Well Drilling 3, 19
*Wells, Casing Head for 172
*Wells, Partition Plug for 55
Oiling Hoisting Ropes 215
Opal 128
Open Cut Mining 108
Cut Work, Cost of 70
Sight Compass, Surveying With 215
Opportunities at the St. Louis Exposition 95
Opportunity 146
Optimism, Result of 415
Order of Drop of Stamps 108, 306, 316
*Ore Bin Delivery Mechanism 172
*Buckets, Dumping Device for 102
*Car 374
"Carbonate" 383
*Concentrator 22, 172, 229, 357, 407
*Conveyor 388
*Crusher for Assayers 136
*Crushing and Stamping Methods 341
*Crushing Machine 388
*Dearsenicating and Amalgamating Apparatus 291
Deposits and Igneous Rocks 3
Deposits, Genesis of 111
Deposits Near Igneous Contacts 422
Deposits of the Northern Black Hills. 166, 187, 205, 221.
*Dumping Apparatus 136
Extracted and Developed 181
*Feeder 337
*Feeder, Regulator for 374
Feeders 366
Grades in the Witwatersrand 113
Hand Sorting of 417
Handling 364
"In Sight" 283
*Jigger 155
*Milling Apparatus 6
Reduction by Electricity 215
*Roasting Furnace 70, 218, 291, 388
Samplers 49
*Sampling Machine 6
*Separator 87, 119, 206, 341
*Separator, Magnetic 6
*Sizing Apparatus 6, 189
*Slime Settling and Classifying Apparatus 324
Sorting 231
*Treating Apparatus 388
*Treating Process 291
Treating, Refractory 155, 291
Treatment 383
Treatment of, for Metals 102
Treatment, Percentage of Extraction in 213
Undeveloped, Measurement of 18
*Washer 70
Weight of Conical Pile of 300
*Ores, Apparatus for Handling 55
"Dry" and "Wet" 383
*Process of Treating 206, 239
Silver-Lead 215
*Oregon, Hydraulic Mining in 213, 216

PAGE.

Mines. 13, 30, 11, 58, 73, 91, 106, 122, 139, 158, 175, 193, 209, 225, 226, 243, 261, 277, 294, 310, 327, 344, 360, 378, 396, 111, 428.
*Mines and Veins 381, 391
*Placer Catalog in 94, 100
*Oroville, Cal., Dredging and Valuing Dredging Ground In 30, 33, 39
Osborne, H. Z 17, 51, 61, 61, 77, 83, 210, 252
Outlook for 1904 115
Output of Large Mines 333
Overshot Wheel 231
*Overstrom Concentrator 256
Oxidation of Tailings 63
Oxide, Red, of Copper 96
Oxides of Copper 333
In Vein Croppings 3
Oxidized Copper Ores With Gold 248
Oxygen Necessary in Cyanide Solutions 128
Ozocerite 164

P

Packing Around Pipes and Boilers 181
Pacific Coast Coal and Oil 181
Coast Manganese Ore 128
Gear and Tool Co. 15
Hardware & Steel Co. 113
Pack, J. W. 317
Paint for Steel 19
Painting Cement Work 417
Palladium 79
Pan Amalgamation, Use of Gold Amalgam in 111
Panama Mining Fees 164
Canal 116
Papers on Mining Methods 300
*Parks, J. F., Death of 251
Parker & Jamieson 329
*Parral to Guadaloupe y Calvo, Chihuahua, Mex 47, 51
Parsimonious Economy 214
*Partition Plug for Oil Wells 55
Parting Gold and Silver 128, 129
Partnerships 79
Partridge, A. R. 313, 363
Patenting Mining Claims 128
Patent Rights 79
*California 421
Receipt for Money for 383
Mining, When Obtained 149
Patents, Hydraulic 147
*Mining and Metallurgical 6, 22, 41, 55, 70, 87, 102, 119, 136, 155, 172, 189, 206, 218, 239, 257, 274, 291, 307, 324, 341, 374, 388, 407.
Notices of 15, 32, 46, 60, 75, 108, 125, 141, 160, 178, 195, 212, 228, 245, 264, 280, 297, 313, 330, 347, 363, 380, 398, 413, 431.
Mining, Reservations in 49
Patented Mining Claims 382
Peat Drying 99
Pelton Water Wheel Co. 228
Pemberthy Injector Co. 125
Percentage of Extraction in Ore Treatment 213
Peripheral Speed of Wheels 350
"Perpendicular" 181
Peru's Mines 45, 159, 227, 262, 312
*Peru, Transportation in 52
And Ecuador 403
Petroleum Briquettes 117
Indications 417
Production 149
Sulphur Bearing, Desulphurizing 374
"Pet Theory" in Milling 3
Philippine Islands' Mines 244
Phosphorescence 49
Phosphorus 366
Photographs 181
For Mine Reports 35
*Photography in Mining 229
*Pick, Miner's 41
Pig Iron Production 230
*Pile Driving, Improved Method of 217
*Pinder Concentrator 338
Pinon, Colo., Rock Sample 198
Pipe Line, Repairing Leaky Joints in 111
Water Capacity of 417
Piping Steam Underground 101
Pious Fund, Silver Payments 2
Piston Clearance 417
Pit for Mortar Blocks 401
Placer Gold in Minnesota 283
Locations 135, 198, 266, 316, 368
*Mine, Colorado 261, 267
*Mining in Southern Oregon 94, 100
*Mining, Electricity in 100
Sluice Box, Grade of 111
Placers, Assessment Work on 316
Lodes in 35, 283, 366, 401
Plank Sheeting on Earth Dams 300
*Plant for Smelting 22
Metallurgical, Building Before Mine is Developed 415
Selection of 400
Plates, Amalgamating 266
Battery, Detached 96
Copper 164, 182, 108
Cleaning of Amalgam 108
Grade of in Mill 198
Platform Switches 253
Platinum 19, 79, 164
Placers 300
Production 130, 300
Plats, Location, Filing of 163
*Plug, Partition, for Oil Wells 55
Plumas Co., Cal., Inquiry 101
Plumb Lines in Vertical Shaft 79
Pneumatic Engineering Co. 141
Hammer 147, 417
Stamp 314
*Tools 424
Pocahontas, Ark., Mineral Sample 198
Pockets, Gold Bearing 81, 350
Points on Placer Locations 135
Poisoning by Cyanide, Cure of 236
*Pony, Mont., Garnet Mine 323
Porcelain Enamel Coating for Iron Pipe 181
"Porphyry" 111
Portland Cement 366
Possibilities of Modern Engineering 295
Potassium Cyanide 215, 417
Potsdam Formation of Bald Mountain District 167
Power, Creation of 416
For Quartz Mill 49
Installation Co. 413
Of Water 19
Required 316
Required for an Arrastra 401
Transmitted by Shafting 368
*Transmission by Ropes 384
Powder, Blasting 247
Cost of 231
Headache 128
*Thawer 360
"Practical" Miners 400
Practical Results of Irrigation 236
*Suggestion 160
*Precious Metals, Apparatus for Recovery of 119, 388
Precipitation of Gold From Cyanide Solutions 50
Prescott Steam Pump Co. 245
*Press for Squeezing Mushy, Zinky or Copper Drosses 206
*Filtering 55
Pressure, and Boiling Point 79
Atmospheric 417
For Machine Drills 373
Hydraulic 198
Nozzle Discharge of Water Under 96
Of Oil in Pipe 417
Of Water Column 417
Steam, High and Low 63
Static, on Pipe Line 383
Probable Extension of the Rand Banket 48

PAGE.

Price, G. W., Pump Co. 195, 380, 421
Of Gasoline Engine 164
Of Silver 146
Prices Paid for Silver-Lead Ores 222
Process, Bromo-Cyanide 3
Crucible, for Steel 9
Del Prat 9, 418
*Electrolytic, of Recovering Metals 206
For Desulphurizing Sulphur-Bearing Petroleum 374
For Making Nickel-Iron Alloys, Direct From Ores 136
*For Making Litharge 55
*Gold Extracting 22, 41, 102
Metallurgical 321
*Of Extracting Precious Metals From Ores 55, 388
Of Extracting Precious Metals, Sulphuric Acid 22
Of Extracting Zinc From Sulphide Ores, etc 239
*Of Forging Rock Drills 6
Of Leaching Ores 41
Of Leaching Ores or Tailings With Solutions of Alkaline Cyanides 22
Of Making Bricks for Refractory Linings 87
*Of Making Sulphuric Acid 172
Of Obtaining Lead or Other Metals From Ores or Mattes 102
*Of Preparing Concentrating Surfaces 357
*Of Recovering Values From Smelter Gases 407
*Of Reducing Minerals 172
*Of Smelting Metals, etc 55
*Of Treating Cyanide Solutions 274
*Of Treating Ores 206, 239, 391
*Of Treating Telluride Ores of Gold and Silver 206
Of Treating Lead, Silver or Zinc Ores 307
Of Treating Refractory Ores 291
*Of Treating Refractory Complex Ores of Gold and Silver 218
*Reduction 150
Sulman-Teed 3
The Washoe 231
Production of Borax in 1902 114
Of Asbestos 401
Of Chromite in 1902 132
Of Coal 128
Of Copper in 1902 221
Of Garnets 383
Of Metals in United States 128, 190, 308
Of Petroleum in 1902 149
Of Platinum in 1902 130
Of Quicksilver in 1902 112
Profits 164
Profession, Engineering as a 166
Progress 382
For 1904 415
March of 62
Mining and Scientific 416
Progressive Man 49
Promoting of Mines 197
Proposed Signal Code 23
Prospecting, Science in 415
*Prospector, Ingenious 77
*Prospectors' Smelter 357
Prospects in the Yukon Basin 48
Prospectuses of Mines 96
Prosperity and Mining 126
Protogine Granite 316
Public Lands in Cuba 201
Lands in Forest Reserves, Mineral Entries on 305
Pulleys, Peripheral Speed of 248
Transmission, Filling Grooves of 49
*Pulp Sampler, Automatic 222
Sizing of 111, 283
*Pulverizer 388
*Pulverizing Apparatus 257, 407
*Pulverizers, Corrugated Lining for 374
Pump Capacity 164
Centrifugal 128
*For Cyanide Plant 306
In Deep and Crooked Shaft 333
Rod, Angle in 215, 333
Running by Compressed Air 417
Steam, Exhaust of in Mine 215
Triplex 164
Pumps Run by Compressed Air 63
Steam, Slip Joint on Pipes of 63
*Electric 387
Size of Discharge Column 248
Pyrites, Burnt, to Recover Cobalt From 40
Pyritic Smelting 167, 188, 418
*Smelting, Copper Matting 184
Pyro-Electricity 401

Q

Quartz and Quartzite 147
Claims, Assessment Work 63
*Mill 102, 136, 324
Milling on the Rand 286, 373, 386
Mill, Not "Reduction Works" 164
*Veins and Mines of Southern Oregon 381, 391
Quartzite 333
Quicksand, Sinking Shaft in, by Freezing 60
Quicksilver 198
*Feed for Amalgamators 11
Feeding 96
*Furnace 119, 257
In Russia 417
Loss of 49, 333, 368
Production 112
*Reduction at New Almaden, Cal. 201
Traps 333
Where Produced 248
With Gold Ores 300

R

Radium 405
Railroad Tunnels 231
Rails for Mine Cars 231
Rainfall and Altitude 96
Raises, Cost of Drilling in 387
Raising 266, 387
Rand, Asiatic Labor for 349
Banket, Probable Extension of 48
Cost of Shaft Sinking on 217
*Cyanide Treatment of Sands on 186
*Gold Reduction Plants on 271, 272, 273
Labor Problem 18, 110, 230, 349
Quartz Milling on 286, 373, 386
Shafts, Depth of 111
*Randsburg, Cal., Mines of 126, 132
*Ratchet Clutch for Drilling Swivels 307
Rationale of the Fumes Nuisance 247
Raw Copper Plates 182
"Rawhiding" Ore 383
Real Values in Mine Management 85
Recalescent Point of Steel 128
Receipt for Money for Patent 383
"Recession of Cliffs" 300
Records in Mine Work 48
*Recovering Amalgam, Machine for 374
*Values From Siliceous Ores, Method of 407
*Recovery of Precious Metals, Apparatus for 119
Of Tin From Tin Scrap 351
Redfield Drill Co. 15, 108, 178, 380, 413
*Rock Drill 5
Red Oxide of Copper 96
*Reducing Minerals, Process of 172
Costs 197
Furnace, Oil and Gas in 274
Of Zinc Ores 8
*Reduction Plant on the Rand 271, 272, 273
*Process, a New 150
Works 164
Reef, Ariz., Inquiry 383

PAGE.

Refining Gold and Silver 128
Brittle Gold 266
Lead-Silver Bullion 316
Metals by Electrolysis 248
Of Copper, Electrolytic 231, 254
Silver in British Columbia 373
Refractory Linings, Process of Making Bricks for 87
Ore, Treatment of 155, 391
Regeneration of Cyanide Solutions 4, 34
Reheating Compressed Air 63, 79
Relative Elimination of Impurities in Bessemerizing Copper Matte 80
Value of Fuels 329
*Relay Governor, Sectroidal 387
*Removing Impurities From Furnace Gases. 107
Reports Written by Novices 78
Photographs Accompanying 35
Reservations in Mining Patents 49
Reservoir Sites. 248
Resistance of Electric Conductors 401
Responsibility of Labor Union 128
Result, a Splendid 127
Of Improved Methods 247
Of Optimism 415
Of Violence 78
Resurvey of Cripple Creek District 338
Retallatory Measures 95
Retarding of Investments by Labor Troubles 110
Retorting Gold Amalgam 63
Reverberatory Furnace 218
*Heating Furnace 257
Revolutions of Engines and Horse Power 350
Richards, G. C. 398
Richards, J. W 380
Rifles, Hungarian 401
Rights of a Patentee 79
*Rig for Drilling Deep Wells 41
Risdon Iron Works 45, 125, 313
Riveted Joints in Steam Boilers 128
Rivets 128
Roads as Assessment Work 49
For Mines 294, 371
Roasting and Amalgamating 333
Copper Ores 401
*Copper Ores in Heaps 1
*Furnace 55, 155, 218, 257, 291, 357, 388
*Furnace Attachment 374
Galena 184
Robertson, Jos. L., & Sons 431
*Rock Drill 70, 119, 136, 257, 374
*Drill Bit 87
*Drill, Redfields 5
*Drills, Valve Mechanism for 180
*Drilling Machine 6
*Drilling System 218
*Drilling, Application of Water in 152
Sample 49, 111, 198, 215, 231, 218, 283, 300, 306, 383, 401, 417.
Stratum Changes 417
Rocks, Igneous; How to Identify Them 50
Microscopic Study of 306, 383
Rocker or Cradle 283
Rogers Engineering Co 413
*Roll Crushing Mill 41
*Rolls, Crushing 155, 307, 357
Rollers vs. Sheaves as Rope Carriers 401
Rope Driving 3
*Socket Swivel 87
Transmission 266, 300, 333
*Transmission of Power 384
Ropes 63, 215, 333
*Kinks in 419
Sheaves for 350
*Ropeway, Aerial 172
*Rotary Dryer 206
*Filter 341
Grinding Mills 206
Roumania's Mines 229
"Round" of Holes in Shaft 111
Rubber, How to Cut 111
Russian Mines 14, 45, 227, 262, 329, 362
Platinum 300
Quicksilver 417
Rust, Compound to Prevent 147

S

Sacramento Mine, Mercur, Utah 300
Saddle Reefs of Bendigo, Australia 215
*Safety Blast Cartridge 87
*Cage 274
*Chair for Mining Cages 55
Clutches on Skips 401
*Gear for Mine Cages, Skips, etc 274
Sale of Mine, Payment of Commission 417
"Salts of Antimony" 283
*Sampler, Automatic Pulp 222
Samplers, Automatic 49
*Sampling Custom Ores 356
Fumes 78, 96
Sand Box in Flume 383
Splash in Mortars 3
Weight of, Sifted and Unsifted 215
Used in Glass Manufacture 19
*San Diego County, Cal., Gold Mines 145, 150
*Sands, Cyanide Treatment of, on the Rand 186
Sandstone, Used in Buildings 401
San Juan, The Golden 204
San Roque Placers 111
*Santa Eulalia, Mexico, Mines of 348, 399, 402
Santo Domingo, Gold in 283
Sapphires 35
*Saving Flour Gold and Platinum, Undercurrents for 267
*Gold, Device for 189
Values 19, 63
Saw, Circular 300, 366
Saws 366
Scale in Boilers 79
Schist, Mica 35
School Lands 49
School, R. 8
Science in Prospecting 415
Scientific Progress 116
*Scorifier Tongs 218
*Screen, Bumping 102
Coarse, Covering Battery Plates 300
Impact 306
Screens, Mill 316
Sizes of 231
Tin, Burning of 63
Screening Tailings Dumps 79
Secondary Enrichment of Mineral Veins in Regions of Small Erosion 97
Enrichment 417
*Sectional Cam for Ore Stamps 341
*Sectroidal Relay Governor 387
Selection of a Plant 400
Selvage, Clay 324
*Separating Liquids From Solids, Apparatus for 41
*Machine for Ores 6
*Separator, Berrigan Centrifugal 184
*Bag Ore 87, 119, 206, 341
*Freid, Gravity, Dry Process 403
*Gold 22, 70, 218, 388
*Magnetic 6
"Series" Dynamo 63
*Serl, Tiburon Island and 94, 101
Setting Boilers 401
Shaft, Angle of Inclination of 111
Boxes for Sheave Wheels 350
Construction and Inspection 265
Depth by Barometric Reading 417
Inspection 266
Lining, Steel for 128
Sinking 19, 49, 69, 79, 96, 215
Sinking, Giving of Bonds for 79
*Sinking and Equipment at the Ashland Mine 323, 337
Sinking, Cost of on Rand 217

(Continued on Next Page.)

INDEX TO VOLUME LXXXVII.

(Continued From Preceding Page.)

PAGE.

Steel Lined in South Africa 384
Stress on Hoisting Rope in 401
Timbering 47, 266
Shafts, Depth of, on Rand 111
For Coal Mines 3
Forms of 246
Changing Skips in 117
Rope Carrier in 401
Ventilating 215
Shafting, Power Transmitted by 368
*Shaper, Universal 339
*Sharpener for Drill 6, 9, 87
Sheave Wheels 350
Sheaves for Ropes in Shafts 401
Sheaves for Wire Ropes 350
Sheeting of Planks on Earth Dams 300
Sheet Iron and Steel, Specific Gravity 49
Shoes and Dies, No Standard Size 63
*Shoes, Stamp, Method of Making 6
"Short Circuit 300
Shovels, Steam 283
Steam, Stoping With 315
"Shunt" Dynamo 63
*Shut-Off Valve, Locke 85
Siam's Mines 124, 380
Siberia's Mines 92, 124
Siemen's-Halske Process 300
Signal Code 230
Code Proposed 23
Code, Uniform, Needed 18
System for Mines 324
Signals 263
*Siliceous Ores, Recovering Values From 407
Silver 164, 197, 266
And Gold Bullion, Assaying 423
Extraction From Slimes 22
In Mexico 181, 350
Lead Ores 215
Lead Ores, Prices Paid for 222
Loss of by Volatilization 231
Market 2, 146, 247
Native, With Copper 333
Plates for Amalgamation 111
Refining 128, 164
Refining in British Columbia 373
Sulphide 164
Sulphide, Treatment of 366
Wire, Annealed 401
Silver City, N. M., Correspondent 366
Silverton District, Colorado 392
Sinking a Steel-Lined Shaft in South Africa 384
Shafts 19
Shaft in Quicksand by Freezing Process 69
*Simple Device to Stop Humming 170
Siphon 147
Size of Catalogues 126
Of Mining Claim 35
Of Shoes and Dies, no Standard 63
*Sizer, Ore 189
*Sizing Apparatus for Ores and Other Uses 6, 291
Of Pulp 111, 333
Skip, Safety Clutches on 401
Skips 231, 266
Changing of From Ore to Water in Shaft 147
Skimming Bullion Melts 283
Slag, Furnace, Utilization of 8
*Ladles, Carriage for 257
Wells, in Copper Smelter 147
*Slime Settling Apparatus 324
Slimes 283
Calcined, Flux for 417
Cyaniding 16, 354
Desulphurizing by Heap Roasting 80, 98
*Device for Treating 189
*Gold, Filter Press Treatment 4, 24, 25
Silver Extraction From 22
*Table, Wilfley 202
Slip Joint on Pipe 63
Slocan, B. C., Zinc Ore Shipments 147
Slope of Sides of Open Cuts 248
Sluice Box Grade 111
Concentrates, Value in 54
*Smelting Apparatus 87
Chlorine 352
Chlorine, With Electrolysis 82, 99
Costs 215
*Furnace 155, 307
Hot Blast 97, 252
Iron Matte 248
*Metals, Process for 55
*Plant 22
Pyritic 167, 188, 418
Pyritic, Copper Matting 184
Practices, Arizona 147
Sulphides in Hungary 418
*Smelter for Prospectors 357
Smith, Francis & Co 195
Soap on Belts 383
"Soapstone," Gold in 96
*Socket Swivel for Rope 87
Soda Minerals 417
Soft Ore and Stamp Capacity 3
Ore Stoping 3
And Hard Strata, Mining in 283
And Hard Strata, Timbering in 350
Soldering Aluminum 367
*Some Notes on the Use of Fuel Oil 221
Observations on Alaska and Northwest Territory 81
Observed Electrical Phenomena 256
*Structural Features of the California Gold Belt 112, 129, 149, 165, 183, 202, 216
Sorting Ore 231
Hand 417
South Africa, American Machinery in 203
Claim Boundaries 49
Electric Machinery in 382
Steel Lined Shaft 384
Water Power in 237
South African Coal Mines 164
South Carolina's Mines 411
*South Dakota, Black Hills Mines 264
Mines ..... 13, 30, 44, 58, 73, 91, 106, 122, 140, 158, 175, 193, 209, 226, 243, 261, 278, 294, 295, 311, 328, 344, 360, 361, 378, 396, 411, 429.
Ore Deposits of Black Hills 166, 187, 205, 221
Potsdam Formation of Bald Mountain 167
Spain, Hematite in 9
Spain's Mines 45, 244, 362, 362
Specific Gravities of Sulphides 300
Gravity, Steel and Iron 49
Specimen Stealing 110
Spectroscope 401
Speed of Fly Wheel 198, 366
Drop of Stamps 316
Peripheral, of Pulleys 248
Regulator for Concentrators 248
Spitzkasten 35
*And Spitzlutten 83
Splendid Results 127
Spring Steel Tempering 19
Springs on Mine Bell Wires 266
"Squaring the Circle" 269
*Squib, Blasting 291
Stadia Measurements 19
Staking Placer Claims 368
Stamp, Ball 383
Battery Capacity 3
Battery Feeding 19
Battery Water 63
*Mill 70, 87, 291
Mill, Age of 49
Mill at Sutter Creek, Cal 96
Mill, Batteries Facing 283
Mill, Duty of 381
*Mill Mortar 102
Mill, Power for 49
Milling, California and Colorado 49
*Shoes or Dies, Method of Making 6
Stem Guides 3
Pneumatic 314
Stamps, Direct Steam 25, 83
Order of Drop of 306
Standard Drill Co 108
Size, Catalogues 126
Standardizing of Methods of Chemical Analysis 306
Static Pressure on Pipe Line 383
Statute of Limitation 366
Stealing Specimens 110
"Squatter's Rights" 316
S. S. Machinery Co 346
Steam 164, 215, 300
Condensed 215
Consumption 96
Conveying, in Pipes 401
Engine, Horse Power of 350
Engine Indicator 49
Engine "Lead" 63
Engines 63
Engines, Knocking in 216
Flow of in Pipe 417
Injector 300
Ore Stamps 316, 25, 63, 83
Pump, Slip Joint on Pipe 63
Required to Heat Tank of Water 417
Shovels 283
Shrinkage 63
Superheated 198
Turbine 136, 181
Using in Rock Drills 231
Used to Dispel Gas from Tunnel 19
Steel and Concrete 96
Annealing and Case Hardening 288
Canadian Bounty on 41
Crucible Process for Making 9
Etching on 350
For Car Axles 266
For Shaft Lining 128
Imports 81
In Mines, Use of 349
Lined Shafts Sinking in South Africa 384
Nickel 417
Paint for 19
Recalescent Point of 128
Ropes for Hoisting 63
Spring Tempering 19
To Harden 128
Versus Timber Head Frames 18
Weight of 232
Welding 147
Works on Pacific Coast 128
Stillwell-Bierce & Smith-Vaile Co 15, 124, 228, 398
Stirling Boiler Co 15
St. Louis Exposition 52, 95, 201
*Exposition, Colo. and Mont. at 389
Stock Companies for Mining 416
Stockholders, Unwilling 164
Stoess, P. C 65
Stoping, Cost of 266
Drills in 366
Effect of Dip of Vein on 215
Soft Ore 3
Underhand 333
With Steam Shovel 315
Storage Battery 383
Storms, W. H. ..... 112, 129, 149, 165, 183, 202, 216, 219, 233, 234, 414, 420.
*Storing Apparatus 41
Stovall, D. H. 213, 216, 267, 298, 306, 381, 391, 399, 402
*Stove, Hot Blast 291
Strata, Unequal, Driving in 283
Strength of American Timbers 389
Stress on Hoisting Rope in Shaft 401
Strikes 126, 214, 315
Strontium Minerals 266
*Structural Features of California Gold Belt ..... 112, 129, 149, 165, 183, 202, 216.
Structure of Minerals 231
Substitutes for Cams 79
Suction Hose for Pumps 215
Suggestion, a Practical 169
Sullivan Machinery Co 108
Sulman-Teed Process 3, 198
Sulphide Ores, Extracting Copper from 319
Ores, Treatment of 274, 366
Treatment 131
Silver, Treatment of 366
Smelting in Hungary 418
Sulphides, Cost of Treating 111
Extraction of from Ores 102
Specific Gravities 300
Sulphur 19
In Coal, Determination of 418
Mine in Nevada 372
Sulphurets, Cyaniding 383
Sacks of Per Ton 215
Sulphuric Acid Fumes 248
Acid Process of Extracting Precious Metals from Solutions 22
*Acid, Process of Making 172
*Sultan Mine, Ariz., Equipment 314, 319, 355
Sunlight Reflected into Mine by Mirror 333
Superheated Steam 198
*Supporting and Conveying Apparatus for Ore Scrapers 307
*Support for Cooling Plates or Coils in Blast Furnaces 374, 407
Surveying with Open-Sight Compass 215
With Magnetic Compass, Underground 401
*Survey of Diamond Drill Bores 353
Susanville, Cal., Forest Reserves 2
Sutter Creek, Cal., Stamp Mill at 96
Sweden's Mines 296
Sweetland, E. C 52
*Swinging Platform Switch 253, 254
*Swivel, Socket, for Ropes 87
Syenite 231
Sylvanite 19, 128
Sylvite 19
*System of Continuous Concentration of Ores by Oil 304, 392
*Of Mine Telephones 391
*Rock Drilling 218

T

*Table Concentrator 189
*Wilfley Slimes 202
Tailings and Slimes, Assay of Tin in 424
Dumps, Screening 79
Oxidation of 63
Used as Mine Filling 350
Talc 111
Tamarack Shaft 164
Tamping Bars 333
*Tangential Water Wheel Efficiencies 84
*Tank 136
Tanks, Water 266
Tasmania Mine 45, 58, 92, 124, 227, 262, 313, 362, 430
Tasmania, Tin and Gold Associated in 164
Tax, Mexican Bullion 367
Technical Education, Advantages of 332
Education vs. Experience 400
*Telephone System for Mines 391
Wire, Stopping Noise of Vibrations 79
Telluride Ores, Dry Crushing and Roasting of 350
Ores, Concentration of 383, 366
*Ores in Black Hills 281, 290
Ores of Gold and Silver, Process of Treating 206
Ores, Treatment of at Kalgoorlie, W. A. ..... 369, 392, 404, 425.
Ores, Treatment of 417
Tellurides 215, 417
Temperature, Increase of, With Depth 118
High, Measurement of 352
Of Water 164
Tempering Drill Steel 300
Heated Drills 96
Spring Steel 19
Tempest in a Teapot 382
Temple Pump Co 245
Tennessee's Mines 344, 429
*Terminal, Discharge, for Aerial Tramway 307
Terrazas, Mex., Rock Specimen 111
*Tester for Blast Cavities 407
Test for Gold and Silver 131
Testing Flash Point of Oil 79
Methods in the Physical Examination of Portland Cements 220, 235, 255
Texas Mines 175, 209, 243, 278, 361, 396
*Thawer, Powder 369
Thawing Dynamite 265
Thermometers 79
Thickness of Filter Press Slimes Cake 111
*Three-Roll Crushing Mill 41
Thorne, W. E 81, 199
Thunder Mountain District, Idaho 389
*Tiburon Island and the Seri 94, 101
"Tif" 63
*Timber Framer 119
Handling 316
Strength of 248
*Timbering Apparatus 324
*Of Drifts 219, 233, 234, 290
Of Shafts 147, 266
Soft Zones in Crosscuts 350
Timbers, Strength of 389
Water on, in Shaft 383
Tin Associated with Gold 164
Alloys 248
Assay of, in Tailings and Slimes 424
In Alaska 351
In Colorado 128
In the U. S 109, 117, 282
Recovery of, from Tin Scrap 351
Screens, Burning 63
*Tipple for Mine 218
*To Determine Current Flow of Electric Circuit 371
*Tongs, Scorifier 218
Ton of Sulphurets, Sacks per 215
Tonnage 333
Of Copper Blast Furnace 417
Tonopah, Nev., Rock Samples 383
*Tool, Mining 102
*Tools, Pneumatic 424
*Top for Blast Furnace 41
Topaz 232, 405
Topographic Map of Northwestern Montana 321
Map of Part of Southern California 184
Topedo Drill 69
Tourmaline 333
Townsite and Mining Claims 383
*Traction Engines 168, 316
Tractive Force of Locomotive 231
Tramming with Wheelbarrows 316
*Tramway, Discharge Terminal for 307
Tramways, Aerial 200
Transmission, Electrical 111, 128
*Of Power by Ropes 384
Rope 266, 333
Transportation Facilities 322
*In Peru 52
Transporting Ore 231
Traps, Mercury 333
*Treating Black Sand, Device for 321
*Ores, Apparatus for 383
*Ores, Process of 206, 239, 291
Refractory Ores 155, 291
Treatment of Base Ores 300
Of Lead, Silver or Zinc Ores, Process for 307
Of Ore Containing Gold, Silver, Copper, Nickel and Zinc 102
Of Ores 383
Of Sulphide Ores 274
Of Sulphides 131
Of Telluride Ores at Kalgoorlie, Western Australia 369, 392, 404, 425
Of Telluride Ores 417
Trenton Iron Co 245
Triplex Pump 164
Trump Mfg. Co 346
*Tubular Ball Mill 374
Tuff 3
Tungstates 417
Tungsten 112
Tungstic Acid 417
*Tunnel Construction 307
Site Rights 248
Through Adjoining Claim 401
Vertical Depth Gained by Water in 333
Tunnels, Railroad 231
Turbines, Gas and Steam 49
Water Power 63
Turbines, Steam 181
Steam, at Essen, Germany 136
*Turntable, Hampson Patent 204
Turquoise 35
Twenty-League Zone in Mexico 417
Two Important Meetings 180
*Noted Black Hills Mines 264
Types of Mortars 3

U

"Undercurrents" 300
*For Saving Flour Gold and Platinum Sands 267
Underground Hoisting Problems on the Witwatersrand 372
Underhand Stoping 333
Undeveloped Ore, Measurement of 18
Uniform Cost Returns 321, 332
Measurement of Water 314
Signal Code Needed 18
Union Iron Works 213
Unions, Labor 2, 118
United Iron Works 141, 380, 398
Telpherage Co 263
United States Geological Survey 68
Geological Survey Publications 394
Metal Production 128
Mint, Assaying Gold and Silver at 317
Mint Report 375
Production of Garnets 383
*Tin in 109, 117, 282
Zinc Production 79
*Universal Shaper 339
Uplift Under the Great Plains 352
Uralite 350
Uraninite 79
Uranium 112, 300
Use of Alkalies in Cyanide Process 52
*Of Fuel Oil, Some Notes on 221
Utah Coal Strike 349
Mines ..... 13, 30, 44, 58, 73, 74, 91, 106, 123, 140, 158, 176, 193, 209, 226, 243, 261, 278, 295, 311, 328, 344, 361, 378, 396, 411, 429.

V

Vajen-Bader Co 228
Value of Mineral Land 34
Of Mexican Exports 132
Values in Mine Management 85
In Slimes or Coarse 300
In Sluice Concentrates 54
*Valve for Hydraulic Air Compressor 274
*Locke Automatic Shut-off 85
*Mechanism for Rock Drills 189
Valves, Leaky 266
Compressor, Gummed 266
Vanadium 3, 112
Vanadinite 350
Van Drake-Olsen Machine Works 279
Van Meter, J. W 304, 392
*Vaporizer for Explosive Engine 155
Variation of Magnetic Compass 96
*Variations in Construction 109
Vein Croppings, Color of 3
Following Down a 316
Values and Country Rock 18
Walls 316
Veins, Gash 63
And Igneous Rocks 3
*Identity and Continuity of 233, 249, 273
In Placers 366
Thinning Out of 248
Velocity of Objects Floating in Water 52
Venezuela Mines 227
Ventilation 333
By Shafts 215
*Of Deep Levels 238, 250
Ventilating Fans 198
"Vertical" 181
Shaft, Lining Up 79
Victor Engine and Motor Carriage 380
Victoria, Australia, Ballarat District 283
Vindicator Mine, Colo 349
Violence, Result of 78
Virginia City, Nev., Occidental Lode 300
Volatilization of Silver 231
Volcanic Ash 165

W

Wages of Coal Miners in Bohemia 154
Wages of Miners 118
Walling Water Ditches 248
Wall ocks, Analyses of 243
Walls of Veins 316
*Washer for Ore 70
"Beach" 401
*Washing Gold, Machine for 136
Washington Mines ..... 13, 30, 44, 58, 74, 91, 106, 107, 133, 140, 158, 176, 193, 210, 225, 245, 261, 278, 295, 311, 328, 345, 361, 378, 397, 411, 429.
Court Decision 417
Washoe Process 231
Waste, Breaking of, at Broken Hill 111
As Filling in Mines 417
Watch Dial, as Compass 49
*Water, Application of in Rock Drilling 152
California Case 385
Capacity of Pipe 147
*Conserving for Hydraulic Mining 399, 402
Discharge of 128
Discharge of from Nozzle 96
Dividing 266
Famine 315
Flow in Pipe 417
Flow of Yosemite Falls 118
Flume for in Tunnel 333
For Concentration 333
For Milling 333
"Hammer" in Steam Pipe 215
Heaters, Use of 3
Horse Power of 147
In Shafts 383
In Stamp Battery 63
Lifting by Compressed Air 165
*Nozzles for Impact Water Wheels 6
On Belt Concentrators 147
Pipes in Gasoline Engines 79
Power 19, 63, 417
Power, Development of 337
Power in South Africa 237
Pressure 383, 417
Rights 96
Tanks 266
Temperature of 164
Uniform Measurement of 314
Velocity of Objects Floating in 52
Wheels, Impact 111
*Wheels, Overshot 231
*Wheels, Tangential, Efficiencies of 84
Wear on Running Rope 63
Weight of Conical Pile of Ore 300
Of Air 417
Of Rails for Mine Cars 231
*Weinland Mechanical Cleaner 6
*Weirs, Pipes, Etc., Data on 36
Welding Iron and Steel 147
Wellman-Seaver-Morgan Co 346
Western Federation of Miners 111, 349
Supply Co 245
Westinghouse Electric & Mfg. Co 195
West Virginia Mines 30
"Wet" Ore 383
Versus Dry Crushing 48
Wheelbarrows, Tramming with 316
Wheels, Flat, Remedy for 266
Peripheral Speed of 350
Width of Belts 198
Wilfley Ore Concentrator Syndicate, Ltd 178
*Slimes Table 202
*Windings of Dynamos and Motors 301
Windlass 35
Wire Gauge 248
Wisconsin Mines 71
Zinc Field 386
Witwatersrand Banket 63
Duty per Stamp 3
Hoisting Problems on 372
Ore Grades in 113
Wolframite 417
Woodward Governor Co 381
Wood Working Shops, Exhaust System for 147
Woolley Foundry & Machine Works 195
Working Costs 179
Miner, Experiences of 114
Workingmen's Wages 62
Worthington Pump Co 263
Wyomingite 63
Wyoming Mines ..... 13, 44, 58, 91, 107, 123, 140, 159, 176, 193, 210, 244, 261, 295, 311, 328, 345, 361, 378, 397, 412, 430.

Y

Yavapai Co., Ariz., Injunction Against Western Federation of Miners 349
*Ybarra Mines of Lower Cal 348, 351
Yeatman, John A. & Co 93, 159, 398
Yellow Aster, Mining at 405
Ymir, B. C., Cyanide Plant 253, 271
Yosemite Falls, Water Flow Over 118
Park, Cal., Ditch in 365
Yuba River, Cal., Barriers 365
Yukon Basin, Prospects in 18
*Territory, Alsek Placer District 370
Yuma, Ariz., Colorado River at 19

Z

Zinc Consumption in Cyanide Plants ..... 287, 302, 318, 336.
Determination of 316
Effect of Temperature 3
Electro-Metallurgical Production of 128
Field, a New 386
Metallic 96
Ore Shipments 147
Ores, Reduction of 8
Precipitation of Gold from Cyanide Solution by 316
Prices, and the Missouri Mine and Mill Operators 314, 365
Process of Extraction 239
Production in U. S 79
Slimes, Lead Smelting of 181
*Sulphides, Extraction of from Ores 102
Use of in Desilverizing Lead 251
Zone of Mineralization 19
Twenty-League, in Mexico 417